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Student and teacher writing motivational beliefs

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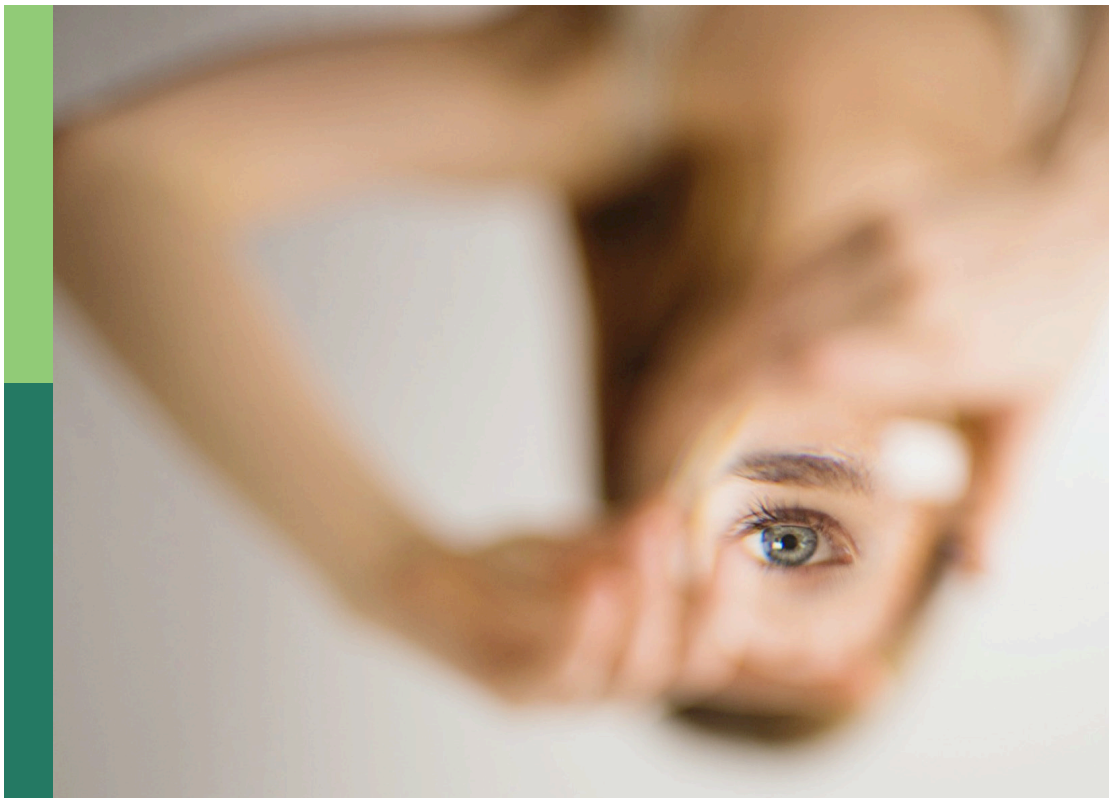

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Student and teacher writing motivational beliefs

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Table of contents

Teachers' Writing Motivational Beliefs

Writing Motivational Beliefs and Instruction

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Editorial: Student and teacher writing motivational beliefs

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Editorial on the Research Topic
Student and teacher writing motivational beliefs

The study of writing has historically concentrated on what students write and how they write. This began to change in 1996 when John Hayes modified his seminal model of writing, arguing that motivation influences how we respond to immediate goals such as writing a particular paper for a given audience, but it also manifests into more long-term predispositions toward writing. While the study of motivational beliefs in writing preceded Hayes (1996) model (e.g., Graham and Harris, 1989), the inclusion of motivational beliefs in this model served as a catalyst for new investigations in this area (Camacho et al., 2021).

This increased and continuing interest in writing motivational beliefs is evident in recent reviews of the literature (Camacho et al., 2021) as well as theory (Graham, 2018). It is also evident in the current volume, which includes 17 chapters focused on writing motivational beliefs. More specifically, this volume brings together in a book collection studies examining the role of writing motivational beliefs across both sides of the desk: writer and teacher. The chapters and associated studies in this volume expand what we know about the motivational beliefs that drive (or inhibit) students' writing and that serve as catalysts for teachers' actions or inactions in the classroom.

This volume

Motivational beliefs and theory

The volume opens with a section on Motivation Beliefs and Theory, where Russell considered how concepts from genre, social action theory, and self-determination theory (Ryan and Deci, 2017) can expand the conceptualization of writing motivational beliefs. Russell also examined the possible implications of these viewpoints for research on student motivation, considering both sociocultural and cognitive perspectives.

Measuring writing motivational beliefs

The second section of this volume begins with a chapter by DeBusk-Lane et al. that examined the multi-dimensionality of the popular Self-Efficacy for Writing Scale (SEWS). Through a series of measurement model comparisons, they validated that the SEWS is a multidimensional tool with a global theme and relevant sub-constructs: efficacy for conventions, self-regulation, and ideation. Using profile analyses, they also established

three different patterns of writing self-efficacy among students (strongly inefficacious: conventions; moderately inefficacious; and efficacious: self-regulation).

Braten et al. designed and tested a new measure to assess students' efficacy for integrating information across multiple sources when writing. Using confirmatory factor analyses, they obtained evidence on the validity of the factor structure of the scale with undergraduate students. They also found that the scale was reliable and statistically associated with students' prior writing achievement, reading comprehension, and executive functioning.

Takada et al. conducted an exploratory mixed-methods study to determine how kindergarten children understand and respond to different methods of assessing motivational beliefs about writing (Likert-type survey, binary choice survey, a challenge preference task, and a semi-structured interview). They found that it was difficult to quantify the motivational beliefs of children this young. Additionally, kindergartners' views of motivation were multifaceted and contextually grounded.

Students' motivational characteristics

The third section of the book focuses on students' motivational characteristics. While information on students' motivational characteristics is presented in other sections of the volume (see DeBusk-Lane et al. above), this section included two chapters that concentrate primarily on this topic. Cordero et al. used profile analysis to identify writing motivational and ability profiles for Grade 7 and 8 students participating in an automated writing evaluation intervention. They identified four distinct profiles and found that 30% of the students were likely to change their profile over the course of the school year. In the second study, Sehlström et al. examined if there were differences in the writing achievement and motivational beliefs of 8-year-old students with and without reading diffculties. Students who were better readers had higher writing efficacy and writing scores than weaker readers.

Interplay between writing motivational beliefs and other aspects of writing

In the fourth section of this volume, three chapters examined the interplay between motivational variables and other aspects of writing (this also occurred to a lesser extent in other sections of the book, e.g., Braten et al.). Busse et al. assessed the interplay between writing efficacy, anxiety, and writing quality with students in Grade 9. They observed positive associations between writing efficacy and writing quality. Negative correlations were obtained between writing anxiety and writing quality. However, the associations between efficacy, anxiety, and writing quality were mediated by students' migration backgrounds.

Skar et al. also examined the interplay between writing efficacy and writing quality, but instead of determining how writing anxiety related to these variables, they focused on attitudes toward writing. They found that efficacy for writing self-regulation and attitudes toward writing each made unique contributions to predicting the quality of texts written by Grade 2 students. They further found that writing motivational beliefs were related to gender and language status (L1, bilingual, and L2).

In a third chapter, De Smedt et al. examined the relationship between writing self-efficacy and writing performance, but they extended their analyses to include measures of implicit theories of writing, writing motives, and achievement goals. Using path analysis, they found statistically significant direct paths between these writing motivational measures and the writing of 16- to 18-year-old students.

Teachers' writing motivational beliefs

In the fifth section of this volume, three chapters concentrate on teachers' writing motivational beliefs. Wang and Troia provide the lead into this section by noting that students' motivation to write is not independent of the learning environment or teacher characteristics, including teachers' efficacy. Applying hierarchical linear modeling, they examined the relations among students' writing motivation, teacher efficacy for teaching writing and other professional traits, teachers' writing instruction, and the writing performance of Grade 4 and 5 students. While the analyses did reveal that the relationship between student motivation and achievement was moderated by writing instructional practices, teachers' efficacy was not uniquely related to how well students wrote.

The chapter by Bingham and Gerde focused just on early childhood teachers' writing beliefs and practices. They found that how teachers defined writing was unrelated to their beliefs about how children learn to write, but (1) teachers who defined writing as involving multiple writing skills were more likely to emphasize the relations between oral and written language in their instructional practices and draw attention to how English print works and (2) teachers' beliefs were positively associated with the number of spelling-related writing interactions they had with children.

In a study by Rouse et al., the instructional moves of preservice teachers during a simulated teaching situation involving writing conferences were observed. While the participants indicated that this simulation was useful and effective, teachers' efficacy for writing instruction was not clearly related to what preservice teachers did during the simulation.

Writing motivational beliefs and instruction

The final section of this volume focuses on writing motivational beliefs and instruction. The first chapter by Wolbers et al. overlaps somewhat with the previous section on teachers' writing motivation beliefs. Teachers of students identified as deaf or hard of hearing were randomly assigned to a professional development (PD) treatment where they learned how to implement a strategy-oriented instructional approach to writing or a business-as-usual condition. The teachers implemented the writing practices taught during PD over the course of the school year. PD and subsequent implementation of the writing program enhanced the following teacher beliefs: writing interest, efficacy for teaching writing, and malleability of writing through effort and practice.

In the chapter by Seikmann et al., a pre-post quasi-experiment was conducted with Grade 9 German students learning English as a foreign language. The students were provided feedback on their writing for an eight-month period. From the start of the school year to the end of it, students' perceptions of the quality of the feedback improved as did their writing self-efficacy, whereas writing anxiety decreased.

Fulton et al. conducted a quasi-experiment with high school students. Their study compared the impact of a dialogic literary argumentation program to a close reading program. Both of these programs improved the argumentative writing of participating students, with the dialogic group making the most growth. While neither of the groups evidenced changes in writing motivational beliefs, the writing motivational beliefs of students in the dialogic group were more positively correlated with their writing performance at posttest than for the close reading group.

Myhill et al. investigated how students aged 7 to 14 years responded to a changed classroom environment for writing. They found that such a change had a positive impact on students. Specifically, they enjoyed more autonomy and choice by the end of the writing treatment and experienced their writing classrooms as more relaxed.

In the final chapter in this volume, Collins et al. assessed how the writing motivations of international students attending university in the United States changed as they completed an online academic course. They found some evidence that participating students' writing motivations were malleable, as increased levels of student writing self-efficacy were evident by the end of the course. While writing self-efficacy at the start of the course positively predicted writing performance, students' beliefs about writing as a tool for exploring and expressing ideas was associated with lower odds of passing the course.

Concluding comment

In closing, we hope you enjoy reading the studies presented in the chapters in this volume as much as we did. We also hope they stimulate you to think about teacher and student writing motivational beliefs more broadly and more creatively.

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Motivation and genre as social action: a phenomenological perspective on academic writing

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This article discusses the relationship between motivation and genre in the context of academic writing, aiming to further bridge the gap between information-processing (IP) cognitive approaches and socio-cultural or dialogical approaches to understanding cognition. The author takes one significant recent article bridging the gap, Graham's Writers Within Communities (WWC) model, as a starting point and attempts to add concepts from genre as social action and Deci and Ryan's Self-Determination Theory (SDT). The article explores how genre as social action is intimately connected with motivation and how SDT's principles of competence, autonomy, and relatedness align with the phenomenological perspective on genre and motivation. The author suggests that these theories provide a more comprehensive understanding of writing motivation, emphasizing that the perception of genre as social action is a crucial motivator for writers and that self-determination is vital to authentic self-regulation in academic writing. The article illustrates the uses of the additional theories with an interview-based case study of a dissertation writer. It ends by discussing the possible implications of this theoretical research for empirical research on student motivation from both IP cognitive and sociocultural perspectives.

KEYWORDS

writing, motivation, genre, phenomenology, cognition, self-determination theory

1 Introduction

This article contributes to efforts to bridge a decades-long divide in writing studies between what have been called information-processing (IP) cognitive approaches, which view cognition primarily in terms of individual mental processes through the analogy of a computer, and socio-cultural or dialogical approaches,[1] which view cognition primarily in socio-cultural terms and generally as an organic, embodied approach to cognition. I will focus on one aspect of cognition and socio-cultural activity: motivation.

1 This article focuses on the North American socio-cultural research on genre (Bazerman, 1994, 2013; Russell, 1997). A broader continental tradition of dialogic semiotic theory and research on language in use takes what are in some ways similar approaches to genre (Berge, 1988, 1993; Linell, 2009). Both have roots in phenomenology and the cultural psychology of Vygotsky, and both have been profoundly influenced by the Bakhtin Circle's work. Beyond that, many phenomenological perspectives exist on these linguistic and semiotic issues, from Jakobson's phenomenological structuralism (Holenstein, 1976) to French *genres de texte* (Bota and Bronckart, 2007). Because the differences are significant, I cannot, in this space, do much more than acknowledge this broader scope. However, I will refer to continental theory and research that particularly resonate with the North American tradition.

Among several recent theoretical articles attempting to bridge the divide, Graham's (2018) Writers Within Communities (WWC) model stands out both for its scope and for its relevance to motivation.[2] He identifies nine characteristics of socio-cultural community(ies): purposes, members, tools, actions, written products, physical and social environments, collective history, and associated social, cultural, political, institutional, and historical forces. He then identifies four characteristics of individual members, specifically the writer(s): long-term memory resources of knowledge and beliefs, production processes, modulators, and written product. Long-term memory resources include, significantly, seven motivational beliefs. He then lays out four tenets to connect individuals and communities. Writing is simultaneously shaped by:

(1) "the community in which it takes place and the cognitive capabilities and resources of community members who create it" (p. 271)
(2) "the capacity of the writing community and the capacities possessed by members of the community" (p. 272)
(3) "variability within a writing community and individual differences in the cognitive capabilities and resources of community members" (p. 273) and
(4) "participation in writing communities and individual changes in the capabilities of community members, which interact with biological, neurological, physical, and environmental factors" (p. 274).

Because motivation is only one of many aspects of writing within communities that Graham takes up in his comprehensive theory, he does not have space to develop it beyond defining seven motivational beliefs. Aitken (2023) has persuasively argued in her chapter, "More motivating than cherry pie? The Writer(s) Within Community Model of Writing Through a Motivation Theory Lens," that Bandura's social cognitive theory of motivation allows us to see some broader motivational aspects of the model, and she adds minor modifications to it.

In this article, I propose further modifications to the WWC model based on two theories of motivation that the WWC model also mentions but does not develop much: the theory of genre as social action as interpreted through the lens of cultural–historical activity theory and Deci and Ryan's Self-Determination Theory (SDT) (Ryan, 2017). These theories share common roots in existential/phenomenological thought, and they both take an organic, biological, embodied approach to cognition (Ryan and Deci, 2004). Together, they add a principled way to connect individuals and communities to understand the functioning of the writing process—how the seven motivational beliefs Graham identifies may work together to link writers and communities.

I will first outline the phenomenological approach to genre called "genre as social action" [similar to what Linell calls "communicative genres or activity types" (2009, p. 52)] to show how it incorporates motivation. Next, I describe SDT and the phenomenological assumptions it shares with genre as social action. I then illustrate their use in a case study of a dissertation student. Finally, I suggest some implications for Graham's WWC theory and new interpretations of some findings on writing motivation from both approaches and empirically testable hypotheses to further research on student motivation using genre as social action and SDT.[3]

1.1 Genre as social action and the phenomenology of motivation

The theory of genre as social action has produced much work, almost exclusively qualitative, on how genres motivate and sustain writers. Based on the sociocultural and dialogic theories of Vygotsky, Bakhtin, and others, genre as social action takes a much more dynamic view of genre than IP cognitive approaches, which tend to view genres as static text types or templates, obscuring a broader contribution genre might make to L1 writing research in IP cognitive approaches.

The key difference is to see genres not as forms of words, as textual conventions, but as "forms of life," social practices (Bazerman, 1994, p. 91). Following Carolyn Miller's seminal article, genres are seen as "typified rhetorical actions based in recurring situations" (1984, p. 159); that is, typified responses to situations that are perceived—intersubjectively construed—as recurrent. What is recurrent is not the material situation itself (every material situation is unique) but rather our typifying perception or social construction of it as recurrent. This phenomenological view of genre is based on the phenomenological sociologist Schutz (1973), whose work lies directly behind the social constructionist tradition. Though originating in phenomenology, genre as social action has also been heavily theorized within the socio-cultural tradition in terms of Vygotsky's developmental psychology, Luria's cognitive psychology (through the embodied biological, not the IP approach), and, most importantly, Engeström's activity theory, which includes explicit motive as the direction of activity [though often motives are plural and competing, as Graham notes (2018, p. 273)].

This approach to genre means, as Hidi and Boscolo (2006, p. 9) point out, that there are as many genres as there are perceived (intersubjectively construed) recurrent situations "in and out of school, whenever writing is required to express, elaborate, and communicate feelings and ideas, information and events, rules and instructions; in other words, when it makes sense to write." Following Linell (2009) and other semiotic theorists (Prior, 2009),

2 Other important theoretical attempts to bridge IP cognitive and sociocultural approaches to writing include Bazerman (2013); Portanova et al. (2018); Klein (2019); Mitchell et al. (2019) and, notably, a special issue of Educational Psychologist (Turner and Nolen (2015)).

3 By phenomenology, I mean a method of doing both philosophy and empirical inquiry that describes "how things appear, show, or give themselves in lived experience or in consciousness" (van Manen, 2017, p. 775), a first-person (or second-person interview-based) description of the "felt sense" of some phenomenon, some particular experience. The goal is in-depth understanding of and meaningful insight into some aspect of the experience that cannot be fully understood from an external, third-person perspective. There have been many North American empirical studies of the phenomenology of writing: handwriting versus typewriting (Chandler, 1992; Haas, 1996), perception of errors in writing (Williams, 2011), freewriting (Elbow, 1989), genre and transfer across the lifespan (Dippre, 2019), motivation in problem-solving (Williams, 2011), qualitative methodology (Prior, 2014), and digital writing (van Manen and Adams, 2009). Moreover, continental theoretical literature on the phenomenology of writing is vast, e.g., Derrida's (2001) *Writing and Difference*.

I would add to writing other semiotic means: speaking, gesture, semaphore, and even intra-mental communication such as self-talk.

A genre as social action is a kind of generalization or categorization of phenomenal experience that evokes—and motivates—future behavior. In Miller's words: "A genre is a rhetorical means for mediating private intentions and social exigence; it motivates by connecting the private with the public, the singular with the recurrent," and thus the writer with their community(ies) (1984, p. 163). In this view, people use genres as a way of perceiving/construing possible goals or directions of action. Genres help individuals and groups see "what motives one may have" (and not have) in some situation (Miller, 1984, p. 165). The theory of genre as social action accounts, in Bawarshi's (2003) formulation, "not only for how writers articulate motives or desires but also for how writers obtain motives or desires to write—how that is, writers both invent and are invented by the genres that they write" (p. 12). With a tax form, citizens see they can pay their taxes (or protest them by turning in a ruined form); with a short answer quiz, students can show their knowledge of content; with a constitution, a group can form an institution, and so on. Bawarshi says, "To begin to write is to locate oneself within these genres, to become habituated by their typified rhetorical conventions to recognize and enact situated desires, relations, practices, and subjectivities in certain ways" and not others (2003, p. 114). He goes on to say that writing is not only a skill but a way of being and acting in the world at some point in time and space.

Genres (as social actions or activity types) are categorizations (typifications) that we create and use collectively to understand and coordinate our actions, including those involving literacy. We internalize ways of using language and other tools (including non-linguistic semiotic resources) of our physical and social surroundings, and we perceive the world through those typified modes of using tools—for example, tools for marking on surfaces, which humans do in order to write. We then interact with the world by externalizing our consciousness and enacting our feelings, thoughts, plans, aspirations, and desires, usually through typified means, such as making marks on surfaces, from cave walls to computer screens. From this perspective, perception—including the necessary typifications—constitutes the foundation of thought, reasoning, and, most importantly, language. Active perception existed prior to and is older than thought in terms of evolution. Moreover, perception precedes and provides the basis for rational and propositional thought as they evolve in humans. As Bazerman (2013) puts it, "The typifications and social-symbolic understandings that are brought to bear in the course of externalizing and internalizing meanings are strengthened" (p. 84) both in terms of embodied cognition and in terms of personal identity.

With the evolution of human languaging, we created a rhetorical world. Our perception is shaped by and shapes the oral, written, and other genres we use—genred and genreing. I use the term "genreing" on the analogy with languaging, as Linell (2009 p. 274) and others use it, to call attention to the active process of classifying, typifying, and the equally active process of perceiving, for which classification and typification are necessary (Mehlenbacher, 2019). To perceive and produce a genre is a motivated social action. When we encounter an environmental perturbation that requires a response, whether in the present or future, it is, in rhetorical terms, an exigence, which is the starting point for Miller's (1984) theory of genre based on Bitzer's (1968) concept of rhetorical situation.[4] An exigence is a communicative problem in a rhetorical situation that needs solving, and when such problems are recurrent, people create genres through what Tomasello (2019) calls collective intentionality. In this way, the typified actions of writing connect the writer(s) to the collective, the community. Genre as social action connects the member(s) to the community(ies), to use Graham's terms.

We act intentionally into the environment to perceive and respond to it—with a feedback loop that Merleau-Ponty (2013) calls "the intentional arc." From this theoretical perspective, perception and action, conscious and non-conscious, are motivated, in that all perception and action are directed to evoke a response, feedback, from internal or external sources, or both. "From a phenomenological perspective, practical action cannot be distinguished from perception. Because people act to perceive, perception is a part of embodied action, not a passive reception that precedes or follows action" (Paul Prior, Personal correspondence, May 1, 2023). Linell (2009 p. 358ff.) makes a similar point regarding dialogic theories.

As Taylor Carman puts it in his introduction to Merleau-Ponty's *Phenomenology of Perception* (2013), "Perception grounds the basic forms of all human experience and understanding. . . [P]erception is not a mode of thought; it is more basic than thought; indeed, thought rests on and presupposes perception" (p. XII). Thought is not something belonging to another realm, as in Descartes' dualism, but rather a direct response to the perception of the world and our position within it, driven by our homeostatic and allostatic needs (Torday, 2015; Lee, 2019), which direct our attention and guide our self-regulation, as we shall see when we take up SDT concerning Graham's WWC.

Moreover, the intentional arc suggests a profound difference between individual-based IP cognitive theories and sociocultural theories that view cognition as embodied, enactive, and embedded in the environment (Dryer and Russell, 2018). In order to act successfully, one does not need to construct a mental representation of the action on the model of a computer.[5] One only needs to respond to feedback toward a perceived need to act into the environment (Dreyfus, 2002). This is called "next-step monitoring." In Nagataki and Hirose's (2007) famous example, a

4 Homeostasis has figured in previous theories of writing processes (Nystrand, 1989) and of rhetorical exigence (e.g., Hunsaker and Smith, 1976; Oakley, 1999), though in different ways than presented here.

5 Elsewhere, I (Russell, 2019) have explored the relation between genre as social action and Hayes's (2012) three-level IP cognitive model of writing processes, which forms the basis of the WWC analysis of individual writing processes. The top level, what Hayes calls the control level, involves 1. motivation, 2. goal setting (plan write revise), 3. current plan, and 4. writing schemas. These all, I argued, can be seen from a phenomenological point of view as aspects of active genre perception—genreing. They can be understood not only by IP cognitive load theory but also by evolutionary cognitive load theory, in that Hayes's control level utilizes functional systems that evolved before writing, ontogenetically and phylogenetically, to manage the cognitive load, such as typifying perception, problem-solving action, sociality, cooperation, indexical pointing, and, of course, languaging. Writers responding to their perception of a genre as social action can also be seen as motivating and managing the other elements of the Hayes model: writing processes (Hayes' second level, which includes task environment) and the writer's resources (Hayes' third level, which includes working memory, long-term memory, reading, and attention), similar to the WWC model.

fielder in baseball (or cricket) does not need to mentally calculate with mental trigonometry the trajectory of the ball off the bat and triangulate the location it will land. They only need to position and reposition their body to stay between themself and the ball in the air. With much practice, they develop a "felt sense" of how to move to be in position to catch the ball.

The perception of a genre as social action may elicit a "felt sense" that one should write. As Gendlin (1982, p. 37) describes it:

> A felt sense is not a mental experience but a physical one. A bodily awareness of a situation or person or event. An internal aura that encompasses everything you feel and know about the given subject at a given time—encompasses it and communicates it to you all at once rather than detail by detail. Think of it as a taste, if you like, or a great musical chord that makes you feel a powerful impact, a big round unclear feeling.

With practice, one may develop an elaborated felt sense of a genre as social action that enables highly skilled performance. However, even a novice, having experienced the felt sense, the exigence, of needing to write, can begin using next-step monitoring to feel their way forward, whether with the aid of immediate feedback, with the memory of writing previous genres in different social actions, or with myriad other resources such as instructions, models, and so on, as Graham's theory (and others) elaborates in terms of members' resources (p. 265).

As Hidi and Boscolo (2006, p. 2) point out, "(IP) cognitively oriented scholars view writing as interrelated processes of different levels of complexity" in accomplishing a writing task (producing text) in some task environment. I suggest here that a writing task might be viewed as a social action or communicative genre in the sense that it is a typified textual (or other semiotic) response to a recurring social situation within some stabilized-for-now social practice or activity type, such as a history book report or an essay answer in US high school history courses.[6]

Graham's theory explicitly builds on socio-cultural theories, specifically "including activity theory and genre theory" (p. 258). WWC's analysis of community dynamics is essentially Engeström's activity theory structure, which he alludes to, citing Engeström's model of expansive learning (Greeno and Engeström, 2014). Moreover, though Graham does not explicitly develop the activity theory connection between the community and individual levels, it is implied. Subject(s)/member(s)/writers(s) use tools to act on some object with some motive to achieve an outcome/written product. Indeed, Graham's "Basic components of a writing community" diagram (p. 264) is four concentric circles. The central two circles contain four of the seven components of Engeström's activity theory model—subject/s (writer/s), tools, object (goal/s), and outcome (written product). The three other AT components are community, which Graham includes in the outer two circles, division of labor, and rules, the latter two of which are elsewhere discussed in terms of typification.

Graham's WIC model also clearly incorporates the phenomenological concept of typification, the phenomenological basis of the theory of genre as social action. He begins, "Actions are the typical practices that a writing community employs to achieve its writing purposes (Russell, 1997)" (2018, p. 258). He mentions "typified actions," "typified patterns of action," "typified practices," or "typified patterns (routines, schemas)" some 16 times. However, Graham does not use the term genre, much less genre as social action, after its mention on the first page (258). As an addition to WWC, I suggest that the genre as social action (typified forms of words) can connect the individual writer(s) with the community(ies) with and for whom they write. The genre as social action can be seen as a nexus for understanding what motivates writers.

1.2 Self-determination theory and the phenomenology of motivation

Another theory of motivation that Graham briefly discusses—also based on phenomenology—might add minor modifications to the theory that further its reach and power. Actively perceiving and then writing a genre as social action is agentive; it requires not only a certain amount of but also certain kinds of motivation. One way to understand motivation in terms of genre as social action is offered by Deci and Ryan's (2013) self-determination theory, which has been important to research on L2 writing motivation but largely ignored in L1 writing research (Graham's recent intervention study of writers' choice is an important exception to be discussed later).

Deci and Ryan (2013) posit three basic psychological needs that motivate humans: competence, autonomy, and relatedness. Humans are social animals and need relations with other people (i.e., community); they must interact with the world competently to survive. However, to be fully human, they must also exercise autonomy—what the tradition of existential phenomenology calls freedom. SDT research has found that, in general, positive extrinsic motivations (e.g., money, grades) have a more immediate effect but fade more quickly, while positive intrinsic motivations (relatedness, competence, autonomy—including feelings of interest and curiosity) are longer lasting and thus more powerful overall. Indeed, extrinsic motivators may have adverse effects if perceived as limiting the writer's autonomy.

However, extrinsic and intrinsic are not a simple binary in SDT; they exist in a continuum. SDT allows partially internalizing motives through social interaction and reflective choice, making extrinsic motivators more intrinsic. SDT calls one position on the continuum identification. If one identifies strongly with others in some area of life and one appropriates or internalizes the motives of those others, one can come to feel that the motives of others are one's own.

How can we understand the dynamic of self-determination in terms of genre as social action? Both the embodied version of phenomenology and SDT provide similar answers. Ryan and Deci (2004) argue in their comparison of existential phenomenology to SDT that there are profound similarities in the theories, all relevant to motivation in writing.

6 There are numerous other ways of categorizing pragmatic discourse that have been used to structure curriculum and assessment, such as the Norm project. See Berge et al. (2019) and particularly Berge et al. (2016), which reviews previous efforts before proposing a new model of theorizing writing.

- Both emphasize that humans have autonomy—freedom to act out of one's authentic self.
- One experiences autonomy to greater and lesser degrees in relation to one's authentic self, depending on one's material and social contexts and choices.
- Our performance and wellbeing improve as we perceive greater autonomy—it is motivating (and its perceived lack is demotivating).
- "Where autonomy enters the picture it is in this realm of meaning. As existentialists have argued, we act in accord with the meaning of events, and it is in the reflective construction of meanings that we can find our possibilities." (Ryan and Deci, 2004, p. 467).
- "Although social contexts can have a clear impact on autonomy, in an ultimate sense, autonomy is something one must also cultivate within oneself and have the courage to enact. That is, in every instance one can act autonomously, which requires that one act in accord with what is authentic and real" (Ryan and Deci, 2004, p. 473).

Both SDT and genre as social action envision the relationship between members and communities as dialogic and, often, in tension. A crucial part of the writing process may be using a community's genres until they become "one's own" through imitation (Bandura, 1962) or anticipatory socialization (Merton, 1968). However, a member's creative use of genres may change the community and its intentions/motivations/desires—though often with a struggle. As Bawarshi (2003) puts it:

The power of genre resides, in part, in [a] sleight of hand, in which social obligations become internalized as seemingly self-generated desires to act in certain discursive ways. This does not mean, however, that writers' desires are completely determined, as evidenced by the fact that textual instantiations of a genre are rarely if ever exactly the same. Every time a writer writes within a genre, he or she in effect acquires, interprets, and to some extent transforms the desires that motivate it (p. 91).

Another central concept for SDT research is self-regulation. Again, Ryan and Deci (2004) point out the connection between SDT and existentialist/phenomenological theory:

- "This sense of autonomy is not simply a functionless construction, but rather it is a phenomenal state reflective of the quality of behavioral organization" (p. 474)—self-regulation, in other words.
- "Autonomy concerns how various urges, pushes, desires, primes, habits, goals, and needs from the *brain, the body, and the context* are *orchestrated* within the individual" (p. 450)—self-regulation (italics mine).
- "Behavior is experienced as autonomous when one's actions are truly self-regulated, meaning one's actions are self-endorsed and congruent with values, motives, and needs. . . rather than being controlled or entrained by forces alien to them" (p. 453).

Recent sociocultural theories, particularly embedded, embodied phenomenological approaches, similarly point to "BBE"—brain–body–environment—as a single system from which motivations arise (Varela, 1996; Thompson, 2007; Gallagher, 2012). For successful performance, thoughts, behaviors, and the environment (physical and social, direct and distal) must be orchestrated [Both Merleau-Ponty (1964, p. 54) and Schütz (1951) use the orchestra metaphor for behavior].

Both SDT and the phenomenological approaches to motivation described here recognize the deep embodied structure of self and its regulation. Humans do not naturally learn to write. Many cultures do not have writing (none had it until relatively recently in human history—roughly 5,000 out of at least 50,000 years ago) (Lieberman, 2007). Unlike speaking, writing is not embedded in human cognitive and anatomical architecture but instead built on prior functional systems, either those familiar in many other mammals (e.g., active typifying perception, memory, problem-solving action, sociality, cooperation) or prior functional systems developed in humans, such as indexing (pointing), tool making and use (especially incising or marking), and, of course, oral languaging (Hasson et al., 2018). All normal humans learn/acquire these functional systems as part of their normal development in every society, literate or not. Functional systems exist not only within the individual but also within social groupings, as theorized by Schutz (1973), Deci and Ryan (2004), and Merleau-Ponty (2013), among others, in phenomenological and socio-cultural traditions. Internal and external functional systems are mutually embedded—engaged. Indeed, "external" and "internal" only exist in relation to a highly permeable skin barrier.[7]

Not only are one's social self, others, and the cultural tools in use (including genres) inseparable from the bodies of others but also one's physical self, one's living body, in that one's body affects and is affected by the bodies of others. One's body exists because of and in relation to other bodies from conception, if not before. We are not only intersubjective but also "intercorporeal," as Merleau-Ponty puts it (2013). Moreover, this extends to our genres as social action. Genres not only imply structured knowledge but also structures of embodied action. As Gregersen (2011, p. 101) puts it: "We know genres and we know what to do with genres."

Graham's WWC briefly mentions SDT's distinction between intrinsic and extrinsic motivation when he takes up the fourth belief about writing: motivation, "why one engages in writing" (2018, p. 256). Moreover, Aitken (2023) briefly suggests that SDT might be used to modify, in a minor way, Graham's theory of motivation, especially with Bandura's social cognitive theory. I suggest ways that SDT might further contribute to Graham's theory and expand our understanding of writing motivation by employing the phenomenological perspective it shares with genre as social action. The goal is to see how motivational beliefs function together.

Graham (2018, pp. 266–267) identified seven sets of motivational beliefs (MBs) that influence writers: (1) the value and utility of writing; (2) whether or not one likes to write or views writing as an attractive task; (3) the writing competence; (4) why one engages in writing; (5) why one is or is not successful; (6) identities as writers; and (7) writing communities. All of these might be seen wholly or in large part as a function of the genre as social action.

7 Functional systems are analyzed by Vygotsky, his neuroscientist collaborator Luria, and his social systems collaborator Leontiev (Bazerman, 2013).

- (4) One's perception of the genre as social action provides the reason for writing—its initiating exigence or BBE perturbation—and thus
  - (1) the value and utility of writing or not writing—in terms of its potential to maintain or improve life, including:
  - (2) the emotional valence, positive or negative, and its degree, in comparison to other genres and social actions or in comparison to not writing, and
  - (3) the felt sense of writing competence for the genre, which impels (or resists) moving fingers to write along an intentional arc shaped by the genre as social action.
- (6) The genre as social action also provides the identity(ies) one can (and cannot) have as a writer of this genre as social action,
- (7) the readers/audience one can have in this genre as social action, and
- (5) the criteria for success, derived from next-step monitoring of the feedback loop of the intentional arc.

The following case study illustrates how Graham's motivational beliefs grow out of genre as social action in one writer's struggle for knowledge, self-determination, and self-regulation.

2 An illustrative case study using original data

The illustrative case study that follows uses interpretative phenomenological analysis (IPA), "a well-established qualitative approach developed to investigate individuals' lived experiences," as Smith and Fieldsend (2021, p. 147) put it, through an in-depth interview focused on evoking the felt sense of a specific moment.

2.1 Description of the case study

The following data are from an HSRB-approved study asking the general research question: What is the felt sense of slowing down or stopping writing or resuming writing after slowing or stopping? The goal is to understand not only writer's block but also the normal processes of stopping and restarting academic writing. Participants completed two semi-structured online video-recorded interviews of about 1 h each, separated by sufficient time to have finished the writing project. In the first interview, after some questions about the writing task and situation, we asked each participant to point to "a place where you slowed down or stopped while writing something important" and evoke that specific moment. Interviewees provided some background on that text and themselves to allow us to understand their evocation of the moment in their writing and their felt sense of slowing and resuming.

I focused on one participant because her first interview (the only one discussed here) focused on her motivation, and she repeatedly mentioned the term. Moreover, she was at a point in her Ph.D. program when she had taken a short dissertation writing course (required of everyone in her program) and therefore had a vocabulary for talking about writing.

Her interview was analyzed using Nvivo. For the case study reported here, her uses of the word motivation were identified and then coded for (1) their valence (position, negative, neutral, mixed), (2) the emotions expressed around uses of the word (textually, visually, and vocally), and (3) the role she attributed to the motivations and associated emotions in stopping and restarting. The analyzed data were then interpreted (redescribed) through the terminology and constructs of both phenomenological and IP cognitive theory.

The analysis was then presented to the participant for comment.

2.2 The participant

Kel (pseudonym) is a Ph.D. student at a large Midwestern university, working on the pilot project she must complete before officially beginning her dissertation, a mixed-methods social science project using a survey and selected interviews. She has completed gathering data for it, drafted the methods section, started analysis of her data, and begun writing sections of the report on the pilot that she will present to her committee for approval before she can "scale it up for the full dissertation." The interview was conducted by a student on the research team experienced in interviewing, and there was an evident rapport between the two, perhaps because Kel had also done considerable interviewing and wanted to cooperate in another interview study to get the interviewee's perspective. My perspective as a senior scholar who had a challenging experience writing the dissertation at a problematic time gave me a particular empathy. However, it may have pushed me to draw conclusions I would not otherwise have, though I am not consciously aware of any now.

3 A descriptive case study

"An especially important goal of descriptive research conducted with the WWC model," Graham says, "is to describe how the characteristics of the writing community and members' individual differences function conjointly." This descriptive case study illustrates how Graham's seven motivational beliefs (MBs) function together to connect her with her communities through her perception of genre as social action. It then describes the participant's felt sense of writing and her feelings of autonomy in terms of existential phenomenology and SDT. Finally, it illustrates self-regulation processes using genre as social action and SDT.

3.1 Genre as social action: orchestrating motivational beliefs

For Kel, the exigence for writing (MB 4—why she engages in writing) is the genre of the IMRD report. She must write it to get a degree, which provides its extrinsic (MB 1) value and utility. Kel reports feeling a great deal of pressure and

questioning her (MB 3) *competence* to write the new genre and, with it, a whole different view of (MB 2) the attractiveness of writing: "I've never had negative feelings about writing. I have always been, it's always come easy to me, and people have always complimented my writing—until I became a research writer." She is writing a new genre as social action, an IMRD report of a pilot study leading to a dissertation based on mixed-methods empirical research. This is her task and task environment, to use IP cognitive terms.

However, there is much more going on here than learning a new set of genre conventions—forms of words. The new genre as social action implies for her a new identity as a writer (MB 6): "until I became a research writer," she says, and entered into what Bazerman (1994, p. 91) calls a new "form of life." Kel displays a situated sense of struggle with the typified genres and activities of her research, especially here in the sub-genre of the literature review, and complex—plural—motivational states, as she feels the pull of different (MB 7) writing communities, different sources of *relatedness*, in SDT terms. Graham critically points out that communities, identities, and motives are multiple. In this case, I want to notice how genre as social action brings that multiplicity into focus as social action.

"Lit reviews are so hard for me," she says, because "I feel that I'm learning a whole new level of backing up claims and motivating, you know, research. It's like a whole new approach to what I always thought came easy to me doesn't come easy anymore." The sub-genre of the literature review "motivates" research in that it shows why the researcher/writer and the readers (other researchers or users of the research) should move their attention in some new direction. The (MB 5) criterion for success is whether it aligns the previous knowledge in the disciplinary sub-community, the previous direction of attention, with some new knowledge claim and some new claim on their attention.

However, the literature review is also, for her at this moment, a threatening hurdle in her underlying desire to gain a doctorate, a mandatory task motivating her to address something she may have avoided or seen outside her realm previously, and she now feels must push herself through her discomfort and feelings of lack of self-confidence despite her memories of other writing tasks/environments/communities where she has felt competent. It forces her to question (MB 1) the very value and utility of writing this genre in her life.

To avoid the literature review, she returns again and again to writing and revising the data analysis and methods sections. She seeks further help from YouTube tutorials on writing literature reviews by a complex software program called Nvivo to provide, as she says, "motivation to get started on that hard, hard part for me."

Nevertheless, she feels little motivation. Overall, she feels demotivated, like an imposter:

> It felt overwhelming, and I. . . I mean, I know this is common for Ph.D. students, but I have these moments of, like, "I can't do this." I'm not, you know, it's this imposter syndrome, like, takes over my brain.

> Like, everybody's read more than me at this point. I haven't read enough. I haven't done enough. I haven't written enough. It's. . . and I have to just stop that. I just have to turn that off because that's just the devil on my shoulder.

She is, for now, a kind of imposter, pretending she is a researcher when she is not yet.

Kel immediately ties her lack of confidence and her feeling of being overwhelmed by the social action of the sub-genre to her long-term career prospects and, indeed, her future identity:

> And I think definitely this process is shaping what I like, like, what career roles I have. You know, I no longer want a job focused on research. I like it, but I only like it when I have a lot of help from other people, when it's a team, because I like to bounce ideas off people.

Her identity as a researcher is bound up with the genre and activity of the experimental article—and the dissertation it is based on (which, unlike the research article, must be individual). This is a source of anxiety and demotivation.

> And I like to have other people sort of validate what I'm thinking. And, and, you know, the point of a dissertation is to establish yourself as an independent thinker and research or. . . so I'm not getting that feedback.

> And it's really hard for me. I'm, I'm doubting everything. So, in that moment before, and right after I (slowed and stopped writing), it was I was feeling overwhelmed.

In this crucial moment of slowing and stopping, she expressed a lack of competence so strong that she felt overwhelmed. The source of her feeling overwhelmed has to do with the institutional requirement to be, in SDT terms, an independent agent (autonomy) to get the degree (and get on with her and her family's life) in tension with her need for connection (relatedness) with other students/researchers, a team "to bounce ideas off."

3.2 The felt sense of writing and the authentic self in existential phenomenology and SDT

To understand Kel's motivation (and lack of it), we might turn to Merleau-Ponty's felt sense in an intentional arc and to Deci and Ryan's concept of self-determination (2013). Both concepts focus on the conditions for agentive social action, autonomy, or freedom. Writing a new genre as social action means, at the most basic level, a felt sense of one's competence in the task and of one's ability to perform. However, other considerations in and around ability affect motivation, other felt senses, and motivational states. Kel, in terms of SDT's basic needs, might be thought of as doubting her competence in this genre as social action because she is caught between the requirement that she act autonomously as

a dissertation writer and her need for relatedness—the team "to bounce ideas off of" she longs for.

Moreover, the dissertation rules constrain her autonomy because she cannot collaborate with others. The felt sense of writing ability presupposes an affirmative answer to "Am I allowed to?" One may feel one could perform if one is allowed to do so in one's own way, yet one cannot without risking adverse consequences (real or imagined) for performing the writing task (or performing it in one's own way) beyond the moment of writing. The genre as social action of the dissertation does not allow her to collaborate with other students.

In addition, permission might imply not simply permission to write a text but permission to be (at least provisionally) one who writes this genre in this social action: identity, in other words. Writing a genre as social action involves perceiving oneself within an intersubjective community of those who write the genre, acceptance as a member of some social world, some life-world, as Schutz (1973) terms it. Her struggle with this genre as social action makes her question her identity.

Moreover, writing a genre as social action also risks a loss—ceding—of autonomy and even one's previous identity to the group. Does one have the willingness or desire to write the task and become a member of that intersubjective community? The phrase is often: "I can bring myself to do this" (or "I can't bring myself to do this"). As Groucho Marx reportedly said, "I don't want to belong to any club that would accept me as one of its members" (Quote Investigator®, 2011 "I don't want,"). Kel slowed down as she questioned her desire to be part of the community of researchers.

One can conclude that writing a genre (as social action) includes not only ability but also power and permission, acceptance and identity (present and future possible), desire, and identification. Kel is unsure she wants to be a "research writer" who must write this "hard part," the research review, where she must take a personal, agentive position and assume a new identity and authority. She has a deep "interest" in writing some ways and not others—not interest as mere curiosity or attention but interest as an agentive stake in the outcome, the investment of her very self. Moreover, because the social action involves writing, making potentially permanent marks that endure across time and space, all of these motivational states are operating not only in the present moment, where the writing is happening (or meant to); they are operating potentially in the imagined future of readers responding, of life consequences, large or small.

Indeed, competing motivations lie at various places on the continuum SDT posits between extrinsic and intrinsic. Kel's extrinsic motivations intertwine with her intrinsic motivations as she struggles with whether or not she will identify with researchers (and write their genres). Her familial and financial future rests on graduation (extrinsic motivation) and thus the subgenre she finds so hard.

She wonders if pursuing research (and its genres, with the motivational path the IMRD genre entails) is being true to herself, authentic, or a diversion. In SDT terms, she worries that extrinsic motivators may be in play and thus demotivating. There is a lack of confidence and a perceived crisis of values (MB 1). She wonders if research writing is "really" her. To be or not to be a person who writes like that and those people. Should she internalize their motives and make their genres (and social actions) hers?

From outside her perspective (more precisely, from the perspective of insiders in the field), it is pretty clear that "a job focused on research" in her field involves "a lot of help from other people," a team where one can "bounce ideas off people." Furthermore, she realizes that her institutional position as a Ph.D. student, writing a dissertation "to establish yourself as an independent thinker and researcher," keeps her from "getting that feedback." Nevertheless, she feels "overwhelmed." Unsurprisingly, it is difficult for her to get writing again, self-regulate, to use the SDT term, or maintain the "intentional arc," to use Merleau-Ponty's phenomenological term.

3.3 BBE system of motivation and SDT self-regulation

As Kel's comment about her lack of a "team" suggests, there are others in her BBE system of motivation here, proximal and distal. She mentions many in the interview: children, husband, officemate, dissertation director, fellow Ph.D. students, her imagined future "team" of colleagues/collaborators, the subjects of her study represented in the quantitative data, and—most saliently at this moment—authors of the literature review articles she is summarizing. As Paré (2014) says, when we look at relationships in writing, "the rhetorical situation (or task environment) suddenly becomes quite crowded" with people (p. A-9).

We now come to the phenomenological moment being specifically analyzed: Her slowing down and restarting on the literature review, and thus, to her self-regulation, her BBE system of motivation. I suggest that many of her self-regulatory behaviors proceed from the genre as social action she is attempting. Paré et al. (2007) have shown that the dissertation is a complex multi-genre, with several embedded social actions—and perforce motivations—sometimes conflicting or competing. As we have seen, she is extrinsically motivated to finish the dissertation to get a university teaching job. However, this involves writing a research genre, the IMRD, with the social action of adding new knowledge, and a sub-genre, the literature review, with the social action of describing existing knowledge other researchers have found so she can locate and claim what she is adding. She mentions various genres in the interview that regulate her behavior: APA citation style, university and department documents regulating her dissertation process, conferencing with and getting feedback from her advisor and committee members, and delivering conference papers to meet expectations, etc.

As we have seen, at that crucial moment of slowing and stopping, she needs more confidence in writing the IMRD and questions whether she is even motivated to write it. However, she knows it will be much more difficult for her to get a university teaching job without a Ph.D. and thus needs to write a dissertation. She is discouraged and lacks motivation, perhaps because it is mainly extrinsic, something she feels forced on her (external locus of control). However, the social action of the literature review sub-genre elicits self-regulatory behaviors that seem to move the locus of control toward intrinsic motivators. Recall that extrinsically motivated behaviors can become more or less intrinsically motivated as they are perceived to align with one's own integrated values and beliefs—"integrated regulation," in Ryan and

Deci's term (2004, p. 453). Despite her discouragement, she then behaves in ways that show her understanding of the logic of the genre expectations and her alignment with that logic—how the research subcommunity's disciplinary expectations realized in the genre as social action can help realize her deeper motives.

Just before she slowed down, she had returned to writing summaries of articles for the literature review. She thought if she could "just get back into the reading. . . it'll motivate me to write. All right." She clearly understands that the literature review's social action is indeed social, involving other people in the sub-community of researchers on her topic (Bazerman, 1988; Hyland, 2000) (Unlike most graduate students, she had a short course on research writing, where she was instructed on how to write the key sub-genres, such as the methods section, the results and discussion, and the literature review).

At the slow-down moment, she was in her office, before the quarantine, with another graduate student, listening to music on her headphones to relax her (corporeal self-regulation) and to minimize distractions from her officemate (intercorporeal self-regulation).

She had begun stacking printouts of the articles for her literature review—a very physical, material action, again based on the social action of the review—into two stacks. She was also classifying them on one screen into a two-column Google Doc figure based on the stacks while glancing at her data tables on another screen. Note the multi-modal self-regulation of the paper stacks and the two screens, which represented, respectively, the stacks of research articles according to the authors' positions on the topic and the data from people she had researched—again, a physical, multi-modal configuration reflecting the social action of the literature review sub-genre in relation to the IRMD genre. She is an active agent, seeking ways to understand the literature, not simply following instructions or protocols from the regulatory documents.

However, she feels considerable frustration because she is unsure if she has correctly classified articles or, as she recalls asking herself, "Am I just placing some weird label on it that I came up with from my own, you know, for my own interpretive purposes? So that was a slowdown moment." She feels intellectually responsible to be fair to the authors in her literature review—that is, authentic, in line with her values and those of the field, not selfishly pursuing her "own interpretive purposes" to the extent that she distorts what others "say" (wrote). Indeed, the stress she feels comes from her worry that she is acting out of inauthentic, selfish motives. As Ryan and Deci say (2004, p. 457), people can "access a direct source of knowledge concerning the degree of integrity in our own actions. Thus, when people behave, they have some internal information for judging whether the behavior is authentic or imposed, self-endorsed, or alien." That is, in phenomenological terms, people have a felt sense of whether something is authentic, "integrated regulation." Thus, Kel's motive is not to avoid doing something that will violate some rule that will get her in trouble. She is attempting to get the classification of the literature right so that she is not missing something important in the community's expectations.

She then looked down from her screens at her desk and saw "a couple of sticky notes," large ones. She had previously put various lists of article authors on each sticky note for her literature review. She classified them with "curlicue" brackets and arrows pointing to the criteria according to which she had grouped them.

She returned to her two-column literature review figure in Google Docs and added a double-headed arrow between the columns. The arrow allowed her to create a continuum to put studies that did not fit at either extreme.

> And then quickly I was like, "Oh, but there's so many other ways to think about this research. It's not just from the perspective of how they designed their studies. It's from the perspective of how they interpreted results or, you know, what data they collected.". . . and it was like, okay, this is helpful. This moves me in the right direction.

She perceived this as a breakthrough that motivated her to go on writing, though only briefly, as we will see.

> It felt, it felt really good. It felt like, "Oh, okay. I can do this." I can—if I can have a visual, then I—it's not just a stack of this many research articles that I need to, you know, figure out where to put in the lit review. It's something that I can start with the visual, and I can, I can start to figure out how they, how they work so that I can figure out where to put them in my own lit review."

Kel borrowed the visual genre from a previous paper, as she explains: "I had just finished another paper where I envisioned a continuum of sorts. . .. And so that was in my head, and I thought, "Oh, this is the same. This, this is the same" (On genre borrowing, see Tardy, 2012).

Her motivation to contribute to the written conversation in the social action of the literature review returned and, with it, a shift in emotion from frustration to creative energy as she orchestrated the physical articles in the stacks, the visual representation in the on-screen Google doc, and the post-it notes (Spinuzzi, 2003) with curlicues [an occluded genre (Swales, 1996)] for organizing information flexibly) in order to self-regulate.

> It was branching off of other people and how we could extend what they've found. And I could see it serve in the bigger picture of the literature instead of just this long list of to-do items that I am responsible for. And so that provided some new motivation.

The motivation comes from the meaningful conversation (written) that the genre's social action demands.

However, the new motivation and new start were only a part of the long dissertation writing process. Other motivations followed, other slow-downs, stops, and restarts.

> And then, I think very quickly after that, it was like, time for me to go, and I had to pack everything up and go home. And once I get home, I don't make much progress because I have kids. So the kids are, you know, they just take over once I get home.

However, she later used the post-it-inspired continuum visual to produce an outline of the literature review. Furthermore, she did finish the dissertation and graduated. However, that is another analysis, based on the second interview.

To summarize, the social actions of the IMRD genre and research review sub-genre elicited several self-regulatory behaviors involving the brain, body, and environment. Regarding her genre environment, she borrowed one genre she knows, the list on a continuum, to help her write another she is struggling with, the literature review. Regarding self-regulation, she physically arranged (body, behavior) her office (physical environment) to manage the social action of the sub-genre. In doing so, she managed her attention, her emotions ("to motivate me"), and her embodied thinking (the stacks of articles and the figure). Interestingly, she did not report a felt sense of thinking or writing but only of physically arranging objects in her immediate environment, drawing brackets on a post-it, and the positive emotional valence that accompanied the renewed motivation.

In phenomenological terms, Kel experienced motivation as plural, complex, even competing "motivational states" (Deci and Ryan, 1981), shifting from moment to moment, intention to intention, during the process of writing. At various timescales, from a single slow-down/restart to a whole dissertation writing process, various interweaving intrinsic and extrinsic motivations may take the fore at any moment and, with them, various identities and various senses of motivation (or its lack)—motivational states. Kel describes this often in terms of competing pulls of teaching, research, family, and personal care impinging on her attention, on her felt sense, moment to moment. However, the motivational states are, for the writer, anchored in the stabilized-for-now object of her activity, the genre as social action, and the subgenres that exist in the writer's genre system and broader BBE system of motivation. In this sense, genre as social action can be seen as a key to motivation.

4 Discussion

The WWC model attempts to merge sociocultural and cognitive perspectives. This article attempts to elaborate further implications of it using genre theory and SDT by explicating the motivational processes of writing within communities. This discussion suggests implications of IP cognitive and SDT research for empirical sociocultural research and implications of genre as social action for IP cognitive studies research, along with suggestions for pursuing shared areas of interest between genre theory and SDT.

4.1 Implications for sociocultural studies

Socio-cultural studies of motivation have been overwhelmingly qualitative, which limits the generalizability of the findings (Haswell, 2005; Yin, 2014). IP cognitive and SDT research can add a quantitative element to socio-cultural approaches to increase the power and reach of the sociocultural approach (e.g., MacArthur et al., 2016). Graham and others have begun that work already. For example, to test socio-cultural claims about the effects of macro-level features on meso-level classroom practices, Hsiang and Graham (2016) surveyed teachers to see if particular government and educational policy features influenced how writing was taught and varied across locations.

The dominant mainline socio-cultural approaches to motivation, from Britton (1975), have tended to view classroom genres and the social actions or practices they embody (e.g., assessment essays, reports demonstrating knowledge) as generally demotivating. Moreover, many sociocultural pedagogical innovations are an attempt to motivate students by having them write personal or "real-world" genres, often in situations where the task is collaborative or the topic is chosen by the student (or presented in a way to spark interest) (Hidi and Boscolo, 2006).

In this view, how students enactively perceive genres differently from teachers and other students becomes a crucial driver of how they write (or do not) them. Current research increasingly finds that motivation is "dynamic, context-sensitive, and changeable" (Maclellan, 2005, p. 194). If motivation is about making meanings through social action, then the varying ways students perceive genres with their social actions can be crucial. One use of phenomenology and genre as social action is to complicate the concepts of personal and real-world genres and the school-based genres they are compared unfavorably with in dominant socio-cultural approaches. Two sociocultural studies will illustrate this.

The phenomenological view allows researchers and teachers to deepen their understanding of classroom genres and motivation. Genres as social actions may align—and skew—the motives of the teacher and student. For example, Yañez and Russell (2009) studied a journalism major taking an Irish history course (as a general education elective) who was highly motivated to write a paper on it because she saw it as preparation for a career where journalistic standards would require her to tell a story "objectively." However, the teacher was motivated by professional standards of academic history that assumed there was no objective truth but only different versions that needed to be accounted for. Different disciplinary perspectives produced profoundly different perceptions of the same classroom assignment. If teachers realize the ways students are appropriating their classroom genres, they can change the genres or reframe them for students to increase their motivation.

Information-processing cognitive and SDT research can provide a way to operationalize and quantify for research purposes the perceptions and effects of genre as social action on motivation. More extensive studies might survey students to see how they perceive the genre(s) as social action they intend(ed) to write, for example, to get at their varying motivational states and contradictions within them, which, as WWC points out, are often in play.

Similarly, in Gere et al.'s (2018) study, "A Tale of Two Prompts," students in a university statistics course were asked to show their understanding of statistics concepts by writing (1) an email to grandparents analyzing studies of the effects of caffeine and recommending when and how much coffee to drink and then (2) a memo to a Tour de France team analyzing studies of the effects of dark chocolate on athletic performance with diet recommendations for the team. Students did far better on the second task because, the authors argued, the second task created "a clear through-line from present work to future work," while "the grandparent assignment was a kind of cul-de-sac; a worthy end, perhaps, but an end in itself and not a means of writing their way into a professional world" (pp. 164–165). The students could not "see themselves" explaining statistical concepts to their grandparents about chocolate, but they could see it for a professional team making a high-stakes decision on nutrition.

The authors of the study mentioned motivation explicitly only twice; instead, they described the difference in "aspirational function" or "anticipatory socialization for career mobility" (Gere et al., 2018, p. 164). How the students perceive the genre as social action in relation to their future identity is crucial. The authors conclude, "A useful question to ask about an assignment is what kind of aspirational quality it has and how it might be perceived as a scaffold to a desirable future role. How an assignment is constructed can go a long way toward supporting students in making meaning of their learning and conveying their knowledge of course concepts" (Gere et al., 2018, p. 165). Taking into account the motivational aspects of genre as social action may clarify such aspects of classroom genres and tease out the ways they are demotivating (for some) and might be made more motivating by changing or reframing them. That reframing might grow out of the differences in students' perception of the genre as social action of an email to grandparents and a memo to an organization—the latter wielding much more power and thus consequences.

These and other socio-cultural qualitative studies might benefit from or inspire quantitative studies in the SDT tradition as they are very much about intrinsic and extrinsic motivation. Ryan and Deci's (2004) analysis of the extrinsic/intrinsic continuum might help describe the motivational differences in the assignment genres—and perhaps offer a more precise framework for generating testable hypotheses for future quantitative research to delineate the ways active genre perception affects and is affected by motivation.

Self-Determination Theory and research methods could partially overcome the chief limitation of qualitative research usually employed to study genre as social action—the lack of generalizability. Researchers have developed over 30 questionnaire scales to measure SDT constructs, several of which would be useful in larger-scale studies of motivation and genre (Metrics and Methods, n.d.).

Quantitative empirical research on motivation in the tradition of SDT shares much with socio-cultural research regarding assumptions about the roles of agency and autonomy in motivation and the dynamic interplay of brain, body, and environment (context) in meaning-making and self-regulation. It might readily inform socio-cultural studies of L1 writing, as it has yet to do thus far, apart from a few exceptions (Robinson, 2009; DeCheck, 2012; Kirchhoff, 2016; Williams, 2018; Feigenbaum, 2021).

Because SDT and genre as social action/dialogic share basic assumptions, it is worth noting again that the continental dialogic tradition of phenomenology, represented most relevantly here, perhaps, by Linell (2009), has significant similarities with the North American tradition of genre as social action and might also benefit from SDT research for the same reasons. Furthermore, the many second language acquisition studies using SDT might provide models for L1 writing studies.

4.2 Implications for IP cognitive studies

Similarly, IP cognitive and SDT researchers might benefit from a phenomenological analysis that explicates the relationship between students' perception of the genre as social action and their construal of—and motivations for—pedagogical interventions or experimental tasks.

For example, in one of the only studies of student L1 writing motivation using SDT, Graham and colleagues took up an important issue in both socio-cultural and IP cognitive approaches to motivation: the effects of choice and preference in an argumentative writing task on student motivation and performance (Aitken et al., 2022; Aitken and Graham, 2023). Some 224 US undergraduate students in an introductory course on special education participated. In each of the two 75-min classes, students were given a case study on a controversial issue raised in the course material (ADHD medication for a second grader and a more restrictive environment for a student with behavioral issues). In the first 60 min, a "guest lecturer" (the first author) introduced the case, and students discussed it with other students who took differing positions and made notes for writing. They then wrote a 25-min essay arguing for a position on each of the two topics. Students were divided into two groups. For the first case study, one group was assigned a position, and the other chose a position. For the second case study, the groups were reversed. Before the class sessions, students completed measures of writing self-efficacy and knowledge of the two topics, and afterward, their essays were scored holistically.

The quantitative analysis (Aitken et al., 2022) found that the effects of choice on writing performance were limited, while the qualitative analysis (Aitken and Graham, 2023), using SDT extensively, provided important insights into the effects of choice and preference on motivation. Researchers predicted that "choice would have a statistically significant impact on writing quality because, following self-determination theory, an autonomy-enhancing technique, such as choice, should enhance students' intrinsic motivation for the task to be completed" (Aitken et al., 2022, p. 1856). However, they "did not find a main effect for choice, drawing into question the common contention among many writing experts and teachers that choice is a universally effective tool for improving writing" (Aitken et al., 2022, p. 1856). I suggest that analyzing the students' perception of the genre as social action might offer further insights into the study results and its use of SDT. How did the students perceive the genre as social action, and with what effects on their motivational beliefs?

The researchers rightly point out an advantage of their study over previous studies: it "was conducted in a real classroom context rather than as a contrived assessment to test students' writing competence" (Aitken et al., 2022, p. 1857). Despite this clear and potentially significant advantage in context authenticity, the students' perception of the task environment—the genre as social action—may have blunted (mediated) the effect of choice—because it reduced their autonomy. Students in the "choice" groups were not choosing a topic but only a position on an assigned topic. In the qualitative study, students praised opportunities to choose a topic. However, several did not, with one student who did not "see choosing her position on an assigned topic as a "real" choice even though she recognized that it was technically a choice; maybe, just not a meaningful choice," and several expressed dislike at being forced to write on a topic as it reduced their autonomy (Aitken and Graham, 2023, p. 311).

Moreover, students in the "choice" groups were not choosing a genre but were assigned one, further reducing choice. The students were actually given two genres, a pretend one masking a real one—an ambiguity common in classroom genres. The prompts

were presented as letters: "Pretend you are Mr. Lars and write a letter to (your wife) by arguing that you should (should not) put your son on medication for his ADHD symptoms" (Aitken et al., 2022, p. 1849). However, the prompt refers to the task as a "persuasive essay" or "argumentative essay." Furthermore, writing a letter to one's spouse about such an important and emotionally charged decision about a child—rather than face-to-face or phone communication—puts this in the phenomenal world of the classroom exercise, not the family, where the stakes and emotional valences are different. Indeed, whom are the students persuading, and of what? Students may have felt—with reason—that there is no expected meaningful communication outside classroom/experimental meanings of content learning activities or writing exercises (Magnifico, 2010).

Moreover, no grades were attached, and the students were told their essays would not be read by their partners, so even the motive of persuading the teacher and peers is not live but imaginary. The methods presented in the studies do not specify any purpose the students were given in the instructions/framing of the intervention. Logically, the students might have inferred that the goal of this task—the genre as social action—is to learn about the issues involved in the syllabus topics, not to communicate or write well. If that is the case, some students may have been motivated to try harder on the position they disagreed with. As the authors point out (Aitken et al., 2022, p. 1858), the qualitative study supports this view as a significant number of the interviewees saw "experiencing new perspectives" as a benefit and so tried to "knock it out of the park"—a logical consequence of perceiving the genre as social action as a discussion- or writing-to-learn exercise. Though the authors do not mention SDT in their analysis of the benefits of no choice, it is possible to see how these students were meeting their need for autonomy by choosing to find the benefits, making the genre not a meaningless classroom exercise but an opportunity or choice to exercise their writing powers. Thus, "autonomy-enhancing techniques" "for optimal writing outcomes" might include not only the two analyzed in the study—choice of topic and choice of position—but also a choice of genre as social action—how the students and the teacher/researcher choose to frame or reframe the action phenomenologically.

Similarly, in a study of Portuguese students in grades 5 through 8 who wrote one narrative text ("Tell a story about a child who found a wounded animal") and one opinion text ("What is your opinion about children practicing sport every day?"), Camacho et al. (2022) hypothesized that the students' implicit theories would be significantly associated with performance-oriented goals. This hypothesis was not supported. That is, students whose score on the implicit theories measure indicated they believed their writing skills tend to be fixed (rather than malleable and thus incrementally improvable) also tended to score lower on the goals measure that indicated their intentions or goals when they write are to perform better than other students (performance-approach goals)—a finding that contradicted earlier research in other subject areas such as math. Moreover, the study "indicated a direct, negative relation between performance-approach goals and narrative text quality" (and a negative though less significant relation on opinion text quality) (Camacho et al., 2022, p. 9).

Importantly, however, Camacho et al. (2022, p. 5) "used a writing performance measure which was only scored for research purposes and had no influence on students' grades." As the authors point out, the lack of a grade "may partially explain the non-significant relations between performance-based goals (either approach or avoidance) and writing performance" (Camacho et al., 2022, p. 8). The authors point out that another similar study, with older students, "used a graded writing assignment with influence for grades" and found an association between performance-approach goals and text quality (Camacho et al., 2022, p. 9).

In phenomenological terms, the genre as social action that students perceived may not have been either opinion or narrative about either wounded animals or sports participation; it may have been perceived as doing a classroom exercise for the researchers. Students with mastery goals seem to have perceived the social action as practicing writing skills. In contrast, the students with performance-based goals seem to have perceived the social action as low-value "busy work" unrelated to their grades. As Camacho et al. (2022, p. 2) point out, "Implicit theories can be domain-specific as one student may believe that ability in one school domain is malleable (e.g., writing), while ability in another domain is innate." A phenomenological analysis suggests that implicit theories may also vary across genres as social actions. If so, this might be an important variable or complex of variables for generating new testable hypotheses or reanalyzing existing data.

Viewing a task (environment) as a genre as social action might further elaborate models of the components of competence that affect motivation beyond the trichotomous model developed by Elliot et al. (2011), which Camacho et al. (2022) used. Elliot et al. (2011) developed a 3 × 2 goal model, "which is ingrained in the definition (task, self, or other) and valence (positive or negative) components of competence, encompassing six goals (i.e., task-approach, task-avoidance, self-approach, self-avoidance, other-approach, and other-avoidance)." A phenomenological analysis might propose other definitions and valences by elaborating on the concept of a task as a genre as social action. For example, the task might be viewed differently from a proximal or distal perspective and its motivations as different in valence and degree, accordingly. A trivial and negative task from the immediate perspective of the classroom might be highly salient and positive from the perspective of another social action, such as an aspirational socialization perspective. Similarly, the self of the research subject, the self of the student seeking a good mark, and the aspirational self of the imagined future professional might elicit different motivations. Finally, performing for others might mean performing for teachers, classmates, distal readers (such as Kel's article authors), or imagined future colleagues (Kel's imagined collaborators).

One implication of beginning with an analysis of participants' (students, teachers, researchers, etc.) perception(s) of the genre as social action is that the genre and its framing (actual and fictional) become a part of the design of classroom activities and research studies. For example, Wardle analyzes what she calls "mutt genres": "genres that share superficial conventions with other genres" but have been stripped of their original social action. Mutt genres "mimic genres that mediate activities in other activity systems, but within the (new) activity system their purposes and audiences are vague or even contradictory. They are quite different from and serve very different purposes in (writing classrooms or research) than they

do in other disciplinary activity systems" (Wardle, 2009, p. 774).[8] Research and pedagogy in both socio-cultural and IP cognitive approaches might use phenomenological genre analysis to find potential pitfalls in assignments and their framing to prevent—or retrospectively diagnose—confusions and contradictions that impede writing development or research progress and to generate testable hypotheses on the effects of student perception of the task and task environment, framed as genre as social action.

4.3 Shared areas of interest between the SDT and genre as social action

The deep shared roots of genre as social action and SDT in existential phenomenology suggest fertile ground for research into writing and cognition—but embodied, embedded cognition in the tradition of Luria (Bazerman, 2013; Portanova et al., 2018).

One shared area to explore is mindfulness in research and pedagogical interventions. Since Maturana and Varela's (1991) work in the early 1990s, the phenomenological tradition has been occupied with mindfulness, including relationships with Eastern traditions. Two decades before that, the therapist Gendlin (1982) developed a mindfulness technique called Focusing out of the phenomenological concept of the felt sense, which he further developed as a technique specifically to help writers, Thinking at the Edge (2004). Gendlin's (2004) student, the pioneering writing researcher Sondra Perl, developed the Felt Sense exercises for use in writing classrooms. Ryan and Deci (2004) refer approvingly to Maturana and Varela (1991) and to Gendlin (1982) when they compare SDT to existential/phenomenological approaches to mindfulness. This is not surprising as both SDT and felt-sense approaches recommend that people become mindful when deciding when something is authentic. Both attend not only to the brain but also to what resonates in the whole body and beyond, the phenomenal self, orchestrating the body, brain, and environment. One area to be explored is mindfulness as a self-regulating strategy to be developed in classrooms and other pedagogical settings, as Perl (2004) does. Self-regulated strategy development (SRSD) research (Ennis et al., 2014) notes that much of the self-regulation and self-determination language of the SRSD model, including the use of positive self-statements and self-questioning (Graham and Harris, 1996), mirrors language used in mindfulness training. One essential addition of mindfulness training is its emphasis on becoming aware of the body and emotions, explicitly locating and harnessing the felt sense of writing some genre, as in Horwitz et al.'s (2018) intervention study of writer's block.

Another area where research might overlap is in the neuro-substrate of motivation. SDT has attempted to "map the phenomenology of intrinsic motivation onto the neural substrates of motivational processes that are encompassed by intrinsic motivation" (Di Domenico and Ryan, 2017, p. 2). Although no neuro-imaging studies (to my knowledge) have specifically studied writing motivation directly, studies that use neuroimaging to track brain activity as subjects carry out tasks that suggest analogs to intrinsic motivation have produced exciting results. They suggest that well-documented neural processes such as the SEEKING and dopamine systems are at work. "A complementary approach to theorizing about the neural systems that support intrinsic motivation is to map its phenomenology with the activity of large-scale neural networks" (Di Domenico and Ryan, 2017, p. 9). For example, researchers have mapped the "neural correlates of intrinsic motivation by comparing patterns of neural activity when undergraduate students imagined themselves performing intrinsically motivating writing activities (e.g., "writing an enjoyable article") and extrinsically motivating writing activities (e.g., "writing an extra-credit article"). Most prominently, these studies found preferential activity within insular regions when participants imagined the enactment of intrinsically motivating activities" (p. 9).

The phenomenological tradition has for 20 years pursued the third-person neural correlates of first-person and second-person descriptions of experience. Researchers use phenomenological descriptions—the description of one's own mental phenomena "bracketed off" from immediate action or interviews to elicit such descriptions—in conjunction with neural imaging to produce "neuro-phenomenology," a term coined in the mid-1990s by the Chilean cognitive neuroscientist Varela (1996). The goal of neurophenomenology is to use first-person phenomenological description (or second-person interviews) to expand and enrich third-person accounts drawn from the experimental methods of neuroscience and vice versa (Gallagher, 2012, pp. 36–37, 107–108).

Much neuro-phenomenology research studies meditation and other mindfulness practices. In the classic study of Nepalese monks (Thompson, 2007), neuroscientists noted that the monks claimed their meditation enhanced their mental "clarity." To investigate this further, the neuroscientists measured the monks' brain activity through electrodes while asking them to rate their clarity feelings on a Likert scale before, during, and after meditation. The self-reported subjective clarity ratings of experienced monks corresponded with an increase in high-amplitude gamma synchrony, which was not observed in novice monks, who served as the control group. The study's author emphasizes the importance of the first-person phenomenological descriptions in understanding the changes in brain activity as these subjective reports demonstrate that these changes are indeed happening, which would be unclear (noise in the data) to neuroscientists using only third-person methods. Similar neurophenomenological studies have been conducted in various fields, particularly pain management. There have been no studies of the neural substrates of writing thus far. However, there have been studies of writing using phenomenological description in conjunction with other third-person methods, such as eye tracking, keystroke logging, and video (Gallagher et al., 2015; Horwitz et al., 2018), to study surveillance anxiety and writer's block.

Neuroscientific studies of both mindfulness and pre-reflective awareness concerning writing might well provide insights with explanatory power for both phenomenological and social cognitive theories. Important work on the SEEKING system, for example, undergirds theorizing on the role of emotion in motivation within research on both the neural substrates of SDT in the IP cognitive

8 Berge et al. (2016) make a similar point (p. 14), though they argue for a model that goes beyond genre, to categorize and simplify the acts and purposes for writing in a way that facilitates writing pedagogy and assessment (Berge et al., 2019).

tradition and ecological and radical embodied psychology in the phenomenological and socio-cultural traditions (Gabriel, 2021) (see Portanova et al., 2018 on cognition in writing studies and Clark, 2022 on writing and neuroscience research).

5 Conclusion

Students' perception (or, often, varying perceptions) of the genre as social action may profoundly affect their motivation and thus, potentially, their growth. Taking genre as social action as a construct for writing research can add to attempts to bridge socio-cultural and IP cognitive traditions and allow each to deepen their insights in terms of theory, research, and pedagogical (re)design.

Data availability statement

The original contributions presented in this study are included in this article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the Iowa State University Office of Research Ethics. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Variable- and person-centered approaches to examining construct-relevant multidimensionality in writing self-efficacy

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Self-efficacy is an essential component of students' motivation and success in writing. There have been great advancements in our theoretical understanding of writing self-efficacy over the past 40 years; however, there is a gap in how we empirically model the multidimensionality of writing self-efficacy. The purpose of the present study was to examine the multidimensionality of writing self-efficacy, and present validity evidence for the adapted Self-Efficacy for Writing Scale (SEWS) through a series of measurement model comparisons and person-centered approaches. Using a sample of 1,466 8th–10th graders, results showed that a bifactor exploratory structural equation model best represented the data, demonstrating that the SEWS exhibits both construct-relevant multidimensionality and the presence of a global theme. Using factor scores derived from this model, we conducted latent profile analysis to further establish validity of the measurement model and examine how students disaggregate into groups based on their response trends of the SEWS. Three profiles emerged, differentiated by global writing self-efficacy, with substantively varying factor differences among the profiles. Concurrent, divergent, and discriminant validity evidence was established through a series of analyses that assessed predictors and outcomes of the profiles (e.g., demographics, standardized writing assessments, and grades). Theoretical and practical implications and avenues for future research are discussed.

KEYWORDS

writing, self-efficacy, latent profile analysis, bifactor, latent model

Introduction

> "Self-belief does not necessarily ensure success, but self-disbelief assuredly spawns failure"
> -Bandura, *Self-Efficacy: The Exercise of Control, 1997*

As a foundational component to Bandura's (1997) social cognitive theory, self-efficacy, or "beliefs in one's capabilities to organize and execute the courses of action required to

produce given attainments" (p. 3), is an integral component to the function of human agency. Self-efficacy describes how self-perceptions of capacity to perform tasks and skills influence one's behavior, affect, persistence, and achievement. The act of writing necessitates various interrelated sub-skills, frames, and procedures – spelling, grammar usage, punctuation, organization, voice, prose – and the ability to orchestrate them in a cohesive manner. As a highly complex and challenging process, writing self-efficacy plays an important role in writing success (Pajares and Johnson, 1996; Graham et al., 2019; Wijekumar et al., 2019). And, given that writing is instrumental in society, research over the past several decades has focused great attention to how, why, and to what degree efficacious beliefs influence writing performance and the relationship between writing self-efficacy and other forms of motivation (see Klassen and Usher, 2010; Honicke and Broadbent, 2016). However, little attention has focused on examining psychometrically sound instruments to capture the multidimensionality of writing self-efficacy (Zumbrunn et al., 2020). The overarching purpose of this study was to examine the dimensionality of writing self-efficacy and build validity evidence for a measure of writing self-efficacy – the adapted Self-Efficacy for Writing Scale (SEWS; Ekholm et al., 2015; Zumbrunn et al., 2016).

Writing self-efficacy

Effective writing requires more than adequate knowledge, skills, and competencies. As is true of performance across every academic domain, successful writing also requires efficacy beliefs strong enough to regulate knowledge, skills, and competencies throughout the writing process (Bandura, 1993). Integral to both effort and persistence (Bandura, 1997; Schunk and Usher, 2012; Schunk and DiBenedetto, 2016), self-efficacy has been extensively studied as a major component to writing motivation (Pajares, 2003, 2007; Schunk, 2003). For example, prior studies illustrate writing self-efficacy's relation to powerful motivational concepts such perceived value (Shell et al., 1995), self-concept (Pajares et al., 2000), attitudes (Bruning et al., 2013), and apprehension (Sanders-Reio et al., 2014). Writing self-efficacy has shown to be a robust predictor of writing achievement across many studies, making a strong and independent contribution to writing performance, even when controlling for prior ability or achievement (Shell et al., 1989, 1995; Zimmerman and Bandura, 1994; Pajares and Johnson, 1996; Pajares and Valiante, 1997, 2001; Pajares et al., 1999, 2007a; Bruning and Horn, 2000; Troia and Graham, 2016, Graham et al., 2017, 2019; Wijekumar et al., 2019). Furthermore, Graham's (2018) Writer(s)-Within-Community model suggests beliefs associated with writing capabilities are a core component to how writers situate themselves within specific contexts, times, places, environments, or writing communities, while also contributing to the "capital" they bring forward. In doing so, such beliefs are influential not only to the production of writing (see Hayes, 1996), but also important to the moderating influence of control mechanisms (e.g., decisions, attention regulation, agency, emotions, and thoughts).

Though the depth of literature on writing self-efficacy underscores the value in understanding, measuring, and optimizing student writing self-efficacy, the ability to capture, measure, or otherwise operationalize writing self-efficacy has not been without difficulty (Pajares, 2003; Klassen and Usher, 2010). Self-efficacy researchers have consistently been warned that without adhering to proper item wording, time-vantage, focus, and conceptualization, "the future of self-efficacy research as a theoretically grounded means of understanding human behavior is threatened" (Klassen and Usher, 2010, p. 20). Given this, the field has recently progressed both in its theoretical alignment and focus on specific process-oriented facets within the domain of writing (Klassen and Usher, 2010; Bruning et al., 2013). However, little research has focused on the psychometric properties of measures of writing self-efficacy (Tate and Warschauer, 2018).

The measurement and structure of writing self-efficacy

Over the past 40 years, researchers have used various methods of item reduction [e.g., exploratory factor analysis (EFA)], reliability, and confirmatory factor analyses (CFAs), to evaluate the psychometric quality of writing self-efficacy measures (McCarthy et al., 1985; Shell et al., 1989, 1995; Pajares et al., 1999; Pajares and Valiante, 2001). Contemporary work increasingly applies advanced psychometric methods (Brown, 2015; Kline, 2016). For example, work by Engelhard and Behizadeh (2012) used Rasch measurement theory (a type of item response theory; Rasch, 1960) to examine the psychometric quality of the Writing Self-Efficacy Scale (WSES; Pajares et al., 1999). Similarly, De Smedt et al. (2017, 2018) and Zumbrunn et al. (2020) employed structural equation models to examine writing self-efficacy's relationship to other motivational and cognitive constructs.

Writing self-efficacy has been commonly depicted as a unidimensional factor (Pajares and Valiante, 2006); however, a growing literature suggests that it is multidimensional (Bruning et al., 2013; MacArthur et al., 2015; De Smedt et al., 2016, 2017, 2018; Zumbrunn et al., 2020). This newer research has consistently added and organized items focused on efficacy toward writing self-regulation (e.g., focus, strategy use, and planning) and other cognitive components (e.g., ideation, creativity, and idea development) involved in the writing process (e.g., Bruning et al., 2013; MacArthur et al., 2015; Graham et al., 2017, 2019; Wijekumar et al., 2019). Of these, Bruning et al.'s (2013) SEWS focuses on the efficacious beliefs of *ideation*, traditional writing *conventions*, and *self-regulation*, and has been widely used and adapted since publication (e.g., Ekholm et al., 2015; De Smedt et al., 2016, 2017, 2018; Zumbrunn et al., 2016; Ramos-Villagrasa et al., 2018). Therein, *ideation* serves to depict a writer's efficacy beliefs of their ability to produce, create, and use ideas. *Conventions*, like many measures focused on writing's skills and tasks, seeks to capture a writer's efficacy beliefs associated with common standards, such as grammar and spelling, that are employed to communicate with writing. Lastly, *self-regulation* depicts a writer's confidence to "direct themselves" (affective response), organize, and navigate through the writing process (Bruning et al., 2013).

Several studies have confirmed the multidimensional factor structure originally portrayed by Bruning et al. (2013), De Smedt et al. (2016, 2017, 2018), and Yilmaz Soylu et al. (2017). Additional studies have adapted or extended the SEWS to new languages and samples (Ekholm et al., 2015; Zumbrunn et al., 2016; Ramos-Villagrasa et al., 2018). Ekholm et al. (2015) adapted the SEWS by reducing it to 9 items, yet in doing so confirmed a single factor structure with an undergraduate sample. Extending this work to be more developmentally appropriate for younger writers, Zumbrunn et al. (2016) further adapted the SEWS by adjusting the traditional 0–100 rating scale to a 0–4 rating scale. Incorporating both adaptations, recent work by Zumbrunn et al. (2020), which used a 9-item, 0–4 rating scale, adaptation of the SEWS, found

a 3-factor measurement structure invariant across elementary and high-school students. Furthermore, DeBusk-Lane et al. (2021) and Zumbrunn et al. (2020) found a 3-factor measurement structure of the adapted SEWS with both elementary and secondary school students. Although a well-fitting 3-factor structure is seemingly evident across developmental spectrums, this structure has also exhibited statistical clues (e.g., strong latent factor correlations) that suggest other models may more accurately model the data. This study will extend the existing literature by testing CFA, exploratory structural equation models (ESEM), and bifactor ESEM models that consider various perspectives of modeling factor relationships and the potential presence of a global factor.

Aligning a measurement model with theory

Two issues have emerged related to the ways in which the SEWS has traditionally been modeled. First, because the measure was originally constructed to capture efficacious beliefs of writing collectively through multiple related dimensions, it is likely that it does, in fact, represent both global and specific constructs. It is both theoretically aligned and logically plausible to expect subscales within a measure with related domain-specific facets to exhibit some amount of a global (or hierarchical) factor that reflects participants' overall sense of writing self-efficacy (Reise et al., 2013). Theoretically, Bandura (1997) explained that self-efficacy factors may share similar subskills, incorporate skills that are developed together, enact similar self-regulatory mechanisms, use similar approaches to problem solving, and query constructs that similarly draw from past experiences that have bolstered one's belief in their ability, thus implying a multidimensional factor structure.

Further, recent empirical evidence brings into question whether the adapted SEWS is best modeled by three distinct factors (Zumbrunn et al., 2020, 2021; DeBusk-Lane et al., 2021) or a single factor alone (Ekholm et al., 2015; Zumbrunn et al., 2016). Across both the original 16- and the adapted 9-item measures, moderate latent factor correlations, large first factor eigenvalues, and moderate correlations among the specific latent factors to other unidimensional writing self-efficacy measures suggest the presence of a hierarchical or global factor (e.g., Reise et al., 2013; MacArthur et al., 2015; Ramos-Villagrasa et al., 2018; Zumbrunn et al., 2020, 2021; DeBusk-Lane et al., 2021).

Second, it can be expected that efficacious beliefs derived and exhibited by items that query beliefs associated with "writing even when it is difficult" likely translate and extend to cross-factor items that query beliefs associated with a writer's effort to "think of words to describe my ideas." This conceptual overlap suggests that items may be related to more than one specific factor. Therefore, because the items themselves are imperfect indicators that likely associate with other similar latent constructs, aside from their *a priori* forced factor relationship, current depictions through CFA may not fully depict reality (Asparouhov et al., 2015; Morin et al., 2016a, 2017).

Together, these two hypothesized influences (i.e., global or hierarchical factor and item cross-factor relationships or cross-loadings) are referred to as sources of construct-relevant psychometric multidimensionality (Morin et al., 2016b, 2017). In typical CFA models, item factor relationships restrict cross-loadings to zero, forcing true-score variability between factors (of both cross-loading and hierarchical/global factors) to be absorbed by only *a priori* factors, negating both the presence of hierarchically ordered and conceptually overlapped constructs, which may result in bias parameter estimates (Asparouhov et al., 2015).

Given these issues, there is a clear need to further examine how the SEWS' is modeled. To further examine the presence of a global construct, various bifactor or hierarchical models may more accurately model efficacy beliefs derived collectively from the SEWS' measurement items. Additionally, to better understand how the items interrelate, measurement models that allow multiple cross-loadings between items and multiple latent factors (e.g., ESEM) may provide a better vantage of the unique relationships between conceptually related items.

Beyond gaining a better understanding of how to best model the SEWS, there is also ample room to explore the measure's validity. In this case, although the original SEWS has been related to other psychological and motivational constructs (see De Smedt et al., 2017, 2018; Zumbrunn et al., 2020), these constructs are commonly modeled by either composite scores (specific factor item means) or latent factor values in variable-centered analyses. Variable-centered approaches rely on the assumption that all participant data are collected from a uniform population from which averages are derived, whereas person-centered approaches assume the sample may include several sub-populations (Masyn, 2017). Specifically, variable-centered approaches (factor models) "decompose" covariances to describe relationships between and among variables, while person-centered approaches use covariances to explain and describe relationships between individuals (Bauer and Curran, 2004). The person-centered approach taken in this study allowed us to examine the possibility that students may not be uniform across all dimensions of writing self-efficacy, but rather, that there are subgroups of students characterized by unique clusters of writing self-efficacy dimensions. Although there are many person-centered approaches (e.g., hierarchical clustering, and *K*-means), we used latent profile analysis (LPA). Comparatively, LPA is a model-*based* approach that provides a probability-based classification generated from maximum likelihood methods, misclassification (error) estimates, more nuanced group membership mean estimates, various fit statistics to help determine the number of groups, and classification error adjusted analyses related to group predictors and outcomes (Magidson and Vermunt, 2002).

The purpose of this study was to examine the multidimensionality of writing self-efficacy using ratings from the adapted SEWS and provide further validity evidence (Ekholm et al., 2015; Zumbrunn et al., 2016). To date, no other study has examined the adapted SEWS beyond traditional CFA model depictions, which have been shown to be limited and less accurate among multidimensional measures (Morin et al., 2016a, 2017). With the growing trend of statistically assessing latent concepts with structural equation modeling, it is important to accurately model the data to ensure relational parameter estimates represent true scores and construct-irrelevant variation. To better understand and help further validate the SEWS, this study will employ LPA to identify unique clusters of writing self-efficacy, as well as continue to examine predictors (e.g., demographics) and related outcomes (e.g., standardized writing assessments) of the identified profiles. To demonstrate validity evidence, the adapted SEWS will also be examined as it relates to both writing apprehension and a separate writing self-efficacy measure, the WSES (Pajares, 2007).

Materials and methods

This work is guided by a series of research questions that first assess the presence of two sources of construct-relevant multidimensionality (RQ1 and RQ2), and then examine the dimensionality and profile validity using a person-centered approach (RQ3 and RQ4).

1. Are the items of the SEWS conceptually related across *a priori* factors?
2. Does the SEWS exhibit hierarchically ordered constructs?
3. What specific quantitative profiles of writing self-efficacy emerge?
4. What forms of validity evidence are found for the profiles of the SEWS?
    a. Do the profiles exhibit concurrent validity evidence based on responses to the WSES?
    b. Do the profiles exhibit divergent/discriminant validity evidence based on responses to the Writing Apprehension Scale (WAS-12)?
    c. Do the profiles exhibit predictive validity?

Participants

All 1,466 participants were 8th through 10th graders in a large southeastern school division in the United States. During 2018–2019 school year, this division consisted of 48.5% female, and 32.0% identified as economically disadvantaged [which includes those eligible for Free/Reduced Meal or receives Temporary Assistance for Needy Families (TANF), those eligible for Medicaid, or Identified as either migrant or experiencing Homelessness], 9.8% English Language Learners (ELL), and 12.5% students with disabilities. The division is also racially diverse, including students who identify as less than 1% American Indian or Alaskan Native, 3.3% Asian, 25.6% Black or African American, 49.3% White, 16.4% Hispanic, less than 1% Native Hawaiian or Other Pacific Islander, and those who identified as non-Hispanic, but two or more races 4.9%. Demographics across grades 8 through 10 are comparable to the overall averages.

Measures

Demographic variables

To both accurately describe the sample and provide validity evidence of profiles, we requested several demographic and prior performance measures from the partnering school division, including participants' sex, race/ethnicity, first quarter grades, and standardized writing scores.

Writing self-efficacy

The adapted SEWS (Ekholm et al., 2015; Zumbrunn et al., 2016), originally developed by Bruning et al. (2013), was the primary measure for this study. The modified version of this scale consists of nine items that ask students to rate, on a scale form 1 (*Almost never*) to 4 (*Almost always*), how confident they are that they can perform specific writing processes. Two studies reported McDonald's Omega (Deng and Chan, 2017; McNeish, 2017) for each factor: conventions, ideation, and self-regulation at 0.65, 0.79, and 0.80, and 0.61, 0.77, and 0.75, respectively (Zumbrunn et al., 2020; DeBusk-Lane et al., 2021). The full scale is provided in the **Supplementary material**.

Validity-building predictors and outcomes

To support a substantive interpretation and develop validity evidence of the profiles, the person-centered approach used several predictors and outcomes. In addition to assessing the demographic variables, we also examined two other measures to provide additional criterion-related validity evidence: the WSES (Pajares, 2007) and a shortened version of the WAS (Daly and Miller, 1975; Pajares and Johnson, 1994; Bline et al., 2001), the 12-item Writing Apprehension Scale (WAS-12; Limpo, 2018). The WSES was chosen, based on both its broad usage in prior literature and the extent to which it has been statistically evaluated, to provide concurrent validity evidence to the SEWS. The WAS-12 was chosen, also based on its extensive use and statistical reliability, to provide concurrent divergent/discriminant validity evidence. Lastly, a standardized writing assessment across the grades was examined as a primary outcome.

Standardized writing assessment scores (8th and 10th grade). Both the 8th and 10th grade participants participated in a statewide standardized writing assessment. For all students, the first component required students to correct errors embedded in sections of a notional rough draft of student writing. The second component required students to write a short paper in response to an expository or persuasive prompt; papers were scored on a scale of 1 (low) to 4 (high) by two trained readers using a holistic rubric including the components of composing/written expression and usage/mechanics. At the time of this study, the school division was piloting a new performance-based writing assessment that required a local rubic – no computation of reliability is available. Documentation that guided the development of the grading rubric may be found in **Supplementary material**. This assessment was conducted approximately 2-weeks after participants completed all other measures included in this study. Therefore, this assessment served to provide predictive validity by inspecting the relationship between writing efficacy beliefs and writing performance.

Writing Self-Efficacy Scale (Pajares, 2007). The WSES scale consists of 10 items asking students how sure they are at performing a specific writing skill on a scale of 0 (*no chance*) to 100 (*completely certain*). Pajares (2007) reported a two-factor solution representing basic grammar skills and advanced composition skills, individual factor Cronbach alpha coefficients of 0.88 and 0.86 respectively, and similar factor and reliability findings at the elementary, middle school, and high-school levels, among 1,258 students from grades 4–11.

Writing Apprehension Scale-12 (Limpo, 2018). The WAS-12 is a 12-item shortened version of the 63-item WAS originally presented by Daly and Miller (1975) that was, through item reduction, reduced to 26 items representing a single factor. Similarly, through item reduction techniques, 12 items that represented two salient factors, concern and affect, were presented with Cronbach's alphas for each facet greater than 0.85 (Limpo, 2018).

Importantly, the WAS-12 was previously presented with concurrent validity to Pajares and Valiante (1999) WSES, where the "affect" (*I like writing*) facet was positively correlated (although not significantly) and the "concern" facet was negatively significantly

related. These findings are in-line with previous work that has examined writing anxiety and writing self-efficacy (Pajares and Johnson, 1994; Pajares and Valiante, 1999; Goodman and Cirka, 2009; Martinez et al., 2011; Sanders-Reio et al., 2014; Limpo, 2018).

Procedures

All survey data was collected in January 2018 as part of the partnering school division's priority to assess student writing motivation. Survey data was collected online, and each item was presented iteratively with the overall directions for each applicable section as a header. Students had no time limit to complete the survey, and teachers were instructed to not provide help in clarifying or explaining survey directions or items. All psychological measures were collected in one sitting in each student's English class.

Analysis

The data analytic plan encompassed two phases, a variable-centered approach that consisted of multiple factor model comparisons, and a person-centered approach that consisted of a LPA and subsequent analyses.

Variable centered analyses (RQ1 and RQ2)

The analyses, unless otherwise noted, were estimated in Mplus version 8.2 using the robust weighted least square estimator using diagonal weight matrices for the factor models (WLSMV; Muthén and Muthén, 1998–2017). All measurement models are depicted in **Figure 1**.

To answer RQ1 and RQ2, which focus on examining the SEWS' hierarchical and item cross-association, several model comparisons were needed. In total, participant responses on the SEWS were represented with seven models: EFA, CFA, hierarchical CFA (h-CFA), bifactor CFA (b-CFA), ESEM, hierarchical-ESEM (h-ESEM), and a bifactor-ESEM model (b-ESEM). For all models, we report item descriptive statistics [distribution, polychoric correlation coefficients (Finney and DiStefano, 2006), model-based omega coefficients of composite reliability (Deng and Chan, 2017; McNeish, 2017)], standardized factor loadings, and model fit indices. When applicable, we report omega hierarchical or omega hierarchical subscale coefficients to extract how much variability accounted for by the global factor (Rodriguez et al., 2016).

Model evaluations

Model evaluations in this study relied on goodness-of-fit indices and the substantive interpretation of parameter estimates, as the use of the Chi-square test of exact fit and the Chi-square differences test is biased due to sample size and model misspecifications (Marsh et al., 2005; Kline, 2016). We used the following: the comparative fit index (CFI; Bentler, 1990); the Tucker–Lewis index (TLI; Tucker and Lewis, 1973); the root-mean-square error of approximation (RMSEA; Steiger, 1990; and its 90% confidence interval); and the standardized root-mean-squared residual (SRMR; Asparouhov and Muthén, 2018). Following established guidelines (e.g., Marsh et al., 2005; Kline, 2016), CFI and TLI greater than 0.9 and 0.95 was considered indicative of excellent fit to the data, respectively. For RMSEA and SRMR, values less than 0.05 and 0.08 are contended to be of excellent fit to the data, respectively (Hu and Bentler, 1998, 1999; Asparouhov and Muthén, 2009, 2018). Additionally, each model comparison included inspections of parameter estimates, statistical conformity, and theoretical adequacy (Fan and Sivo, 2009).

As suggested in Morin et al. (2016a), the CFA and ESEM model was first compared (RQ1). Assuming the ESEM target factor loadings remain strong and well-established (similar to CFA), the precision for which the factor correlations are modeled will likely be superior in the ESEM and reduced (Asparouhov et al., 2015). Unexpected and theoretically difficult to explain cross-loading in the ESEM model could suggest needed changes at the item level. Next, depending on which initial model fit the data best (CFA vs. ESEM), its corresponding hierarchical and bifactor model was compared (RQ2). To be clear, subsequent model comparisons for RQ2 were directly dependent on the optimal model from RQ1.

Person-centered analyses (RQ3)

We used factor scores derived from the best fitting variable-centered measurement model in the person-centered approach. Factor scores were derived from Mplus (Muthén and Muthén, 1998–2017). This process will model qualitative differences between profiles over and above any globally held attribute of writing self-efficacy, while also providing clarity of Global (G)-factor differences between profiles.

Using this approach, we extracted profiles using Mplus 8.2's (Muthén and Muthén, 1998–2017) MLR estimator, 10,000 random starts, 1,000 iterations for the random starts, and 500 final stage optimizations (Hipp and Bauer, 2006). To generate iterative profiles of increasing profiles, we used MplusAutomation, which is an R package used to systematically execute several Mplus input files, to arrange and run all enumeration files (Hallquist and Wiley, 2018; R Core Team, 2019).

For enumeration, we estimated LPAs with 2–7 profiles using the factor scores (Nylund-Gibson and Masyn, 2016) derived from the best fitting measurement model. Following the split-sample cross-validation procedures outlined in Masyn (2013), we randomly split (stratified) the sample approximately equally into "calibration" and "validation" sets, representative to sex, ELL, and grade level (other covariates were not representative to this split due to sample size considerations). Once split, the following enumeration process was performed on the calibration data.

To enumerate these data, we selected models based on multiple statistical indices, theoretical interpretability, and substantive meaningfulness (Nylund et al., 2007; Marsh et al., 2009). Statistical indices included minimum values of Akaike information criterion (AIC), Bayesian information criterion (BIC), and sample-size adjusted BIC (aBIC). Smaller values of AIC, BIC, and aBIC estimates indicate more parsimony when comparing models (Collins and Lanza, 2010; Geiser, 2013). The entropy value and classification probabilities were also examined, with values closer to 1 indicating higher precision and reliability of classification (Jung and Wickrama, 2008). Although entropy alone was not used as a determinant metric, it offers valuable information about how the profiles relate and are distributed (Lubke and Muthén, 2007). We also employed the bootstrapped likelihood ratio test (BLRT), and the Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMR-LRT) to compare nested models (Muthén and Asparouhov, 2012). These model comparison tests compare the model with k latent classes to the model with $k-1$ latent classes, whereby a non-significant

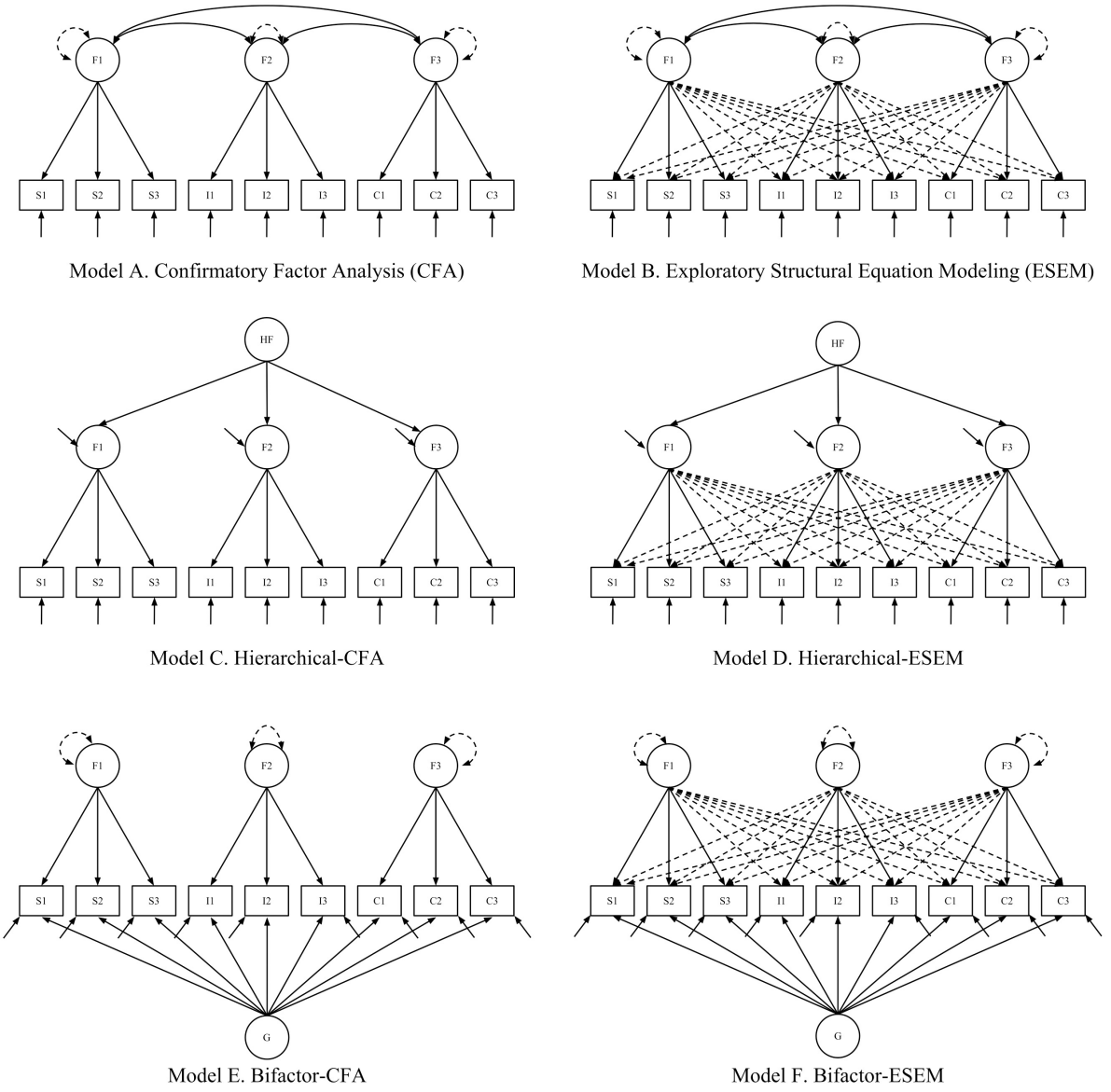

FIGURE 1
Measurement models based on the 3-factor Self-Efficacy for Writing Scale (SEWS).

p-value indicates the $k-1$ class should be favored (Muthén and Asparouhov, 2012). It should be noted that these indices and tests are heavily influenced by sample size (Marsh et al., 2009). In such cases, these indices will continually suggest an increasing number of profiles, as AIC and BIC will continue to decline as profiles increase, suggesting each is a better fitting model. To mitigate this, we used elbow-plots to graphically depict information criteria, where the point after the slope flattens is recommended as the optimal number of profiles (Petras and Masyn, 2010; Morin et al., 2011). All enumeration statistics are reported in **Supplementary material**.

Once a profile solution was determined from the calibration data, we followed the split-sample double cross-validation procedures outlined in Masyn (2013). If successful, the model would be used for the entire sample (Collins et al., 2010; Masyn, 2013). If unsuccessful, a more substantive approach would be taken, whereby similar profiles found between the calibration and validation data would be assessed for similarity (Morin et al., 2016d). Like common measurement model invariance testing, Morin et al. (2016d) procedures compare models across increasing equality constraints to assess configural, structural, dispersion, and distributional similarity.

Predictor analyses (RQ4a and RQ4b). We assessed each predictor [sex, race/ethnicity, grade, and prior year standardized assessment (when applicable)] for its influence on profile membership both individually and collectively. Scores from both the WSES and the WAS-12 were also included as predictors to add validity evidence to the profiles. We used Mplus' R3STEP procedure (to account for profile classification error) that results in a series of multinomial logistic regressions to examine how each predictor alone, and accounting for the others, influenced the likelihood of membership in the profiles.

Outcome analyses (RQ4c). Each outcome (WSES, WAS-12, and standardized writing assessments) was assessed across the profiles.

Using a similar statistical approach as R3STEP, Mplus' BCH method evaluates the means of outcome variables across profiles (Vermunt, 2010; Bakk and Vermunt, 2016).

Results

Descriptive statistics

Table 1 displays all disaggregated demographic data for sex, race/ethnicity, and grade level for the total sample of students. Minoritized race/ethnicity groups included students from the following backgrounds: American Indian or Alaskan Native, Black or African American, Hispanic, Native Hawaiian or Other Pacific Islander, and those who identified as non-Hispanic, but two or more races.

Overall, item response distributions were commonly negatively skewed, yet still within normally accepted ranges of −1 to 1 (Kline, 2016; Table 2). The "conventions factor," however, was noticeably negatively skewed (Item 1 = −2.277; see Table 2) and exhibited strong kurtosis. Omega values for the SEWS' original 3-factor structure were adequate (ω = 0.58–0.76) and similar to past work reporting omega composite reliability (Zumbrunn et al., 2020).

Variable-centered findings

The EFA models suggested the presence of three salient factors, aligned with *a priori* item-to-factor loadings with adequate fit (see Table 3). All confirmatory and ESEM models provided adequate fit to the data (CFI: 0.981–1.000, TLI: 0.971–1.000; see Table 3), however, as the models progressed, they generally continued to improve. An exception, the h-CFA's fit declined compared to the base 3-factor CFA. Judging from these fit statistics alone, the bifactor ESEM model was retained (Morin et al., 2016b, 2017).

Research question 1

To determine the extent to which the items of the SEWS exhibited construct-relevant psychometric multidimensionality due to the presence of conceptually related constructs, we compared the CFA to the ESEM model. Overall, both models fit the data well, however, the ESEM model's goodness-of-fit statistics were marginally better. For example, the CFA exhibited an RMSEA of 0.067, while the ESEM model 0.029, suggesting the ESEM model had less error of approximation and has excellent fit (MacCallum et al., 1996). Latent factor correlations were stronger for the CFA (| r| = 0.510–0.808, M = 0.652) than the ESEM (| r| = 0.428–0.704, M = 0.547), suggesting the ESEM model provided a more distinct vantage of the specific factors compared to the CFA. Standardized parameter estimates (factor loadings and residual variances) for both the CFA and the ESEM are presented in Table 4.

As expected, an examination of the parameter estimations across both the CFA and ESEM models suggested both models exhibited strong factor to item relations [CFA: | λ| = 0.538–0.857, M = 0.756; ESEM (*a priori* items only): | λ| = 0.549–0.970, M = 0.711]. As depicted in Table 4, the *a priori* factor loadings across the ESEM model were weaker, suggesting a more accurate depiction of true score variation in comparison to the CFA. Interestingly, target factor loadings across the factors (target only: | λ| = −0.195–0.221, M = 0.042) were commonly statistically significant, yet lacked strength. This may indicate that many of the items exhibit a common theme and could better be exhibited by a general factor. Together, these findings suggest the ESEM model more accurately depicted true score variation and accounted for construct-relevant multidimensionality from conceptually related constructs between the latent factors of the SEWS.

Research question 2

To examine if the SEWS exhibits construct-relevant psychometric multidimensionality due to the presence of a hierarchically ordered construct, we compared the ESEM model (previously found to be superior to the CFA) to both the hierarchical ESEM and bifactor ESEM models. Drawing from the model selection procedures adopted from Morin et al. (2016b), we did not examine the bCFA. Overall, the fit of all three ESEM models was excellent. Of note, however, the hESEM model fit was asymptotic to that of the ESEM model, as the first-order factor correlations (now disturbances) from the ESEM model were modeled as factor loadings. Because of this, degraded fit, and the fact that second-order models are less interpretable and theoretically useful, this comparison was omitted.

The bESEM model did not converge in its original configuration. In assessing the failed model, it was found that item 1 ("I can write complete sentences") was heavily negatively skewed, as 80.2% of all responses (n = 1,176) were for "*Almost always*." Taking a substantive approach to this item, it is developmentally appropriate and therefore expected that most secondary students are capable and view themselves as capable of "writing a complete sentence," and our participants responded accordingly, obviously negatively skewing the response distribution. This item also stands apart from the other two within-factor items that did not reflect a similar response trend. Interestingly, on inspecting the initial confirmatory and base ESEM models, this item did not strongly or abnormally present itself, as the WLSMV is well known to control and handle non-normal item distributions (Finney and DiStefano, 2006). Therefore, identifying this item's response distribution as problematic only in a bifactor exploratory structural equation scenario is both statistically and pragmatically relevant and useful to future research in this area.

Upon removing this item, the bESEM model adequately converged and a full parameter inspection was conducted to ensure the specific *conventions* factor displayed normal functioning and adequately represented a meaningful latent factor from the two remaining freely estimated items that sufficiently differentiated from the other specific factors and target items (Brown, 2015; Kline, 2016; see Table 5). In doing so, the specific *conventions* factor displayed expected *a priori* and target parameter estimates, clearly delineating a unique and meaningful factor. For this factor alone, *a priori* factor loadings ranged from 0.375 to 0.724, while target (as close to zero as possible) loadings ranged from −0.084 to 0.033 and global factor loadings ranged from 0.326 to 0.474 (see Table 5). Therefore, despite dropping item 1, the bESEM adequately modeled the data well and was used in comparison to the ESEM model.

Compared to the ESEM model, the bESEM model goodness-of-fit indices were superior (see Table 3). To be clear, however, given the parameter estimation set-up inherent to a bESEM model, it was somewhat expected to find a nearly perfect fit (CFI of 1.0, nearly optimal RMSEA and SRMR, degrees-of-freedom approaching just-identified, and a non-significant Chi-square). Therefore, we inspected

TABLE 1 Descriptive statistics for demographic variables.

	N%		Sex				Minority			
			Male		Female		Non-minority		Minority	
N%	1,466		727	0.50	739	0.50	810	0.55	656	0.45
Grade										
8	203	0.14	117	0.08	86	0.06	152	0.10	51	0.03
9	488	0.33	213	0.15	275	0.19	252	0.17	236	0.16
10	775	0.53	397	0.27	378	0.26	406	0.28	369	0.25

the model estimates to best gauge the model's value over and above the ESEM model.

The bESEM's G-factor exhibited strong significant factor loadings for all items (| λ| = 0.326–0.820; *M* = 0.625). In most cases, the strength of the factor loading on the G-factor exceeded that of the S-factors. Although factor loading significance is derived from the ratio between the loading strength and its standard error and simply provides a statistical test to determine if the loading is significantly different than zero, it does suggest which loadings likely provide practical significance. For example, although the target loading of item 6 was statistically significant on the *conventions* factor, the strength of the loading suggested it may not be practically significant. Nevertheless, most of the S-factor loadings (| λ| = 0.087–0.724; *M* = 0.409) were markedly stronger than the target loadings (| λ| = −0.009–0.154; *M* = −0.002).

Although the strength of the S-factor loadings are commonly less than that assumed by the G-factor, it can be expected that the factor correlations reported for the ESEM model (| *r*| = 0.428–0.704, *M* = 0.547) were somewhat consumed and re-expressed by increased factor loadings on the G-factor due to having an orthogonal latent factor arrangement. Items 2 and 7 exhibited weak loadings on their *a priori* factor (λ = 0.087 and 0.179, respectively), yet strong loadings on the G-factor (λ = 0.723 and 0.820, respectively), suggesting these items related stronger to global efficacious beliefs toward writing than specific efficacious beliefs toward writing *ideation*. Ultimately, the *ideation* factor appeared to contribute less specific relation within the model (1.91% of the reliable variance) than either the *conventions* or *self-regulation* factors, which exhibit some items that provided stronger parameter estimates toward the S-factor than the G-factor. Additionally, as depicted by OmegaH, the global factor assumed approximately 87% of the reliable variance, suggesting there is a robust theme that runs congruent amongst all the variables therein. Therefore, this model provided a superior depiction of and fit to the data, as suggested by both the goodness-of-fit indices and the extent to which the parameter estimates are generally supportive of a general factor, while also exhibiting specific factor variability. Furthermore, the strength of the G-factor substantiates the need to more accurately model construct-relevant psychometric multidimensionality in relation to globally structured concepts.

Although a well-fitting and interpretable bESEM model was reported, the validity and overall statistical extent to which the latent factors represented each set of items was not explored. Future research would do well to examine more robust statistical approaches to examining if each latent construct was reliable or exhibited construct replicability (Hancock and Mueller, 2001; Rodriguez et al., 2016). Such statistical tests as index H, which is defined as the sum of the ratios of the items' squared loadings (often explained to be the proportion of variance explained by the factor) on a particular factor to 1 minus the squared loading (unexplained variance), represents a statistical method to examine construct reliability to judge how well a latent variance is represented by the items (Hancock and Mueller, 2001). Additionally, it would be beneficial to examine explained common variance (EVC), which assesses the unidimensionality of the common variance in a set of items to determine if a bifactor representation should actually, given a strong global factor, be treated as unidimensional (Ten Berge and Sočan, 2004; Reise et al., 2013). Future research is needed to fully and statistically establish the appropriateness of a bifactor ESEM representation, as statistical support is essential to ensuring the model is both accepted and appropriate to develop theory and be employed practically. Along this same initiative, future research would do well to also ensure that the ideation factor is statistically meaningful. Using similar tests, research should examine whether this factor can be fully assumed by the global factor.

Person-centered findings

Research question 3

To establish the extent to which the data disaggregates into discernable, meaningful, and interpretable profiles, we first enumerated a calibration data set using the bESEM factor scores. Examining the bESEM calibration enumeration, the non-significant aLMR *p*-value indicated the 3-profile model was favored. The double split-sample cross-validation method, however, suggested the 3-profile solution was not congruent across the entire sample ($p = 0.0001$ and 0.0026, respective to both cross-validation adjusted Chi-square LRTs; see **Supplementary material**). This split-sample cross-validation method was then deployed to the 4-profile, 5-profile, and 6-profile calibration and validation data, also with no success in replicating the profile configurations across the entire sample.

Despite this, we substantively inspected both the calibration and validation 3-profile solutions and found they had very similar profile means, variances, and proportions. Therefore, we assessed the profile similarity using Morin et al.'s (2016d) multi-group tests of similarity. As evidenced by continued model fit improvements from CAIC, BIC, and aBIC, it was determined that the two samples met *configural, structural, dispersion,* and *distributional* similarity, validating the 3-profile solution across the entire sample. From this, we also statistically and substantively inspected the 4-profile solution to ensure a 3-profile solution provided a better vantage.

The 4-profile solution replicated the major profiles exhibited by the 3-profile solution, but also included a profile that exhibited low *global* and *ideation* (−0.393, −0.653 factor score averages,

TABLE 2 Adapted Self-Efficacy for Writing Scale response frequencies and descriptive statistics.

	N	Almost never (1)		2		3		Almost always (4)		*M*	σ^2	Skewness	Kurtosis
Self-efficacy for ideation		*n*	*p*	*n*	*p*	*n*	*p*	*n*	*p*				
ω = 0.79, CI [0.763, 0.805]													
2. I can think of many words to describe my ideas.	1,466	27	0.018	199	0.136	691	0.471	549	0.374	3.216	0.241	−0.628	−0.039
6. I can think of many ideas for my writing.	1,466	79	0.054	313	0.214	630	0.430	444	0.303	2.994	0.721	−0.482	−0.465
7. I can put my ideas into writing.	1,466	46	0.031	252	0.172	619	0.422	549	0.374	3.149	0.650	−0.629	−0.276
Self-efficacy for mechanics													
ω = 0.62, CI [0.582, 0.658]													
1. I can write complete sentences.	1,466	4	0.003	41	0.028	245	0.167	1176	0.802	3.776	0.241	−2.277	5.253
3. I can punctuate my sentences correctly.	1,466	21	0.014	158	0.108	580	0.396	707	0.482	3.359	0.513	−0.857	0.164
5. I can spell my words correctly.	1,466	44	0.030	190	0.130	609	0.415	623	0.425	3.239	0.623	−0.809	0.085
Self-efficacy for self-regulation													
ω = 0.78, CI [0.762, 0.802]													
4. I can concentrate on my writing for a long time.	1,466	116	0.079	446	0.304	603	0.411	301	0.205	2.742	0.761	−0.196	−0.682
8. I can avoid distractions when I write.	1,466	235	0.160	484	0.330	545	0.372	202	0.138	2.485	0.832	−0.045	−0.811
9. I can keep writing even when it is difficult.	1,466	186	0.127	523	0.357	548	0.374	209	0.143	2.541	0.774	−0.031	−0.710

Omega coefficients of composite reliability were computed using 1,000 bootstrapped samples along with bias corrected confidence intervals (see Zhang and Yuan, 2016). By scale response, both the sub-sample quantity (n) and the proportion ($\hat{p}$) are provided.

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TABLE 3 Goodness-of-fit of all models.

Model	Chi-square	df	CFI	TLI	RMSEA (90% CI)		RMSEA *p*	SRMR
EFA 1	550.182	27	0.853	0.804	0.115	[0.107, 0.123]	0.000	0.068
EFA 2	337.031	19	0.911	0.831	0.107	[0.097, 0.117]	0.000	0.035
EFA 3	27.708	12	0.996	0.987	0.030	[0.015, 0.045]	0.989	0.012
CFA	180.045	24	0.981	0.971	0.067	[0.058, 0.076]	0.001	0.037
hCFA	225.819	24	0.978	0.967	0.076	[0.067, 0.085]	0.000	0.037
bCFA	163.020	18	0.984	0.968	0.074	[0.064, 0.085]	0.000	0.031
ESEM	26.874	12	0.998	0.994	0.029	[0.014, 0.044]	0.992	0.012
hESEM	26.874	12	0.998	0.994	0.029	[0.014, 0.044]	0.992	0.012
bESEM	0.176	2	1.000	1.003	0.000	[0.000, 0.019]	0.997	0.001

RMSEA *p*: probability that RMSEA is ≤0.05.

TABLE 4 Standardized factor loadings and residual variance for the CFA and ESEM.

	ICM-CFA		ESEM			
Items	λ (SE)	δ	λ (SE)			δ
			Ideation	Mechanics	Self-regulation	
1. Ideation						
Item 2	0.728 (0.014)**	0.470	0.549 (0.041)**	0.311 (0.034)**	−0.001 (0.034)	0.429
Item 6	0.797 (0.015)**	0.364	0.877 (0.042)**	−0.142 (0.022)**	0.060 (0.031)	0.267
Item 7	0.857 (0.011)**	0.265	0.739 (0.038)**	0.043 (0.032)	0.111 (0.030)**	0.288
2. Mechanics						
Item 1	0.838 (0.034)**	0.298	0.190 (0.033)**	0.711 (0.043)**	−0.050 (0.038)	0.363
Item 3	0.717 (0.024)**	0.486	−0.023 (0.039)	0.732 (0.044)**	0.041 (0.031)	0.456
Item 5	0.538 (0.031)**	0.710	−0.106 (0.037)**	0.568 (0.035)**	0.107 (0.040)**	0.680
3. Self-regulation						
Item 4	0.805 (0.016)**	0.351	0.157 (0.033)**	−0.003 (0.021)	0.673 (0.034)**	0.376
Item 8	0.724 (0.020)**	0.476	−0.195 (0.024)**	0.007 (0.019)	0.970 (0.035)**	0.282
Item 9	0.800 (0.015)**	0.360	0.221 (0.033)**	0.022 (0.020)	0.576 (0.031)**	0.423

All *a priori* item factor relationships are in grayscale. **$p < 0.01$.

respectively) averages and a markedly higher (0.653) self-regulation average. However, there was little statistical evidence to select the 4-profile solution over and above the 3-profile solution, as the 4-profile solution was not supported by aLMR *p*-values and the information criteria continue to strongly decline, while the 3-profile model was supported by both a non-significant aLMR *p*-value for the $k + 1$ profile and a notable and obviously elbow plot decline in information criteria (e.g., AIC, BIC, aBIC; Petras and Masyn, 2010; Morin and Marsh, 2015).

Consistent with prior enumeration work and previous recommendations that guide enumeration decisions, a more parsimonious profile solution was retained as the final model, given the statistical support and substantive interpretation (Marsh et al., 2005, 2009).

Table 6 reports each profile's mean, standard error, and proportions, while Figure 2 depicts this visually. Each profile's mean latent factor score derived from the bESEM model, and the profile standard error are reported in Table 6. To best describe each profile throughout this study, we named the profiles: profile-1 (Strongly Inefficacious: Conventions), profile-2 (Moderately Inefficacious: Ideation), and profile-3 (Efficacious: Self-Regulation). This naming convention represents the overall general factor valence, while also denoting the strongest positive specific factor. Demographic descriptive statistics are reported in Table 7.

The bESEM LPA produced three profiles well-differentiated by *level* differences of global writing self-efficacy. In this case, and relating to the common interpretation of bifactor models, the Strongly Inefficacious: Conventions and Moderately Inefficacious: Ideation profiles exhibited low global writing efficacy yet were well-differentiated through all three of the *specific* factor responses. The *Strongly Inefficacious: Conventions profile*, which included approximately 26% of the participants ($n = 381$), is characterized by the lowest *global* writing self-efficacy, low *ideation*, moderate *conventions*, and relatively average *self-regulation*. Participants in this profile were collectively doubtful, yet exhibited above average confidence for attending to writing *conventions* and much less confidence in their ability to develop and use ideas. Relative to their doubt, students in this profile felt that they could attend to the basic rules of writing such as spelling and punctuation, yet overwhelmingly lacked efficacy about their ability to think of and write about new ideas. Comparatively, the *Moderately Inefficacious* profile portrayed participants who, despite having more than half the low global

TABLE 5 Standardized factor loadings for bifactor exploratory structural equation modeling solution of the Self-Efficacy for Writing Scale (−se1).

Items	λ (SE)				
	Ideation	Mechanics	Self-regulation	G-factor	δ
1. Ideation					
Item 2	0.087 (0.121)	0.154 (0.056)	−0.063 (0.039)	0.723 (0.038)**	0.442
Item 6	0.511 (0.259)*	−0.099 (0.031)**	0.047 (0.021)*	0.750 (0.032)**	0.164
Item 7	0.179 (0.155)	−0.036 (0.033)	0.025 (0.038)	0.820 (0.038)**	0.294
2. Mechanics					
Item 3	−0.084 (0.077)	0.375 (0.110)**	−0.045 (0.062)	0.474 (0.046)**	0.625
Item 5	−0.017 (0.069)	0.724 (0.192)**	0.033 (0.026)	0.326 (0.033)**	0.367
3. Self-regulation					
Item 4	0.081 (0.047)	−0.013 (0.024)	0.439 (0.036)**	0.654 (0.022)**	0.373
Item 8	−0.025 (0.045)	0.036 (0.021)	0.623 (0.043)**	0.563 (0.032)**	0.294
Item 9	0.009 (0.042)	−0.028 (0.029)	0.336 (0.038)**	0.690 (0.029)**	0.411
ω	0.866	0.654	0.838		
ω_H	0.017	0.039	0.061	0.788	
ω_{HS}	0.082	0.432	0.292		
% Var. Ind. G-factor	9.46%	65.94%	34.86%		
% Reliable Var.	1.91%	4.31%	6.77%	87.01%	

**$p < 0.01$, *$p < 0.05$. All target factors are in grayscale. % Var. Ind. G-factor, percent variation independent of the G-factor; % Reliable Var., percent of reliable variance (ω_H / $(1 - total\ error)$); ω, coefficient omega; ω_H, coefficient omega hierarchical; ω_{HS}, coefficient omega hierarchical subscale.

TABLE 6 Profile indicator means and standard errors (bESEM).

	Global		Ideation		Conventions		Self-regulation		$\hat{p}$
Profile	*M*	SE	*M*	SE	*M*	SE	*M*	SE	
1	−0.725	0.077	−0.496	0.049	0.128	0.064	−0.040	0.044	0.267
2	−0.219	0.092	0.566	0.151	−0.414	0.159	−0.516	0.079	0.151
3	0.484	0.112	0.073	0.033	0.021	0.040	0.224	0.098	0.582

$\hat{p}$, proportion of sample. Profile 1: Strongly Inefficacious: Conventions; Profile 2: Moderately Inefficacious: Ideation; Profile 3: Efficacious: Self-Regulation.

efficacy, exhibited strong beliefs associated with developing and using ideas, yet were less confident with managing the writing process and employing common writing conventions. As the smallest profile, including approximately 15% of the participants (n = 222), the *Moderately Inefficacious: Ideation* profile is also the most obvious in terms of demonstrating the utility of capturing global writing self-efficacy while simultaneously capturing meaningful subscale specificity. Thus, without modeling the collective variability exhibited by all the items, such disparities and unique profiles were, given the demonstration from both the CFA and ESEM LPAs, not likely to be found. *Efficacious: Self-Regulation*, denoted by strong positive global beliefs, average *ideation* and *conventions*, and moderately strong *self-regulation*, is expressed as the normative profile by including almost 60% of participants (n = 853). Expressing strong global beliefs, these participants exhibited confidence in all specific facets, especially in their ability to manage the writing process.

Research question 4

To assess the concurrent and divergent/discriminant validity of the SEWS, we assessed several predictors and outcomes for their relation to the final enumerated profiles derived from RQ3. First, all demographic predictors were assessed together to provide a more realistic depiction of which variables predicted profile membership, controlling for the other demographic variables. Referencing Table 8, sex, gifted, and disability status were not significant predictors of profile membership. Students from minoritized racial/ethnic backgrounds were reported as being approximately 70% more likely to be in *Moderately Inefficacious: Ideation* than *Efficacious: Self-Regulation*, while ELL students were approximately 300% (or about four times) more likely to be in Strongly Inefficacious: Conventions than *Efficacious*. Results also showed that for each one unit increase in grade level, students had about a 50% greater likelihood of being in Strongly Inefficacious: Conventions relative to *Moderately Inefficacious* and were approximately 35% more likely to be in *Efficacious* when compared to Moderately Inefficacious: Ideation, while controlling for all other demographics.

Next, measurement model (CFA in both cases) factor scores from both the WSES (basic skills factor: ω = 0.89, CI [0.879, 0.902]; advanced skills factor: ω = 0.92, CI [0.911, 0.929]) and the WAS-12 (affect: ω = 0.88, CI [0.867, 0.890]; concern: ω = 0.84, CI [0.828, 0.855]), and first quarter English grades were assessed for their predictive utility toward the likelihood of profile membership. All regression coefficients, standard errors, and odds ratios are reported in Table 9. Outcomes (WSES, WAS-12, and standardized writing assessments) are reported across each profile in Table 10.

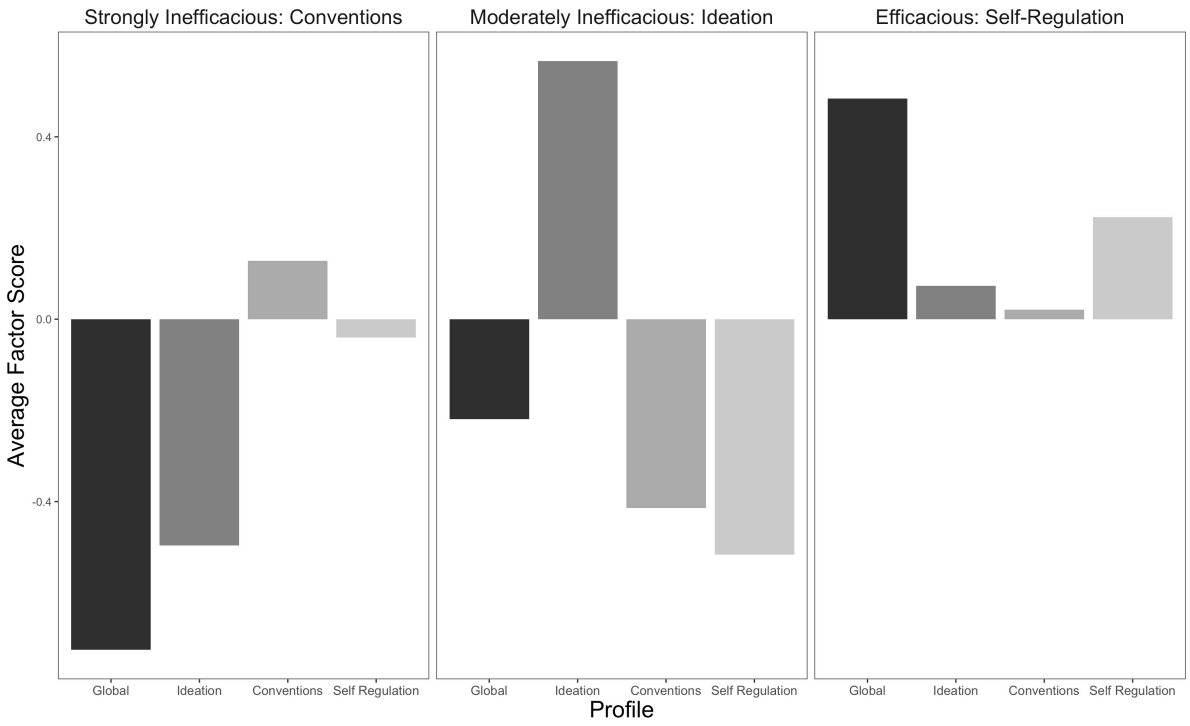

FIGURE 2
Latent profile model based on bifactor factor scores of the Self-Efficacy for Writing Scale (SEWS).

TABLE 7 Demographic % by profile.

	Profile 1	Profile 2	Profile 3
Total *n* (1,466)	26.67	15.14	58.19
Sex (female)	48.85	48.20	51.70
Minority	46.29	50.45	42.56
8th	10.23	18.02	14.42
9th	36.32	36.49	31.07
10th	53.45	45.50	54.51
ELL	6.39	4.05	2.58
Disability	13.55	15.32	11.96
Gifted	13.04	9.91	16.06

Each percentage represents the percent of each variable represented in each profile. Profile 1: Strongly Inefficacious: Conventions; Profile 2: Moderately Inefficacious: Ideation; Profile 3: Efficacious: Self-Regulation.

Discussion

The purpose of this study was to examine the multidimensionality of writing self-efficacy using ratings from the adapted SEWS and provide further validity evidence for this measure (Ekholm et al., 2015; Zumbrunn et al., 2016). In summary, the SEWS exhibited evidence of construct-relevant multidimensionality as a product of both latent constructs overlap among the writing SE dimensions (*conventions, self-regulation*, and *ideation*) and the existence of a global writing self-efficacy factor. Using a bifactor ESEM, three latent profiles emerged, characterized by a global indicator across *Strongly Inefficacious, Moderately Inefficacious*, and *Efficacious* themes and specific factor differences between profiles (*Convention*, *Ideation*, and *Self-Regulation*, respectively). These profiles exhibited strong relationships that aligned with hypothesized expectations.

RQ1: Conceptual overlap of writing self-efficacy dimensions

Theoretically, Bandura (1997) suggested that multidimensional measures constructed to capture different facets of efficacious beliefs would likely exhibit conceptual overlap. We are aware of no other studies examining if this is truly the case. Our findings suggest that efficacious beliefs are better modeled by an ESEM. Whereas findings across recent writing self-efficacy literature show that efficacious beliefs exhibit latent factor correlations and suggest conceptual overlap (e.g., Bruning et al., 2013; Limpo and Alves, 2017; Ramos-Villagrasa et al., 2018; Zumbrunn et al., 2020, 2021; DeBusk-Lane et al., 2021), the present study provides statistical evidence that such correlations are, in some part, better modeled across all items. Although this is common in the social sciences, especially in psychological measures (see Morin et al., 2016c), it does indicate that there is shared variability across latent factors and, given new statistical approaches (e.g., ESEM), may better be modeled to represent reality more closely.

Theoretical implications

The ESEM model reported here provides the current theoretical understanding of writing self-efficacy with important updates. For example, items focused to capture efficacious beliefs of *ideation*, in some part, are also influenced by self-beliefs associated with how well one can perform common writing *conventions*. However, it

might be expected that beliefs associated with "...put[ing] my ideas into writing" (item 7) relate to beliefs associated with common writing mechanics such as punctuation, spelling, or forming complete sentences. In this case, as item 7 is phrased, to "put" ideas into writing implies the use and performance of the "generally accepted standards for expressing ideas in writing" (Bruning et al., 2013, p. 28). These cross-concept influences exist for all factors included in this study. Therefore, such cross-concept relations support the notion that efficacious beliefs exist not in extreme *specificity*, but that they prevail broadly in relation to writing. In relation to the adapted SEWS, this suggests that efficacious beliefs associated with the "psychological and linguistic features of the writing process" (Bruning et al., 2013, p. 25) likely exist and can be modeled, in some part, by a global factor, as latent factor correlations remain ($|r| = 0.428–0.704$, $M = 0.547$) despite allowing items to cross-load within the ESEM.

RQ2: Writing self-efficacy as a hierarchically ordered construct

Using the ESEM model as a basis, we explored the extent to which the SEWS exhibited the presence of a hierarchically ordered global factor. Following Morin et al. (2016a) procedures, the best fitting model from RQ1 was compared to the like (CFA/ESEM) hierarchically- or globally situated model (hESEM/bESEM).

In comparing the ESEM model to the adapted bESEM model, the bESEM model exhibited superior overall goodness-of-fit and anticipated G and S-factor relations. That is, although most (all but one) S-factor *a priori* loadings exhibited stronger loadings for the G-factor, most of the factor loadings continued to provide significant strength over and above the G-factor, while continuing to model minimal target item relations across non-*a priori* item factor relationships. In this case, the continued latent factor correlations found in the ESEM model are re-expressed as the global factor. The *ideation* factor loadings suggest it contributed less to the S-factor than either of the other factors, which exhibited stronger collective loadings to the S-factor. It is important to recall that the G-factor represents the shared variability across all items, while the S-factors express shared variance among the *a priori* items controlling for the G-factor (Reise et al., 2013). These trends are clear in examining the omega coefficients and the percent of variation independent of the G-factor. For instance, for the *ideation* factor, only 9.46% of the reliable variance is independent of the global factor, suggesting the *ideation* factor is almost entirely captured by the global factor. However, despite dropping item 1, the *conventions* factor models 65.94% of the reliable variance after accounting for the global variability, suggesting it is a unique factor (Reise et al., 2013). *Self-regulation* exhibited the second highest amount of variance accounted for independent of the G-factor (34.86%), while also accounting for the highest percent of reliable variability at 6.77%. Therefore, *self-regulation* also appears to be a strong unique factor, as it accounted for a large portion of variability after accounting for the G-factor and models the largest portion of reliable variability after accounting for error. The G-factor, which accounted for 87% of the total reliable variability, suggests that the global factor is ubiquitous across the items and strong.

Theoretical implications

The existence and prevalence of such a robust global writing self-efficacy factor extends the theoretical updates provided by the ESEM model. Although efficacy beliefs are commonly understood to be domain-specific (e.g., writing, math, and science) (Bandura, 1986, 1997, 2006, 2018; Pajares, 1996, 2006; Bong and Skaalvik, 2003; Pajares and Usher, 2008; Klassen and Usher, 2010; Usher, 2015; Marsh et al., 2018), our findings suggest there is a strong common theme associated, at least, to the psychological attributes associated with the process of writing. Furthermore, this model also suggests students vary in some of the facets or S-factors. Although students may exhibit collectively high or low efficacious beliefs associated with writing, they still appear to vary between the specific factors. Although this seems logical, as there should be natural S-factor variation at any given point along the (global) continuum of writing beliefs, it may be that such variability is indicative to certain student characteristics, experiences, or methods of writing instruction, as it is well argued that a student's sociocultural context, or writing community, and collective experiences greatly influence their self-efficacy development (Bandura, 1997; Usher and Pajares, 2008; Graham, 2018; Usher and Weidner, 2018). Additionally, given that the ideation factor was almost entirely modeled by the G-factor may suggest that ideation is instrumental to more macro-level or global efficacy beliefs. As will be discussed in RQ3, profiles derived from this model's factor scores suggest specific factor ideation to be unique between profiles and may be a strong determinant in differentiating groups of students who globally express less efficacious writing beliefs at-large. It is important to acknowledge, however, that the SEWS was administered within students' English/Language Arts class and the instructions focused responses on writing conducted in that context. Considering writing efficacy beliefs, and writing beliefs at large, are both a product of prior experience and situated within particular contexts or communities, the degree to which the present model depicts beliefs unique to such is limited (see Graham, 2018). Future research should examine writing in different contexts or communities to inspect potential differences, especially considering the specific factor vantage provided through a b-ESEM.

Nevertheless, this model affords researchers and theorists alike the opportunity to statistically examine a more exact representation of *specific* factor variability over and above a general theme, seemingly providing ample avenues for future research aiming to understanding how various levels of global efficacious beliefs manifest into specific factor expressions and trends (Morin and Marsh, 2015).

RQ3: Profiles of writing self-efficacy

Once the bESEM model was established as the final model that best depicted the data and best modeled the evident construct-relevant psychometric multidimensionality, we sought to examine how latent factor scores from the final bESEM model disaggregated into interpretable profiles to further establish the measure's validity. A 3-profile solution was both statistically and substantively superior to model these data.

Theoretical implications

The prevalence of profiles differentiated by generalized writing self-efficacy, and the inclusion now of identifiable specific factor differences, informs our current theoretical understanding of how students may exhibit differences in writing self-efficacy. It is important to remember while interpreting the profiles that the

TABLE 8 Predictor coefficients and odds ratios for demographic variables.

Predictors	Profile 1 vs. 3			Profile 2 vs. 3			Profile 1 vs. 2		
	Coefficient	SE	OR	Coefficient	SE	OR	Coefficient	SE	OR
Sex	−0.176	0.173	0.839	−0.188	0.245	0.829	0.013	0.258	1.013
Grade	0.008	0.122	1.008	−0.439**	0.169	0.645	0.446**	0.124	1.562
Minority	0.155	0.144	1.168	0.533**	0.185	1.704	−0.378	0.208	0.685
Gifted	−0.290	0.284	0.748	−0.901	0.471	0.406	0.611	0.491	1.842
Disability	0.225	0.291	1.252	0.354	0.538	1.425	−0.129	0.362	0.879
ELL	1.397**	0.486	4.043	0.906	0.704	2.474	0.491	0.512	1.634

**$p < 0.01$. Profile 1: Strongly Inefficacious: Conventions; Profile 2: Moderately Inefficacious: Ideation; Profile 3: Efficacious: Self-Regulation.

TABLE 9 Predictor coefficients and odds ratios for WSES and WAS-12 latent factor scores and first quarter English grades.

Predictors	Profile 1 vs. 3			Profile 2 vs. 3			Profile 1 vs. 2		
	Coefficient	SE	OR	Coefficient	SE	OR	Coefficient	SE	OR
WSES – basic	0.365	0.24	1.441	−0.497*	0.207	0.608	0.863**	0.179	2.370
WSES – advanced	−1.719**	0.217	0.179	−0.887**	0.269	0.412	−0.832**	0.189	0.435
WAS12 – affect	−2.168**	0.232	0.114	−1.165**	0.25	0.312	−1.003**	0.188	0.367
WAS12 – concern	1.545**	0.198	4.688	0.983**	0.235	2.672	0.562**	0.183	1.754
Q1 English grades	−0.041**	0.011	0.960	−0.046**	0.011	0.955	0.005	0.006	1.005

*$p < 0.05$; **$p < 0.01$. Profile 1: Strongly Inefficacious: Conventions; Profile 2: Moderately Inefficacious: Ideation; Profile 3: Efficacious: Self-Regulation.

TABLE 10 Bifactor-ESEM LPA outcomes by profile.

	Profile 1	Profile 2	Profile 3	Summary of significant differences
	M	*M*	*M*	
Total *N*	391	222	853	
WSES – basic	−1.014	−1.332	1.077	1 = 2 < 3
n	391	222	853	
WSES – advanced	−1.400	−1.303	1.301	1 = 2 < 3
n	391	222	853	
WAS-12 – affect	−0.661	−0.209	0.474	1 < 2 < 3
n	391	222	853	
WAS-12 – concern	0.496	0.213	−0.376	1 < 2 < 3
n	391	222	853	
Grade 8 total performance	446.189	436.446	476.044	2 < 3
n	38	38	117	
Grade 8 category 1	34.218	34.279	37.065	1 = 2 = 3
n	38	38	117	
Grade 8 category 2	34.770	32.560	37.067	1 > 2 < 3
n	38	38	117	
Grade 10 total performance	444.216	431.196	477.077	1 = 2 < 3
n	191	93	432	
Grade 10 category 1	35.063	34.236	38.167	1 = 2 < 3
n	191	93	432	
Grade 10 category 2	34.594	32.276	38.516	1 > 2 < 3
n	191	93	432	

Category 1: research, plan, compose, and revise for a variety of purposes; category 2: edit for correct use of language, capitalization, punctuation, and spelling. Significant differences are $p < 0.05$ from a Wald Chi-square difference test. Total performance, category 1, and category 2 are standardized writing scores. Profile 1: Strongly Inefficacious: Conventions; Profile 2: Moderately Inefficacious: Ideation; Profile 3: Efficacious: Self-Regulation.

specific factors represent variability over-and-above the global factor (Chen et al., 2006). For instance, although profile-1 (*Strongly Inefficacious: Conventions*) exhibits a very low global factor mean, each specific factor mean represents scores derived while accounting for the global factor. For example, in looking at the raw data, two participants that exhibited identical *ideation* factor scores of −1.133 had response patterns of [1, 0, 1] and [2, 1, 1] on the SEWS (for items 2, 6, and 7, respectively), and exhibited global facet factor scores of −1.37 and −0.304, respectively. Although these global factor scores represent the generalization across all 8 items included in the scale, this example clearly demonstrates that the specific factor scores represent important differences not accounted for by the global factor. Bandura's (1997) contention that more specific beliefs are highly influenced by contextual and experiential factors support our findings; the results here further suggest that these differences are likely expressed differently throughout the continuum of writing self-efficacy. The current findings also suggest that students within profiles might undergo systematic or relatable experiences unique to their writing community (Bandura, 1997; Usher and Pajares, 2008; Graham, 2018). Future research should seek to replicate and further explore such nuances between different contexts and writing communities.

Our findings provide additional theoretical support and evidence that extends writing self-efficacy theory. Bandura (1997) suggests that commonly held or generalized beliefs likely translate into more specifically held facets and these two (generalized and specific beliefs) are inextricably connected. In other words, if a student generally holds less efficacy toward writing, they are also likely to naturally not be very efficacious toward more focused or specific skills associated with writing, such as punctuation or spelling. The present profiles demonstrate this well and support this notion, as both the *Strongly Inefficacious: Conventions* and the M*oderately Inefficacious: Ideation* profiles also exhibited less than average specific factor scores on most specific factors. For example, as a likely product of a strongly globally aligned ideation specific factor, these two profiles are nearly opposite in their expression of ideation beliefs, with the globally positive profile showing more normative specific factor responses. This may suggest that those who hold lower general efficacy beliefs are far more nuanced in their sub-facet beliefs across the specific factors. This is important to both the theoretical understanding of efficacy beliefs and practical efforts of fostering students' writing efficacy beliefs.

This study further suggests that within this connection or trend between generalized and specific beliefs, there exists rather cohesive groups of students who may exhibit systematic differences among the specific factors. This finding suggests the relationship is not linear within academic domains. Although future research is needed to examine *why* profiles exhibit unique specific factor trends beyond their reported generalization of writing efficacy, we posit that these unique profile trends are produced by differences in students' interpretations of learning events and in turn, their experiences related to feelings of self-efficacy. Results from DeBusk-Lane et al.'s (2021) support this notion, finding differences in not just the sources reported between profile, but the specific occasions or interpretations of sources they reported, it is likely that students who exhibit generally less (or more) efficacious beliefs of their writing ability interpret and develop their beliefs from disparate sources.

To date, only one known study has been published and employed a bESEM LPA on self-efficacy data. Work by Perera et al. (2019) examined teacher efficacy profiles derived from a bESEM model. Although they state no major theoretical implications to the self-efficacy literature, their profiles resemble and exhibit similar *level* and *shape* effects as reported here. Findings from both Perera et al.'s (2019) and the present study support that writing self-efficacy is best modeled as a general global factor with more specific self-efficacy dimensions (*conventions, self-regulation*, and *ideation*).

RQ4: Validity evidence for writing self-efficacy

Our findings align well with the literature that suggests writing efficacy beliefs and writing motivation in general tends to decline through the secondary school years (Pajares and Valiante, 1999; Pajares et al., 2007a; Pajares and Usher, 2008; Usher and Pajares, 2008; Klassen and Usher, 2010), although the probability of membership into Strongly Inefficacious: Conventions vs. *Moderately Inefficacious* is an interesting point with the stark differences between *ideation*. Because some students also exhibited higher probabilities of being in Strongly *Efficacious*, relative to *Moderately Inefficacious*, by grade, perhaps this indicates beliefs – and instructional contexts – diverge to some degree throughout these years of schooling. Indeed, students' likelihood to become more aware of their own domain-specific abilities in comparison with their peers during the middle school years is well documented in the literature (e.g., Eccles et al., 1993; Eccles and Roeser, 2009; Wigfield et al., 2015). Caution should be taken, however, as these data are cross-sectional and longitudinal inferences should not be taken.

Theoretical implications

In terms of predictors of profile membership, the primary contribution is that these predictions replicate prior findings throughout literature and further substantiate the theoretical understanding of how personal factors relate to expressed efficacious beliefs (Bandura, 2008; Pajares and Usher, 2008). Interestingly, the lack of statistical significance for sex, which has been a focal point in writing efficacy research (Pajares et al., 1999, 2007a; Pajares and Valiante, 1999, 2001; Villalón et al., 2015; De Smedt et al., 2017), is, perhaps, the most surprising finding amongst the predictors. Our results however align with recent findings from DeBusk-Lane et al.'s (2021), who also found that sex was not predictive of profile membership when accounting for other demographic variables. Despite this incongruence across the literature highlights that more research is needed to further unpack how sex – and, though not explored directly in this work, gender (see Pajares et al., 2007b) – relates to efficacy beliefs.

Like DeBusk-Lane et al. (2021), we also found strong statistically significant predictive effects associated with differences in grade-level. In both cases, those in higher grades were more likely to be in a less efficacious profile. However, the present findings indicate a stronger relationship of those in higher grades being predicted to be members of the Strongly *Efficacious* profile, suggesting that students become more differentiated as they progress through these grades. This could be explained by developmental changes in efficacious beliefs that are strongly influenced by everchanging, dynamic, and normative

experiences that all mix with, inevitably, rapidly developing biological influences (Bandura, 1997). Additionally, it is likely that students (grades 8–10) transitioning to high-school also tend to become more academically specialized. It would be expected that those who ascribe to and focus on more non-writing domains become less efficacious in their writing and account for some students of higher grades having a higher likelihood of membership in less efficacious profiles.

Aside from student demographics, we also assessed the predictive nature of those who identified as gifted, having a disability, or being an English language learner. Surprisingly, neither those identified as being gifted or having a disability were significantly predictive of profile membership (García and de Caso, 2004; García and Fidalgo, 2008). English language learners' identity, however, was significantly predictive of profile membership such that these students had a higher likelihood of being members of the *Strongly Inefficacious: Conventions* profile, as compared to the *Efficacious: Self-Regulation* profile. Given prior literature in these areas, though limited, these trends align and would be expected (Teng et al., 2018).

To further provide validity evidence, we also examined the predictive value of both the WSES and the WAS-12 on profile membership. Interestingly, both measures were highly predictive across all profiles. Those with higher WSES's basic skills were more likely to be in Strongly Inefficacious: Conventions compared to *Moderately Inefficacious*, yet also more likely to be in *Efficacious: Self-Regulation* than *Moderately Inefficacious* profiles. This, along with grade differences, may suggest that as students gain more writing skills, they also become more efficacious and comfortable with, at least in regard to the Strongly Inefficacious: Conventions *profile*, writing *conventions*. Comparatively, those with higher WSES advanced skills were generally more likely to be in profiles with higher efficacy beliefs. This is to be expected, as the crosswalk between basic and advanced skills as operationalized by the WSES appears to translate well to the SEWS' *conventions* and *ideation* factors, respectively. So, in this case, it is logical for those with stronger writing skills and beliefs to be more associated with membership profiles exhibiting stronger efficacy beliefs. Nevertheless, those with higher skills scores were approximately 82% more likely to be in the Efficacious: Self-Regulation profile, relative to the Strongly Inefficacious: Conventions *profile*. Diverging results of the WAS-12's affect (liking) and concern (writing anxiety) indicated that those who reported liking writing more exhibited stronger and significant predictions into more positive profiles (3 > 2 > 1), in-line with research between anxiety and writing self-efficacy (Pajares and Johnson, 1994; Pajares and Valiante, 1999; Goodman and Cirka, 2009; Martinez et al., 2011; Sanders-Reio et al., 2014; Limpo, 2018).

We also assessed how the profiles related to both the WSES and the WAS-12. Both factors of the WSES aligned with the global factor indicator in each profile. Participants reported less efficacy in less globally efficacious profiles. Interestingly, however, Strongly Inefficacious: Conventions (profile-1) and Moderately Inefficacious: Ideation (profile-2) exhibited similar averages for both the basic and advanced factors (although basic was reported less efficacy for profile-2 than 1). Responses to the WAS-12's affect (liking) writing factor were in-line with our hypotheses, such that those with a stronger sense of efficacy toward writing exhibited a stronger affliction toward writing. Conversely, those who reported less efficacy toward writing (members of lower profiles), exhibited a stronger relation to the concern factor of the WAS-12. These findings provided validity evidence that the profiles are aligned to the well-established positive relationship between writing self-efficacy and writing affect, and the negative relationship between writing self-efficacy and writing apprehension. Furthermore, our results provide new insights into the relationship between writing self-efficacy and apprehension. Although apprehension aligns with lower efficacy beliefs, the profiles identified allow a better understanding of how specific factors associated with the writing process differentially relate. That is, apprehension may play a large part in shaping a student's beliefs around creativity and ideation, yet have little impact on their beliefs around conventions because such skills – and related efficacy beliefs – are more durable or reinforced. Future research would do well to inspect these interactions to better understand how specific efficacy beliefs interact with apprehension, especially in students who hold lower writing efficacy beliefs.

As would be expected, first quarter English grades significantly predicted membership into efficaciously stronger profiles, however, no predictive relationship was found that differentiated between the Strongly Inefficacious: Conventions or *Moderately Inefficacious* profiles. These results provide both concurrent and divergent validity evidence of both the profiles and the adapted SEWS' global indicator (Pajares and Johnson, 1994; Pajares and Valiante, 1999; Goodman and Cirka, 2009; Martinez et al., 2011; Sanders-Reio et al., 2014; Limpo, 2018), yet also suggest grades may not well differentiate between those who hold lower efficacy beliefs in general. Future research is needed to further explore the relationship between students' grades and the experiences that generate such grades, and how students' experiences with writing shape their writing efficacy beliefs.

Additionally, a standardized writing assessment was used to establish predictive validity of the profiles. Grade 8 total standardized writing scores mimicked earlier findings that have tended to find clear and statistically significant differences between *Efficacious: Self-Regulation* above that of both Strongly Inefficacious: Conventions and *Moderately Inefficacious*. Although no clear differences were found among grade 8's category 1 scores, category 2 scores indicated that Strongly Inefficacious: Conventions (which exhibited above average efficacious beliefs associated with writing *conventions*) was significantly higher than *Moderately Inefficacious* (which exhibited less than average *conventions*). Considering category 2 primarily involved editing for ". . .punctuation, and spelling," it is no surprise that those who exhibited stronger beliefs also performed better in this area. Grade 10 scores were reported in a similar manner across all three standardized test scores, also finding that category 2 was higher for those who exhibited above average *conventions*. In this case, using the bESEM model likely attenuated these differences and demonstrated the advantage of more accurately and precisely capturing specific factor differences among the profiles. As such, our findings imply that relations between writing self-efficacy and both grades' standardized writing scores may be more related to specific factor differences than generalized efficacy beliefs. This would make practical sense, as the standardized tests used in this study focused on specific writing processes, such as editing. These results highlight how standardized tests may not fully tap into all aspects of the writing process and may not differentially relate to students of varying levels of generalized efficacy beliefs associated with writing. This suggests that when inspecting the relationship between grades and efficacy beliefs it is especially important to ensure skill alignment between both performance and beliefs. This line of reasoning is not meant to negate the differences between the *Efficacious: Self-Regulation* profile and the two lowest profiles, but that there were either no discernable differences between Strongly Inefficacious: Conventions and *Moderately Inefficacious*,

or that Strongly Inefficacious: Conventions exhibited stronger standardized category 2 scores than *Moderately Inefficacious*, despite *Moderately Inefficacious* reporting stronger global efficacy. Although the predictive nature of the bESEM model was not assessed, the standardized test outcomes reported between profiles here may offer important clues as to the nature of such a prediction. Given writing self-efficacy has been positively associated with writing performance (see Pajares, 2003; Pajares et al., 2007a), the present study adds further evidence that there is a clear difference present between profiles with higher and lower efficacy beliefs and the state-wide standardized writing scores. Furthermore, our findings also offer theoretical support for how scales should be developed. Criterial alignment (*correspondence*), whereby the measure aligns with the performance outcome, often results in greater performance prediction (Pajares, 1996; Bandura, 1997, 2006; Klassen and Usher, 2010; Marsh et al., 2018). In this case, higher *conventions* scores related to the performance outcome of the standardized test's category 2 outcome, which measured a student's ability to edit. Future research should continue to assess the relational and predictive association between each profile and important outcomes such as grades, with the ultimate intent to focus improvement.

Implications for educators

The present study may offer important information for educators about the development of students' writing self-efficacy. As the findings demonstrate, students who exhibit strong writing efficacy beliefs, or even those who appear doubtful, may also substantively differ on the extent to which they hold efficacious beliefs of their ability to attend to the rules of writing (*conventions)*, their ability to develop and use ideas (ideation), or their ability to self-manage throughout the writing process (self-regulation). Understanding these trends in the classroom may offer benefits in terms of targeting opportunities for students to develop mastery experiences (Pajares, 1996, 2003; Villalón et al., 2015), while also acknowledging that students' efficacy beliefs may largely be held more generally toward writing. Our findings showing that a rather substantial group of students who commonly view writing with less confidence simultaneously hold much less efficacious beliefs in relation to using and crafting ideas, suggests educators may do well to focus on creating, molding, developing, and employing ideas during writing tasks (more so than focus on writing conventions or self-regulation).

Despite the statistical and theoretical value of determining which indicators from the bESEM model best predict meaningful and important outcomes, others have noted that improving writing self-efficacy should be "advanced as an explicit goal for writing instruction" (Usher and Pajares, 2008; Bruning and Kauffman, 2015, p. 160). This suggests that there is great value in cultivating writing self-efficacy in general. As such, the present findings, which depict groups of students differentiated by a collective and global sense of efficacious beliefs toward writing, support the notion that efforts to foster stronger efficacy beliefs across all areas of ideation, conventions, and self-regulation may enhance students' writing performance. This is not meant to denounce the present study's findings, but to clearly articulate that the robust presence of a global factor (that represents ~87% of the reliable variation) and the meaningful presence of the specific factors may suggest viable instructional pathways both globally and in a targeted sense that require future research to fully examine.

Conclusion

The present study demonstrated that a strong general factor exists among all the items of the SEWS, while the specific factors (i.e., *conventions, self-regulation*, and *ideation*) continue to be well-represented. This suggests that writing self-efficacy simultaneously exists along both a collective spectrum of efficacious beliefs and is expressed differentially among the original multidimensional factors of the SEWS. Participants, when grouped into three profiles (Strongly Inefficacious: Conventions, *Moderately Inefficacious,* and *Efficacious: Self-Regulation*), differentiated by global factor shape and exhibited unique differences along the specific factors. Generally, these profiles were well differentiated by global efficacious beliefs, while specific factor differences were mainly seen between the two lower efficacious profiles (Strongly Inefficacious: Conventions, *Moderately Inefficacious: Ideation*) across all three specific factors. Both student grade level and racial/ethnic minority status were predictive of profile membership, while the WSES and WAS-12 also demonstrated concurrent and divergent validity across the profiles. Further, the profiles were also validated using grades, WSES, and the WAS-12 as outcomes to provide concurrent and discriminant validity evidence. Together, these findings provide evidence that the adapted SEWS contains construct-relevant psychometric multidimensionality as a product of both conceptual overlap between the specific factors and the existence of a global or generalized theme congruent to all items, therefore suggesting the often used, and perhaps over-used, CFA depiction is less than optimal. These findings extend the current theoretical understanding of writing self-efficacy in terms of the hierarchical, multidimensional structure of this complex construct, how writing self-efficacy manifests across unique student profiles, and how student characteristics and learning outcomes relate to membership in one of the three profiles.

Data availability statement

Requests to access these datasets should be directed to the corresponding author. Due to participant privacy and the provided ethnical consent, limited data access should be expected.

Ethics statement

The studies involving human participants were reviewed and approved by the Human Research Protection Program/Institutional Review Board, Virginia Commonwealth University. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

MD-L and SZ conceived the project and designed the study. MD-L wrote the manuscript. SZ, CB, MB, RB, and AS provided the feedback and edits. All authors made substantial contributions and reviewed and approved the completed manuscript.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1091894/full#supplementary-material

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Measuring multiple-source based academic writing self-efficacy

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Although writing self-efficacy has been a productive line of research for several decades, no prior writing self-efficacy measure has focused on students' self-efficacy for integrating information across multiple sources when producing an academic text. To fill this gap in existing research on the measurement of writing motivation, we designed a measure targeting the extent to which students are confident that they can write an academic text that integrates content from several different sources. In a study with Norwegian undergraduate students (n=136), this measure, which we called the Multiple-Source based Academic Self-Efficacy Scale (MAWSES), was validated by means of confirmatory factor analysis and relationships between the resulting unitary construct and other relevant constructs. The findings provided evidence concerning the reliability and validity of the MAWSES. In future research, this measure could be included as an independent variable to predict processes and products of multiple-source based, integrated academic writing, as a moderator or mediator of effects in writing intervention research, or as an outcome variable in its own right.

KEYWORDS

multiple-source based writing, synthesis writing, writing motivation, writing self-efficacy, measurement

Introduction

In higher education, writing is typically a multiple-source based activity in which students write about information gathered from a set of diverse sources on the same topic, issue, or phenomenon (Sonia et al., 2023). As these sources often present complementary (information across different sources is part of a larger whole not specified in any single source) or conflicting information, student writers are tasked with synthesizing or integrating information across different perspectives and arguments to demonstrate their writing competence or communicate their understanding. Such multiple-source based, integrated academic writing tasks have been found to represent a formidable challenge across educational levels that may require particular instructional interventions (Mateos et al., 2018; Weston-Sementelli et al., 2018; Granado-Peinado et al., 2019; Du and List, 2020; Kiili et al., 2020; Marttunen and Kiili, 2022; Barzilai et al., 2023; Kullberg et al., 2023; Vandermeulen et al., 2023a). As such, they can also be assumed to require considerable motivation on the part of the students, not least with respect to their confidence in their ability to successfully complete such tasks (i.e., their self-efficacy beliefs; Bandura, 1997). However, although writing self-efficacy has been a productive line of writing motivation research for several decades (for reviews, see Klassen, 2002; Bruning and Kauffman, 2016; Abdel Latif, 2021), no prior writing self-efficacy measure has been created that targets this specific writing task (Abdel Latif, 2021). We therefore created a process-focused, task-specific writing self-efficacy measure focused on the process of integrating information across multiple sources when completing the task of composing an

academic text. In the current study, we performed a preliminary validation of this measure, analyzing the structure of the scores in addition to relationships between these scores and a range of variables considered relevant based on theories of writing (Hayes, 1996; MacArthur and Graham, 2016; McNamara and Allen, 2018) and prior research on writing motivation (Abdel Latif, 2021). Before we further specify the research questions that guided our study, we briefly discuss the role of motivation within theories of writing, conceptualizations and relevant research on multiple-source based writing, and prior research on writing self-efficacy and its measurement.

Writing and motivation

In Flower and Hayes' (1981) and Hayes and Flower's (1980) classic cognitive process theory of writing, motivation was only represented as motivational cues in the task environment. However, when Hayes (1996) substantially revised this theory, motivation was featured as an important individual difference factor in writing, referring to writers' goals, predispositions, beliefs and attitudes, and cost/benefit estimates. Further, motivation was assumed to be bidirectionally related to the task environment, as well as to writers' text interpretation (i.e., reading comprehension), working memory and executive functions, and knowledge. Hayes (1996) did not specify how writers' motivation could be assumed to draw upon and be influenced by environmental and cognitive factors, however. Other relevant individual difference factors, such as gender and language background (Abdel Latif, 2021), were also not considered in relation to motivation within this theoretical framework.

Another influential model of writing that highlights the importance of motivation is Zimmerman and Risemberg's (1997) model of self-regulated writing. Based on Bandura's (1986) social-cognitive theory, Zimmerman and Risemberg's (1997) model describes how proficient writers monitor and regulate their behavior, cognition, and environment when completing writing tasks, with motivation for such self-regulated writing essentially stemming from writers' perceived self-efficacy, that is, their perceived ability to perform the actions required to complete specific writing tasks. Further, the relationship between self-efficacy on the one hand and self-regulated writing and writing performance on the other was regarded as reciprocal, with self-efficacy not only influencing but also being influenced by writers' self-regulation and performance (Zimmerman and Risemberg, 1997).

The application of the model of domain learning (Alexander, 1997, 2004) to the domain of writing (MacArthur and Graham, 2016) highlights how the motivational construct of interest interacts with writers' strategies and knowledge, with more proficient writers characterized by higher individual interest in writing, the use of deeper level writing strategies (knowledge transformation), and more principled knowledge about writing and the processes of writing.

Finally, the writer(s)-within-community (WWC) model of writing by Graham (2018) presents a broader, more nuanced view on writing motivation. As such, it draws on a range of motivational theories, including expectancy-value theory (Wigfield and Eccles, 2000), self-efficacy theory (Bandura, 1997), self-determination theory (Deci and Ryan, 2000), goal-orientation theory (Elliot, 1999), and attribution theory (Weiner, 2005). Like Hayes's (1996) model, the WWC model describes motivational constructs as interacting with writers' working memory and executive functions.

In summary, although motivational constructs have been featured within several theoretical accounts of writing, none of these frameworks have addressed motivation for writing from multiple sources, in particular. In the following, we turn to this educationally relevant writing task and some crucial processes involved in that task.

Multiple-source based academic writing

During the last decades, multiple-source based academic writing has been addressed by reading comprehension researchers focusing on multiple text comprehension and by writing researchers focusing on synthesis writing. Within the area of multiple text comprehension (also termed multiple document literacy; Bråten and Strømsø, 2010), process models have focused on purposeful literacy tasks in which students' read multiple sources to construct an integrated understanding of a topic and subsequently communicate their understanding in the form of a written task product (Rouet and Britt, 2011; Britt et al., 2018; List and Alexander, 2019). In these models, the main emphasis has been on reading rather than writing, that is, on integrated understanding conceptualized as a coherent mental representation of the content included in different texts (Perfetti et al., 1999). That is, although writing tasks have quite often been used as post-reading assessment tools targeting multiple text comprehension in this area of research (Barzilai et al., 2018; Primor and Katzir, 2018), it seems fair to say that the attention to writing *per se* has been rather modest (McNamara and Allen, 2018; McCarthy et al., 2022). Accordingly, the lack of integration commonly observed in students' writing task products (e.g., Anmarkrud et al., 2014; Du and List, 2020; Kiili et al., 2020; Kullberg et al., 2023) has typically been interpreted as an issue related to reading comprehension rather than writing competence within multiple text comprehension (McNamara and Allen, 2018; McCarthy et al., 2022). That said, in a recent study, McCarthy et al. (2022) demonstrated that students' writing ability may be a unique predictor of their multiple text comprehension when the latter was assessed with a multiple-source based writing task. No attention was devoted to writing motivation in that study, however. A more direct focus on multiple-source based writing has been implemented by writing researchers primarily interested in synthesis writing (e.g., Segev-Miller, 2007; Solé et al., 2013; Mateos et al., 2018; Granado-Peinado et al., 2019; Vandermeulen et al., 2020b). Synthesis writing can be defined as source-based writing directed toward synthesizing information from different sources to compose a new text that can be understood by people without access to the original source materials (Vandermeulen et al., 2023b). This line of research has described how writers select, organize, and connect source information in order to produce a new discourse that is both loyal and transformative in relation to the sources (Spivey and King, 1989; Segev-Miller, 2007). Further, it has highlighted the recursive nature of reading and writing when writing synthesis text, with more adaptive switching between processes of reading and writing (e.g., reading and comprehending the sources, writing the synthesis text, reading and evaluating the synthesis text, and revising the synthesis text) characterizing more proficient synthesis writers (Solé et al., 2013; Vandermeulen, et al., 2020a,b). Individual difference variables

addressed by synthesis writing researchers include educational level, reading comprehension skills, writing skills, reflection, prior knowledge, and topic interest (Spivey and King, 1989; Solé et al., 2013; Van Steendam et al., 2022; Castells et al., 2023). To the best of our knowledge, writing motivation has not been included in prior research on synthesis writing, however.

Taken together, research within multiple text comprehension and synthesis writing has emphasized the importance of integrating content across diverse sources in order to produce a new, cohesive, and understandable text. This may involve explaining, relating (e.g., comparing and contrasting), and reconciling different or opposing views on the topic discussed across the source texts, thereby providing readers with a credible overview of the topic in question. Needless to say, this is a cognitively demanding task that may require not only skill but also considerable will (i.e., motivation) on the part of the writers.

Writing self-efficacy

Given the plethora of studies on the antecedents and consequences of students' perceived self-efficacy following Bandura's (1977) initial discussion of the construct, it is no wonder that researchers in the domain of writing quite soon began to target student writers' confidence in their ability to perform specific writing tasks. Taken together, research on writing self-efficacy conducted over nearly four decades has strongly indicated that a positive relationship exists between students' self-efficacy and their writing performance (Klassen, 2002; Bruning and Kauffman, 2016; Abdel Latif, 2021). However, findings regarding relationships between writing self-efficacy and a range of relevant individual difference variables have been less consistent.

Several studies have indicated higher self-efficacy for writing among females than among males (e.g., Hidi et al., 2002; Andrade et al., 2009). However, there are also some indications that such gender-related differences may be reduced and even reversed at higher educational levels (Abdel Latif, 2021), and that any differences in this regard may be related to gender orientation or gender identification rather than to gender *per se* (Pajares and Valiante, 2001).

With respect to language background, there is a general lack of research on the potential relationship between this variable and writing self-efficacy. To the extent that students who have another language background than the majority language perceive their own language ability to be problematic, it seems reasonable to expect that their self-efficacy for writing in the majority language could be lower than that of language majority students, however (Abdel Latif, 2021).

With respect to educational level, writing self-efficacy has been found to decline as students move beyond elementary school (Pajares and Valiante, 1999; Pajares et al., 2007a) but not necessarily when they move into and through the high school grades (Shell et al., 1995; Pajares et al., 2007b). Besides, prior research has hardly addressed potential differences in writing self-efficacy between students at different levels of postsecondary education, with more extensive study experience beyond high school possibly leading to higher writing self-efficacy (Mitchell et al., 2021).

In accordance with Bandura's (1997) theory of self-efficacy, previous mastery experiences with writing (i.e., writing achievement) has been shown to be a strong predictor of students' writing self-efficacy (Pajares et al., 2007b). However, few studies have so far compared the contribution of students' previous writing achievement to their writing self-efficacy with that of other relevant predictors.

Finally, there seems to be a general lack of research on relationships between writing self-efficay and cognitive variables such as reading comprehension, working memory, and executive functions. Thus, although relationships between writing motivation and cognitive variables have been highlighted within cognitive perspectives on writing, including Hayes's (1996) influential model, these cognitive variables (i.e., reading comprehension, working memory, and executive functions) have mainly been studied in relation to writing performance, not writing motivation (MacArthur and Graham, 2016; McNamara and Allen, 2018; Limbo and Olive, 2021). However, given that these cognitive variables may be linked to students' mastery experiences with writing (McNamara and Allen, 2018), it seems reasonable to expect that they could be positively related to their writing self-efficacy as well. In particular, reading comprehension at the level of situation model construction (Kintsch, 1988), that is, inferential reading comprehension, seems important in this context. Moreover, working memory, which refers to a processing resource with limited capacity involved in the storage of information while simultaneously manipulating information for brief periods of time (Baddeley and Logie, 1999; Alloway, 2009; Swanson and Alloway, 2012), needs to be further studied in relation to writing self-efficacy. The same is true for executive functions, which can be defined as a set of separate yet related cognitive mechanisms involved in the regulation of behavior and cognition during the performance of challenging tasks (Miyake et al., 2000; Miyake and Friedman, 2012).

It also seems likely that some inconsistencies in research on writing self-efficacy in relation to other variables are due to differences in the way this construct has been measured across studies. In his comprehensive review of writing motivation measures, Abdel Latif (2021) noted that 21 different writing self-efficacy measures had been published and used since 1984, including unidimensional as well as multidimensional measures. As an example of an early unidimensional measure, Graham et al. (1993) used seven items to assess students' perceived self-efficacy for performing basic composing processes related to planning, translating, and reviewing (Flower and Hayes, 1981). More recent multidimensional writing self-efficacy measures include Bruning et al.'s (2013) 16-item measure focusing on the three dimensions of self-efficacy for generating ideas, mastering writing conventions (mechanics, syntax), and self-regulating the writing process, and MacArthur et al.'s (2016) 18-item measure focusing on the three dimensions of self-efficacy for performing different writing tasks (e.g., introduction, summary, and conclusion writing), using strategies for planning, organizing, and revising text, and self-regulating writing by evaluating progress, managing time, and avoiding distractions.

Despite the merits of these previous measures of writing self-efficacy, we contend that a specific measure of self-efficay for multiple-source based writing in an academic task context may fill an important gap in the measurement literature. Crucial to our argument is the view shared by scholars in multiple document literacy and synthesis writing that integrating information across multiple sources is a critical process in academic writing (e.g., Rouet and Britt, 2011; Vandermeulen et al., 2023b). Gaining understanding about students' perceived self-efficacy for multiple-source integration when composing academic text therefore seems like an important agenda for writing motivation research.

The present study

In summary, theories of writing have included writing motivation as an important individual difference factor (Hayes, 1996; Zimmerman and Risemberg, 1997; Graham, 2018). Among the motivation constructs that have been addressed by writing researchers, writing self-efficacy holds a unique position (Klassen, 2002; Bruning and Kauffman, 2016; Abdel Latif, 2021). However, among the many measures developed and used to gauge this construct, none has focused on perceived self-efficacy for multiple-source based, integrated academic writing (Abdel Latif, 2021). Because this reflects a crucial process in an academic writing task context (Rouet and Britt, 2011; Sonia et al., 2023; Vandermeulen et al., 2023b), not least within higher education, such a writing motivation assessment tool may complement existing measures of writing self-efficacy. Therefore, the main purpose of the current study was to develop a scale targeting the extent to which students are confident they can write an academic text that integrates content from several different sources. In addition, we provided some preliminary validation data for this measure by testing a unidimensional model of the construct in a sample of Norwegian university students, as well as by examining relationships between participants' scores on this measure and a range of individual difference background and cognitive variables. Specifically, the following four questions guided our research:

1. Are participants' writing self-efficacy scores based on our measure characterized by a unidimensional structure?
2. Are the background variables of gender orientation, language background, study experience, and previous writing achievement related to participants' scores on our writing self-efficacy measure?
3. Are the cognitive variables of reading comprehension, working memory, and executive functions related to participants' scores on this measure?
4. What is the relative contribution of the measured background and cognitive variables to participants' scores on the writing self-efficacy measure?

Based on the way we designed our writing self-efficacy measure (see the *Method* section), we expected it to be characterized by a unidimensional structure. Regarding the background variables, we did not expect gender orientation or language background to be related to participants' scores on our measure. This is because prior research has indicated that gender-related differences in writing self-efficacy may be reduced or eliminated at higher educational levels, and because our participants could be expected to be quite proficient in Norwegian although they differed with respect to language background (see *Participants* below). Regarding previous writing achievement, we, based on the assumptions of self-efficacy theory (Bandura, 1997) as well as prior research (Pajares et al., 2007b), expected this background variable to be positively related to our measure of writing self-efficacy. We also expected the background variable of study experience to be positively related to our writing self-efficacy measure because more experience with multiple-source based writing tasks in higher education may increase students' confidence in their ability to successfully complete such tasks. Regarding the cognitive variables, despite a general lack of prior research, in accordance with Hayes's (1996) theory of writing, we expected reading comprehension, working memory, and executive functions to be positively related to our writing self-efficacy measure. Finally, regarding the relative contribution of the background and cognitive variables that we measured, we expected previous writing achievement to be the strongest predictor of students' scores on our measure (Pajares et al., 2007b).

Method

Participants

Participants were 136 students at the University of Oslo who were enrolled in programs in education (31.6%), special education (23.5%), arts and humanities (22.1%), social sciences (21.3%), and informatics and mathematics (1.5%).[1] Sixty-five participants were first-year bachelor students, 36 were second-year bachelor students, and 31 were third-year bachelor students, with only four participants being enrolled in master level programs at the time of data collection. Their overall mean age was 24.07 years ($SD = 6.41$), and 77.2% identified as female, 18.4% as male, and 2.9% as other. Most participants (66.7%) had Norwegian as their sole language background, while 19.1% had another language background, and 14.7% had a mixed language background (i.e., Norwegian and another language). However, 95% of the participants were graduated from a Norwegian high school and all their current university level programs were taught in Norwegian. Participation in the study was voluntary and each participant received a gift card worth approximately USD 20 after the data collection. The collection and handling of the data were in accordance with the Norwegian Personal Data Registers Act and were approved by the Norwegian Social Science Data Services.

Materials

Demographic survey

Participants provided information about their age, gender identification ("with which gender do you identify the most?"), study experience, and language background on a brief demographic survey. With respect to study experience, they used a scale ranging from 1 (bachelor first year) to 5 (master second year),[2] and with respect to language background, they were asked in which language their parents talked to them when they grew up and responded using the three categories of Norwegian, another language, or Norwegian and another language.

Measure of previous academic writing achievement

We assessed participants' previous academic writing achievement by having them self-report their final high-school grade in written language arts class (i.e., written Norwegian). Those grades were based

1 This study is part of a larger project. However, research questions, materials, analyses, and results are unique to this study and not reported elsewhere.

2 A bachelor's degree at the University of Oslo is normally completed in three years, with a master's degree normally requiring two additional years.

on the language arts teachers' running evaluations throughout the final high school year, averaged across various written assessment tests and assignments, with mastery of a range of written academic texts representing different genres emphasized within the national curriculum (e.g., literary essays, argumentative texts; Norwegian Directorate for Education and Training, 2016, 2020). Of note is that Norwegian high-school students engage in multiple-source based writing in different subjects (e.g., language arts and history). Such writing activities are grounded in the national core curriculum, which provides the overarching values and principles for grades 1–13, including critical thinking and the use of different knowledge sources (Norwegian Ministry of Education and Research, 2017). Based on the Norwegian grading system for high school, ranging from 1 (not good) to 6 (excellent), participants rated their previous academic writing achievement on a 6-point scale. Of note is that self-reported grades have been found to correlate highly (approx. 0.90) with the grades provided by the teachers (Dickhäuser and Plenter, 2005; Hofer et al., 2012). Although students' self-reports may slightly overestimate their actual grades, such overestimation has been found to be unrelated to gender as well as to students' self-concept and achievement in the domain (Dickhäuser and Plenter, 2005).

Measure of reading comprehension

We assessed reading comprehension by means of a Norwegian adaptation of a cloze test developed by Jensen and Elbro (2022), which required readers to draw global, situation level (Kintsch, 1988) inferences in order to fill in each of the gaps. This measure consisted of 34 2-4-sentence passages with one gap in each passage and four alternative words provided for each gap. Correct refilling of the gaps could only be achieved by drawing inferences regarding the global situation described in the passage (i.e., situation model construction; Kintsch, 1988). As an example, an English translation of one passage read:

> She had to be ready in two hours so she was in a bit of a rush. The bag was already in the car and the ticket, keys, and wallet were in her pocket. Her husband ran after her with her [*passport*, packed lunch, shopping list, USB key]. It was lucky, otherwise she would not have got very far.
>
> Jensen and Elbro (2022, p. 1233)

The Danish version of this measure was validated by Jensen and Elbro (2022), who demonstrated that the scores of adult readers were highly correlated with their scores on a standardized reading comprehension test as well as with their scores on other reading-relevant measures (vocabulary, sentence comprehension, topic identification). Recently, Salmerón et al. (2022) also provided some preliminary validation data for a Spanish adaptation of this measure.

Participants read the passages and refilled as many gaps as possible during a period of 10 min. Scoring was done by counting the number of correctly refilled gaps (possible maximum score = 34). The internal consistency reliability for participants' scores on the measure (Cronbach's α) was 0.84.

Measure of working memory

Working memory was measured with a Norwegian adaptation of Swanson and Trahan's (1992) Working Memory Span Task, which is based on the technique originally developed by Daneman and Carpenter (1980). The Norwegian adaptation has been used and validated in much prior work with postsecondary students (e.g., Delgado et al., 2020; Bråten et al., 2022; Haverkamp and Bråten, 2022). The materials consisted of 42 unrelated declarative sentences, five to 12 words in length, which were organized into 12 sets of sentences. The number of sentences in each set ranged from two to five, and the sentences in each set were read aloud to participants with an interval of two seconds between each sentence. Participants were asked to comprehend the sentences so that they could answer a question about the content of one of the sentences as soon as the final sentence in the set was read. Then, on the same response form, they should write down the final word of each sentence in the set. The working memory task was scored by counting the total number of final words recalled across all 12 sets (possible maximum score = 42) but points were awarded for correctly recalled final words only if the comprehension question for the set was answered correctly. The internal consistency reliability (Cronbach's α) for participants' scores on the measure was 0.87.

Measure of executive functions

To measure executive functions, we used 19 items from a Norwegian adaptation of the Executive Functions for Learning Inventory (EFLI; Follmer and Tise, 2022) to target participants' inhibitory and attentional control (10 items), shifting (5 items), and updating (4 items). The items concerning inhibitory and attentional control focused on the ability to deliberately suppress impulsive or dominant responses and devote sustained attention to relevant tasks (sample item: I am good at focusing on what is most relevant to the task I'm working on). The items concerning shifting focused on the ability to switch flexibly and effectively between tasks and activities (sample item: I can move back and forth between tasks to finish what I have started). The items concerning updating focused on the ability to monitor and update (add/delete) working memory content as required by a task (sample item: I can juggle multiple things at the same time in my mind). Each item was rated on a 5-point scale ranging from *fits very poorly* (1) to *fits very well* (5). In terms of validity, Follmer and Tise (2022) showed that scores on the EFLI both indirectly (via cross-text elaboration strategies) and directly predicted multiple text comprehension in a sample of American college students and actually were a better predictor in this regard than a direct (i.e., task-based) measure of executive functions.

In the current study, a confirmatory factor analysis (CFA) with the lavan R package (R Core Team, 2020) did not support a three-dimensional structure in which each of the 19 items loaded on its designated factor. However, after removing five items with low loadings (< 0.50) and including four correlations between residuals that were suggested by the modification indices and seemed methodologically as well as substantially justified, the re-specified model had an acceptable fit to the data, with $\chi^2(70) = 109.01$, $p = 0.002$; confirmatory fit index (CFI) = 0.95; root mean square error of approximation (RMSEA) = 0.064, 90% CI (0.039–0.087); and standardized root mean square residual (SRMR) = 0.061. The internal consistency reliability (Cronbach's α) for participants' scores on the seven items measuring inhibitory and attentional control was 0.83. For their scores on the three items measuring shifting, it was 0.70, and for their scores on the four items measuring updating, it was 0.75.

Measure of multiple-source based academic writing self-efficacy

To assess participant's confidence in their ability to write an academic text or paper that integrates or synthesizes content from multiple textual sources, we developed the Multiple-Source Based Academic Writing Self-Efficacy Scale (MAWSES). The 8-item MAWSES was based on Bandura's (1997) conceptualization of self-efficacy applied to the specific writing process of integrating information across multiple sources and to the specific writing task of composing an academic text. Thus, this scale can be considered to target "process-focused writing self-efficacy" (Abdel Latif, 2021, p. 13) by focusing on writers' confidence in their ability to perform the writing process of cross-source integration. At the same time, however, it can be considered task-specific by focusing on the specific task of producing an academic text or paper. Taken together, this means that the MAWSES can be considered an integration process for academic text self-efficacy measure.

As no prior writing self-efficacy measure to the best of our knowledge focused on this particular process within academic writing (for review of existing writing self-efficacy measures, see Abdel Latif, 2021), we consulted the literature on synthesis writing (Spivey and King, 1989; Segev-Miller, 2007; Solé et al., 2013; Vandermeulen et al., 2020a,b) as well as on written task products used for comprehension assessment within multiple document literacy (e.g., Ferguson and Bråten, 2013; Barzilai and Ka'adan, 2017; Du and List, 2020; McCarthy et al., 2022; Kullberg et al., 2023) in developing the items for our measure. In brief, these items were developed to represent a core process in writing synthesis texts and communicating an integrated understanding based on multiple source reading, with different aspects of this process, such as dealing with inconsistencies, explaining similarities and differences between perspectives, creating overview and comprehensiveness, and producing a new, original text, presumably captured by the items.

Participants were asked to evaluate their own ability to write academic texts by rating each item on a 10-point scale ranging from *quite confident that I cannot perform this* (1) to *quite confident that I can perform this* (10). All items on the MAWSES are displayed in Table 1 together with descriptive information for each item. Descriptive information for the entire measure and the reliability of participants' scores are also included in the Results section.

Procedure

The second and third authors collected all the data during individual 60-min sessions in a quiet room at the university. The working memory measure was administered orally before participants completed the demographic survey, the Multiple-Source Based Academic Writing Self-Efficacy Scale (MAWSES), and the reading comprehension measure independently on paper. Finally, participants completed the inventory of executive functions targeting inhibitory and attentional control, shifting, and updating and the measure of previous academic writing achievement using a web based questionnaire accessible through a link on a laptop computer.

Data analysis

To examine the construct validity of the MAWSES, we first analyzed all item scores descriptively and then performed a CFA by means of the lavan R package (R Core Team, 2020) to test how well a unidimensional model fit the data. We used chi-square statistics as well as the fit indices of CFI, RMSEA, and SRMR to evaluate the fit of the unidimensional model. Based on proposed cut-off criteria for the evaluation of the goodness of fit (Hu and Bentler, 1999; Marsh et al., 2004; Brown, 2015), we adopted the following criteria for good model fit: CFI $\geq$ 0.95, RMSEA $\leq$0.06, and SRMR $\leq$0.06. In addition to the overall model fit, we examined the factor loadings and the internal consistency reliability of participants' MAWSES scores.

Further, we used one-way between-subjects analyses of variance (ANOVAs) to examine whether participants who differed with respect to gender identification and language background, respectively, scored differently on the MAWSES, and we conducted a correlational analysis to examine zero-order correlations (Pearson's *r*) between participants' scores on the MAWSES and their scores on the variables of study experience, previous academic writing achievement, reading comprehension, and executive functions (i.e., inhibitory and attentional control, shifting, and updating).

Finally, based on the resulting correlational pattern, we conducted a simultaneous multiple regression analysis to examine the relative contribution of participants' study experience, previous academic writing achievement, reading comprehension, and executive functions to their multiple-source based academic writing self-efficacy.

Results

As can be seen in Table 1, our examination of the distributional properties of the item-level MAWSES variables showed that all items were approximately normally distributed, with only one item having a skewness value slightly below 1 (−1.10) and only two items having kurtosis values slightly above 1 (1.23, 1.53). Ordinary maximum likelihood extraction was therefore used for the CFA.

The unidimensional model of multiple-source based academic writing self-efficacy that we specified and tested by means of CFA had an acceptable fit to the data, with $\chi^2(20) = 39.54$, $p = 0.006$; CFI = 0.98; RMSEA = 0.085, 90% CI (0.045–0.123); SRMR = 0.033, with factor loadings ranging from 0.70 to 0.87. However, the RMSEA was somewhat higher than desirable and the modification indices indicated that the fit could be improved by allowing the error variances of items 5 (I can explain a complex topic in a clear and understandable way when I write academic texts based on several different source texts) and 7 (When I write academic texts based on different sources, I can structure the text such that it becomes easy for the reader to understand what I write) to correlate. Because these items to some extent were similarly worded (understandable/easy for the reader to understand) and because both may seem to capture some kind of audience awareness among writers, we considered it both methodologically and substantially justifiable to re-specify the model with their errors freed to correlate. The re-specified model fit the data well, with $\chi^2(19) = 28.59$, $p = 0.073$; CFI = 0.99; TLI = 0.98; RMSEA = 0.061, 90% CI (0.000–0.104); SRMR = 0.027. The re-specification resulted in a statistically significantly improvement of the model fit, with $\Delta\chi^2(1) = 10.95$, $p < 0.001$. The loadings of the eight items ranged from 0.68 to 0.87 (see Table 1), and the standardized estimate of the correlated error was 0.303. The internal consistency reliability of participants' MAWSES scores was high (Cronbach's $\alpha = 0.93$).

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TABLE 1 Descriptive statistics and factor loadings for the items of the multiple-source based academic writing self-efficacy scale.

Item	Item no.	*M*	*SD*	Skewness	Kurtosis	Loading
I can write an academic text that integrates content from several different sources	1	8.25	1.88	−1.10	1.23	0.77
I can combine information from several different texts I have read and write a new, original academic text based on these texts	2	7.30	2.15	−0.83	0.44	0.74
When the content of the texts I have read is inconsistent, I can still write a coherent academic text based on them	3	6.99	2.16	−0.68	−0.03	0.84
When I write academic texts, I can present a complete picture of a topic based on various academic texts I have read about it	4	7.66	1.76	−0.55	−0.31	0.80
I can explain a complex topic in a clear and understandable way when I write academic texts based on several different source texts	5	6.76	1.97	−0.45	−0.25	0.81
When I write academic texts, I can evaluate and integrate different arguments about an issue that are presented in the texts I have read about it	6	7.50	1.99	−0.71	0.11	0.87
When I write academic texts based on different sources, I can structure the text such that it becomes easy for the reader to understand what I write	7	7.46	1.85	−0.79	0.50	0.68
I can explain differences and similarities between different perspectives when I write academic texts based on multiple sources	8	7.80	1.76	1.00	1.53	0.86

Further, one-way between-subjects ANOVAs showed that gender identification (female: $M = 7.49$, $SD = 1.66$; male: $M = 7.39$, $SD = 1.28$) or language background (Norwegian: $M = 7.57$, $SD = 1.50$; another language: $M = 7.04$, $SD = 1.97$; Norwegian and another language: $M = 7.56$, $SD = 1.50$) did not matter in terms of participants' MAWSES scores, with $F\ (1, 128) = 0.08$, $p = 0.778$, for gender identification, and $F\ (2, 133) = 1.15$, $p = 0.319$, for language background. However, a correlational analysis showed that participants' scores on the MAWSES were positively and statistically significantly correlated with their study experience ($r = 0.203$, $p = 0.019$), indicating higher writing self-efficacy the longer participants had studied at bachelor level, as well as with their previous academic writing achievement ($r = 0.343$, $p < 0.001$). Further, participants' MAWSES scores were positively and statistically significantly correlated with reading comprehension ($r = 0.211$, $p = 0.014$) and the three types of executive functions that we measured (inhibitory and attentional control: $r = 0.253$, $p = 0.003$; shifting: $r = 0.202$, $p = 0.019$; updating: $r = 0.333$, $p < 0.001$), but not with working memory ($r = 0.135$, $p = 0.119$). Results of the correlational

analysis are shown in Table 2, which also includes descriptive information (*M*, *SD*, skewness, and kurtosis) about the variables.

Although working memory was not statistically significantly related to writing self-efficacy, we also performed an exploratory mediation analysis to probe if there was an indirect relationship between working memory and the MAWSES scores via previous writing achievement. In doing this, we used the bootstrapping approach available in the PROCESS Procedure for SPSS Version 4.0 (Hayes, 2022), which holds no assumption about the statistical significance of the *c* path. The indirect relationship was tested with a bootstrap estimation approach with 5,000 samples. The results of the mediation analysis are shown in Figure 1.

There was a positive statistically significant indirect relationship between working memory and multiple-source based writing self-efficacy via previous writing achievement, with an estimate of 0.069 ($CI_{95\%}$: 0.016–0.135). Working memory was a statistically significant predictor of previous writing achievement ($b = 0.204$, $SE = 0.087$, $p = 0.021$), which, in turn, was a statistically significant predictor of writing self-efficacy ($b = 0.338$, $SE = 0.086$, $p = 0.0001$). Consistent with a full mediation, the direct relationship between working memory and writing self-efficacy remained statistically non-significant ($b = 0.022$, $SE = 0.086$, $p = 0.795$). The model explained 12% of the variance, $R^2 = 0.12$, $F(2, 125) = 8.33$, $p = 0.0004$.

Finally, based on the zero-order correlations, we performed a simultaneous multiple regression analysis to examine the contribution of participants' study experience, previous writing achievement, reading comprehension, and the executive functions of inhibitory and attentional control, shifting, and updating to their MAWSES scores. Although the positive correlations between the three executive function measures ranged from 0.419 to 0.464 (see Table 2), shared variances from 17.6 to 21.5% indicated that three distinct executive function constructs actually were captured by these measures. We therefore decided to keep all three measures in the equation. A simultaneous multiple regression analysis was performed in this study because we wanted to examine the relative contribution of the predictors, including the three executive function constructs, to multiple-source based writing self-efficacy. The results of this analysis are displayed in Table 3. Taken together, the six predictors explained 24% of the variance in MAWSES scores, $F(6, 121) = 11.12$, $p < 0.001$. The variables that uniquely and positively predicted multiple-source based writing self-efficacy in this analysis were previous writing achievement ($\beta = 0.24$, $p = 0.009$) and the executive function of updating ($\beta = 0.24$, $p = 0.013$).

Discussion

Writers' confidence in their ability to write an academic text or paper that integrates or synthesizes content from multiple sources is an important aspect of writing motivation across educational levels. In the current study, we developed a measure targeting this particular form of writing motivation, which we called the MAWSES, and analyzed the structure of the scores on this measure by means of confirmatory factor analysis as well as the relationships between the resulting construct and a range of relevant individual difference background and cognitive variables. In this way, we essentially followed the classic procedure for construct validation described by Cronbach and colleagues (Cronbach and Meehl, 1955; Cronbach, 1990).

First, the confirmatory factor analysis indicated that the scores on the multiple-source based academic writing self-efficacy measure that we developed could be characterized by a unidimensional structure.

Second, although participants' scores on our measure did not differ by gender orientation or language background, they correlated positively with the background variables of study experience and previous writing achievement. Regarding gender orientation, this finding is consistent with prior research indicating that gender-related differences in writing self-efficacy may disappear at higher educational

TABLE 2 Descriptive statistics and zero-order correlations for measured variables.

Variables	1	2	3	4	5	6	7	8
1. Study experience	–							
2. Previous writing achievement	0.152	–						
3. Reading comprehension	0.160	0.348***	–					
4. Working memory	−0.012	0.204*	0.410***	–				
5. Inhibitory and attentional control	0.144	0.273**	0.052	0.048	–			
6. Shifting	0.067	0.002	0.004	−0.007	0.419***	–		
7. Updating	0.097	0.133	0.060	0.067	0.439***	0.464***	–	
8. Writing self-efficacy (MAWSES)	0.203*	0.343***	0.211*	0.135	0.253**	0.202*	0.333***	–
M	1.74	4.69	24.87	20.66	3.30	3.45	3.27	7.47
SD	0.82	0.84	5.03	8.16	0.73	0.79	0.78	1.60
Skewness	0.51	−0.26	−0.95	0.10	−0.17	−0.51	0.16	−0.80
Kurtosis	−1.31	−0.03	0.97	−0.49	−0.55	−0.09	−0.63	0.83

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. Study experience is scored 1, 2, or 3 depending on bachelor program level (first, second, or third year).

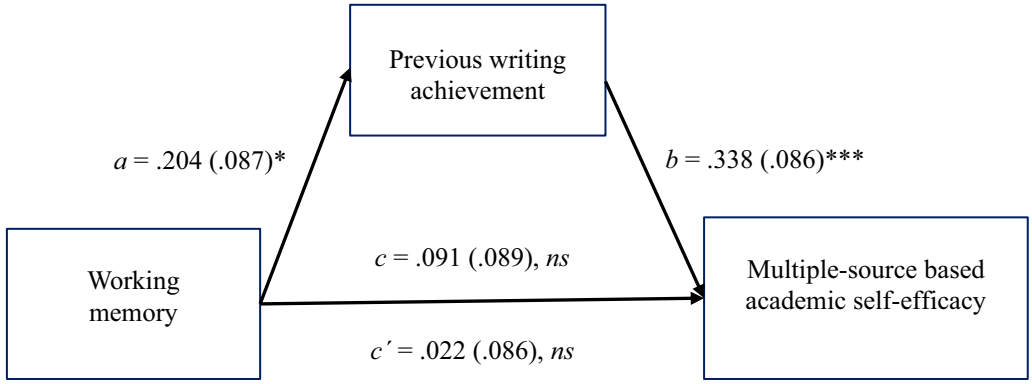

FIGURE 1
Mediation model for the effect of working memory on multiple-source based writing self-efficacy (MAWSES) with previous writing achievement as a mediator (standardized coefficients). *p<0.05, ***p<0.001.

TABLE 3 Results of multiple regression analysis for variables predicting multiple-source based academic writing self-efficacy.

Predictor	*B*	*SE B*	β
Study experience	0.24	0.15	0.13
Previous writing achievement	0.43	0.16	0.24**
Reading comprehension	0.03	0.03	0.10
Inhibitory and attentional control	0.11	0.20	0.06
Shifting	0.07	0.18	0.04
Updating	0.46	0.18	0.24*

*p < 0.05, **p < 0.01.

levels (Abdel Latif, 2021), and regarding language background, our finding suggests that participants having another language background than Norwegian or a mixed language background did not perceive their current language ability as problematic (Abdel Latif, 2021). Relevant in this regard is the fact that the vast majority of the participants, irrespective of language background, were graduated from a Norwegian high school and that their university programs also were taught in Norwegian. The positive relationship found between study experience and participants' scores on the MAWSES suggests that more extensive study experience beyond high school may lead to higher writing self-efficacy (Mitchell et al., 2021), possibly because many writing assignments requiring integration of multiple sources followed by supportive feedback may increase students' perceived self-efficacy for performing such tasks (Bruning and Horn, 2000). The positive relationship found between prior writing achievement and participants' MAWSES scores is consistent with Bandura's (1997) theory of self-efficacy as well as with prior research on the antecedents of students' writing self-efficacy (Pajares et al., 2007b).

Third, among the cognitive variables, reading comprehension and the executive functions of inhibitory and attentional control, shifting, and updating were all positively related to participants' MAWSES scores, and working memory was indirectly related to those scores via previous writing achievement. These findings are consistent with Hayes's (1996) conceptualization of relationships between reading comprehension (termed "text interpretation" by Hayes), executive functions, and writing motivation. It also stands to reason that working memory capacity may underlie students' history of achievement in the domain of writing, which, in turn, contributes to their multiple-source based academic writing self-efficacy.

Fourth, when examining the relative contribution of the individual difference variables that were positively correlated with the writing self-efficacy scores, previous writing achievement and updating emerged as the strongest predictors. Regarding previous writing achievement, this finding is consistent with prior research comparing successful performance in the domain to other potential sources of writing self-efficacy (Pajares et al., 2007b). Further, the fact that updating was a relatively strong predictor in this multivariate context may suggest that the ability to continuously monitor and add/delete working memory content may serve processes of writing such as controlling the relevance/irrelevance of content retrieved from long-term memory (Miyake and Friedman, 2012) and thereby boost students' perceived self-efficacy for mastering multiple-source based writing tasks.

Taken together, our findings provide preliminary evidence suggesting that the MAWSES is a reliable and valid measure of an important aspect of writing motivation in the contexts of multiple document literacy and synthesis writing. As a unitary construct, students' confidence in their ability to accomplish multiple-source based, integrated academic writing tasks was associated with their university level study experience and their previous writing achievement, as well as directly with their reading comprehension and executive functions and indirectly with their working memory capacity. Such relationships are consistent with theories of self-efficacy (Bandura, 1997) and writing (Hayes, 1996; MacArthur and Graham, 2016; Graham, 2018; McNamara and Allen, 2018), as well as with prior writing motivation research (Abdel Latif, 2021).

One limitation of the current validation effort is that we studied participants' scores on the MAWSES in relation to other variables that can be considered antecedents of the construct rather than its consequences, with further validation research needed to examine the predictability of MAWSES for multiple-source based, integrated academic writing performance with other relevant predictors controlled for. That said, it should also be noted that prior writing motivation research, including research on writing self-efficacy, hitherto seems to have been more concerned about the consequences

of writing motivation than about its antecedents (Abdel Latif, 2021). Of course, our findings are also limited by the particular sample that we included and by the way we measured the variables in question, with further research needed to probe the generalizability of these findings across student populations and measures. For example, future research should try to replicate our findings with other measures of previous writing achievement than the self-reports of final high-school grades that we used in this study. In particular, more direct and proximal measures of previous writing achievement should be used in future testing of the indirect relationship between working memory and multiple-source based writing self-efficacy via previous writing achievement that we explored in this study. Regarding the writing self-efficacy measure that we developed, it also seems pertinent to adapt the items to writing within specific academic domains as well as to writing about specific topics within those domains. In addition, the specificity of measurement may be further increased by adapting the items to multiple-source based integrated writing for different academic task purposes (e.g., summary writing in order to learn, cross-text elaboration in order to demonstrate understanding, argumentative writing in order to persuade or reach a balanced conclusion; Nussbaum, 2008). Finally, other theoretically grounded writing motivation constructs, such as writing task values and writing goal orientations (Graham, 2018), should be adapted to multiple-source based academic writing in future research.

Despite the limitations of the current study, we remain optimistic about the potential applications of the writing motivation measure we created. Beyond the potential of the measured writing self-efficacy construct to predict both processes and products of integrated academic writing is its potential to moderate or mediate the effects of interventions targeting integrated academic writing, assess the motivational outcome of such interventions, and provide information about students' writing motivation trajectories within and across educational levels. For example, efforts to improve students' multiple-source based writing in academic contexts might be differentially successful depending on how confident students are they can complete such challenging writing tasks, with the writing motivation measure we created serving as a tool in examining potentially moderated effects of writing interventions. Further, when writing researchers try to assess the motivational effects of instruction in multiple-source based writing (MacArthur et al., 2023), the MAWSES may be a more sensitive measure of such effects compared to motivation measures that do not target this particular type of academic writing. Finally, this measure may be used to study the development of writing motivation in different academic programs within higher education, as well as contextual influences on motivational development in this regard.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by The Norwegian Social Science Data Services. The patients/participants provided their written informed consent to participate in this study.

Author contributions

IB: conceptualization, methodology, analysis, writing, and supervision. YH: conceptualization, methodology, investigation, analysis, and writing. NL: conceptualization, methodology, and investigation. HS: conceptualization, methodology, and reviewing. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Measuring kindergarteners' motivational beliefs about writing: a mixed-methods exploration of alternate assessment formats

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There have been a handful of studies on kindergarteners' motivational beliefs about writing, yet measuring these beliefs in young children continues to pose a set of challenges. The purpose of this exploratory, mixed-methods study was to examine how kindergarteners understand and respond to different assessment formats designed to capture their motivational beliefs about writing. Across two studies, we administered four assessment formats — a 4-point Likert-type scale survey, a binary choice survey, a challenge preference task, and a semi-structured interview — to a sample of 114 kindergarteners engaged in a larger writing intervention study. Our overall goals were to examine the benefits and challenges of using these assessment formats to capture kindergarteners' motivational beliefs and to gain insight on future directions for studying these beliefs in this young age group. Many participants had a difficult time responding to the 4-point Likert-type scale survey, due to challenges with the response format and the way the items were worded. However, more simplified assessment formats, including the binary choice survey and challenge preference task, may not have fully captured the nuances and complexities of participants' motivational beliefs. The semi-structured interview leveraged participants' voices and highlighted details that were overlooked in the other assessment formats. Participants' interview responses were deeply intertwined with their local, everyday experiences and pushed back on common assumptions of what constitutes negatively oriented motivational beliefs about writing. Overall, our results suggest that kindergarteners' motivational beliefs appear to be multifaceted, contextually grounded, and hard to quantify. Additional research is needed to further understand how motivational beliefs are shaped during kindergarten. We argue that motivational beliefs must be studied in context rather than in a vacuum, in order to work toward a fair and meaningful understanding of motivational beliefs about writing that can be applied to school settings.

KEYWORDS

motivation, writing, kindergarten, assessment, literacy, interview, survey, mixed methods

1. Introduction

Developing the skill to put thoughts into words and then transcribe these words so that another person can understand the thoughts is one of the principal learning objectives in most educational settings across the globe. Writing systems are the foundation of literacy, and humans have been engaged with written communication as far back as 35,000 BCE (Fischer, 2021). Over time, writing has evolved into a complex social activity situated within sociocultural contexts. As young children today encounter writing in their environment, and especially as they enter school, they learn to engage in writing to express themselves and communicate within these broader communities.

Over the years, scholars from various disciplines have studied writing from both cognitive perspectives (e.g., Hayes and Flower, 1980; Bereiter and Scardamalia, 1987) and sociocultural perspectives (e.g., Barton and Hamilton, 1998). Such theoretical frameworks have led to a rich understanding of writing as both a complex, mental process that requires orchestration of a wide range of cognitive skills, as well as a social process that occurs between individuals (Graham, 2018; Rowe, 2023). More recently, Graham (2018) proposed the writer(s)-within-community model that combines earlier cognitive and sociocultural perspectives to extend our understanding of the dynamic interactions between the characteristics of the writer, of the writing community, and the written product.

Among the many intricate processes involved in writing are motivational beliefs about writing. Studies examining motivational beliefs about writing have gained traction in the past few decades, as some of the earliest cognitive models of writing (e.g., Hayes and Flower, 1980) were revised to include such affective factors (e.g., Hayes, 1996). Stemming from a wide range of theories, motivational beliefs about writing are multidimensional. A variety of motivation-related constructs have been studied; however, many of these studies lack clear operational definitions of the constructs being examined (cf. Camacho et al., 2021). Further, authors also seem to use various terms interchangeably. Here, we adopt the term *motivational beliefs* from Graham (2022) in its plural form to cast light on the various aspects of the construct. Graham (2018, pp. 266–267) describes seven sets of motivational beliefs about writing: (1) "judgments about the value and utility of writing or expectancy-value beliefs," (2) "beliefs involv[ing] whether one likes to write … or views writing as an attractive activity," (3) "views about writing competence," (4) "beliefs focus[ing] on why one engages in writing," (5) "judgements about why one is or is not successful," (6) "beliefs about their identities as writers," and (7) "beliefs about writing communities." For the remainder of the manuscript, we will use *motivational beliefs* to refer to motivational beliefs about writing.

The increasing amount of attention on motivational beliefs following Hayes's (1996) work has gone beyond just the research community. Following Dweck's (2006) best-selling book on growth mindset — the belief that abilities can change through persistent work — there has been an increasing popularity among education practitioners and parents around fostering motivation in general. Despite this widespread, public interest, researchers have not come to a clear understanding of the role of motivational beliefs in writing. In a systematic review of research published between 2000 and 2018, Camacho et al. (2021) found that overall, research showed a weak-to-moderate, positive relation between motivational beliefs and writing performance. However, their synthesis only included participants in 1st-12th grade. Other populations, such as kindergarteners, were excluded. Overall, it is unclear whether motivational beliefs facilitate writing growth, and the outcomes from studies examining relations between motivational beliefs and writing skills have been highly variable (Graham, 2022). The increased public attention on motivational beliefs, combined with the limited empirical knowledge available to guide decision making, underscores the critical need for additional research in this area.

1.1. Kindergarteners' motivational beliefs about writing

Graham (2022) highlighted the importance of studying motivational beliefs in a wider age range. Given that research examining kindergarteners' motivational beliefs about writing is limited, there is a dire need to extend this research to this younger age group. A better understanding of kindergarteners' motivational beliefs is critical to support young writers in their early school years. In kindergarten, most children are exposed to their first year of formal writing instruction. During this time when children are forming their early identities as writers, it is important that we provide environments that establish and maintain positive motivational beliefs. From a developmental standpoint, examining the early stages of such motivational beliefs is likely to enrich our understanding of the ways in which these beliefs dynamically change across grade levels.

Among the few studies that have analyzed kindergarteners' motivational beliefs, researchers have approached motivational beliefs from different perspectives and have asked a variety of research questions. Nolen (2001) conducted an ethnographic study, documenting the ways in which local, sociocultural contexts (e.g., classroom literacy practices, teacher beliefs, and student-to-student interactions) shaped kindergarteners' motivation to read and write. Kim and Lorsbach (2005) focused specifically on writing self-efficacy — the belief that one can successfully complete a task — and examined whether children as young as kindergarteners can express their own self-efficacy. Even though language and cognitive skills are still developing at this age, they found that kindergarteners were able to express their own self-efficacy using words, attitudes, and behaviors. Others have aimed to characterize motivational beliefs and found that kindergarteners generally have positive beliefs about writing; many of them sustain an interest in writing throughout the school year (Nolen, 2001) and are highly motivated to write (Mata, 2011). Finally, in a more recent exploratory study, Schrodt et al. (2019) found that combining instruction on writing and mindset/self-regulation increased kindergarteners' writing motivation. Altogether, these studies span a wide range of topics, but additional research is needed to establish a more robust research foundation.

1.2. Measuring kindergarteners' motivational beliefs

A commonly reported challenge in studies with young children is the difficulty of measuring motivational beliefs in this age group (e.g., Turner, 1995; Kim and Lorsbach, 2005; Schrodt et al., 2019, 2022). In fact, this challenge is likely to be one of the main reasons why there is

such a limited number of studies with kindergarteners. In order to study motivational beliefs in kindergarteners, more research is needed to understand *how* to capture their motivational beliefs in the first place. Taking the time to carefully explore this question is critical to running any study on kindergarteners' motivational beliefs. It is only after we gain a fuller understanding of what we are measuring that we can be more confident in the interpretations we make from the results.

Many challenges stand in the way of accurately capturing these beliefs in young children. Given that internal thought processes such as motivational beliefs are difficult to observe, self-report measures are often used. However, in using such self-report measures, young children may not be developmentally ready to fully reflect and explain their beliefs accurately from both a cognitive and linguistic standpoint (Kim and Lorsbach, 2005). Indeed, young children find it challenging to answer generalized statements commonly used in surveys, as they tend to think more concretely about specific situations, oftentimes ones that they just experienced (Turner, 1995). Additionally, young children frequently provide answers that represent the extremes of Likert-type questions (Mellor and Moore, 2014; Ruzek et al., 2020), self-report in an overwhelmingly positive manner (Gambrell and Gillis, 2007), and are generally more optimistic (Turner, 1995), resulting in overinflated accounts of motivation. While such accounts of motivation may be a reflection of the limited amount of negative academic experiences that children at this young age have (Gambrell and Gillis, 2007), tendencies to positively self-report may also be due to social desirability bias. In fact, self-reports do not always align with student behavior and performance (Turner, 1995; Graham et al., 2017). These issues make self-report measures, such as surveys and interviews, challenging to use.

While many of these challenges cannot be easily addressed, past research has acknowledged some of these challenges and have taken steps to make self-report measures more developmentally appropriate. For example, Nolen's (2001) student interview measure, Mata's (2011) Motivation for Reading and Writing Profile survey, and Schrodt et al.'s (2019) Literacy and Writing Motivation Survey all used a response format aimed at reducing social desirability bias. In these measures, participants were introduced to two stuffed animals with different motivational belief profiles, then asked to choose the one they are more like. This format legitimized both choices through a more neutral presentation of the two profiles (Baker and Scher, 2002). Efforts have also been made to simplify wording, such as by adapting the wording of items designed for upper elementary school children to meet the needs of a younger age group (Kim and Lorsbach, 2005). Other related surveys measuring young children's reading motivation have additionally used visual aids (e.g., happy/sad faces), consistent response formats across all items, and items that reflect specific, concrete scenarios that young children can more easily relate to (Baker and Scher, 2002; Wilson and Trainin, 2007).

Researchers have also leveraged qualitative and mixed-methods approaches to examine motivational beliefs. Given difficulties with using quantitative survey measures to gain an understanding of self-efficacy, Kim and Lorsbach (2005) conducted interviews and classroom observations involving kindergarteners. Similar ethnographic methods were also used by Nolen (2001) who used a hybrid approach in which participants completed a Likert-type scale survey, while interviewers recorded participants' commentary as they engaged with the survey. Noting challenges in accurately measuring kindergarteners' motivational beliefs, Schrodt et al. (2019) aimed to triangulate evidence through mixed methods (i.e., a survey, an interview, and a behavioral task).

Recent efforts have also focused specifically on expanding upon typical self-report measures by assessing motivational beliefs through a behavioral task. Schrodt et al. (2022) conducted further analyses on a behavioral task, the Writing Challenge Task, used in their earlier work (Schrodt et al., 2019). This behavioral, task-based assessment measures challenge preferences during writing as a means to capture motivational beliefs. The authors found that scores on the Writing Challenge Task predicted kindergarteners' end-of-year writing performance. While capturing kindergarteners' motivational beliefs continues to pose challenges, such studies contribute to the field's efforts to reflect and further improve on ways to study young children's motivational beliefs.

1.3. The present studies

Across two studies, we aimed to address the challenges involved in measuring kindergarteners' motivational beliefs about writing by examining four different assessment formats: a 4-point Likert-type scale survey, a binary choice survey, a challenge preference task, and a semi-structured interview. Specifically, we asked the following research questions: (1) Do kindergarteners understand these assessment formats? (2) How do they respond to these assessment formats? and (3) Are motivational beliefs about writing (as measured by the 4-point Likert-type scale survey, binary choice survey, and challenge preference task) related to writing skills?

Our overall goals were to examine the benefits and challenges of using these assessment formats to capture kindergarteners' motivational beliefs and to gain insight on future directions for studying these beliefs in this young age group. Importantly, these studies did not aim to formally validate included assessments. Rather, our studies were exploratory, leveraging the opportunity to compare several different assessment formats to provide a unique, more comprehensive lens in which to address the aims of our research. In both studies, we use the term *motivational beliefs* to specifically refer to "views about writing competence" (p. 266) and "judgements about why one is or is not successful" (p. 267) (Graham, 2018).

Both studies were embedded within a larger project conducted during the 2021–22 school year. The goal of the larger project was to examine the initial efficacy of peer-assisted writing strategies (PAWS; Puranik et al., 2018), a fully developed education intervention to teach transcription and sentence generation to kindergarteners. Due to interest in measuring motivational beliefs, we piloted a measure during the pre-intervention assessment period in the first month of the school year (i.e., Study 1). Specifically, we examined a 4-point Likert-type scale survey, which we adapted from a measure that was used in our prior research (Al Otaiba et al., 2020; Tock et al., 2021). The 4-point Likert-type scale survey was difficult for many participants to complete (e.g., participants agreed with all items regardless of whether the items were negatively or positively oriented). Based on this overall finding from Study 1, we conducted Study 2 examining three additional assessment formats: a binary choice survey, a challenge preference task, and a semi-structured interview. Our rationale for this second study was that these alternate assessment formats could be better suited to the needs of young children.

Specifically, we aimed to make the assessment formats more developmentally appropriate for kindergarteners. For example, we made tasks simpler (e.g., by reducing the number of survey response choices), more straightforward (e.g., by having participants complete a more concrete, task-based, behavioral assessment), and more flexible (e.g., by asking open-ended interview questions). Study 2 occurred toward the end of the school year during the post-intervention assessment period, about seven months after Study 1. Although our focus in Studies 1 and 2 was not related to the effect of the writing intervention, we did conduct initial analyses for Study 2 to ensure that our variables of interest did not differ by condition (i.e., treatment/control). We did not find any group differences and thus combined the two groups for all further analyses.

One hundred and fourteen kindergarten children (mean age: 5.46 years old, range: 4.92–6.08 years old; female: $n = 58$) from six classrooms in three public school districts in Northern California participated in both Studies 1 and 2. According to school records, 32% of participants were White, 27% were Hispanic/Latinx, 19% were multi-racial, 17% were Asian, 1% were Native Hawaiian/other Pacific Islander, 1% were classified as "other," 0% were American Indian/Alaska Native, and 0% were Black/African American. Percentages sum to less than 100%, as information was not available for four participants. Twenty-one percent of participants were eligible for free and reduced-price meals. In Study 1, data from 110 of the 114 participants were analyzed, after accounting for absences ($n = 3$) and unusable data due to tester error ($n = 1$). In Study 2, data were analyzed from 104 of the 114 participants, after accounting for absences ($n = 1$), participants who had transferred to another school or class since Study 1 ($n = 2$), and unusable data due to tester error ($n = 7$). See Table 1 for more information on the demographics of the participants.

TABLE 1 Demographics of participants (N =114).

Demographic	*n*	Mean	*SD*
Age		5.46	0.31
Sex assigned at birth			
Female	58		
Male	56		
Race/ethnicity			
White	36		
Hispanic/Latinx	31		
Multi-racial	22		
Asian	19		
Native Hawaiian/other Pacific Islander	1		
American Indian/Alaska Native	0		
Black/African American	0		
Classified as "other"	1		
Data not available	4		
Free/reduced price meals			
Eligible	24		
Not eligible	89		
Data not available	1		

SD represents standard deviation. Age represents age in years at beginning of the school year.

2. Study 1

2.1. Materials and methods

2.1.1. Measures

2.1.1.1. Assessment of motivational beliefs about writing

2.1.1.1.1. Four-point Likert-type scale survey

To assess motivational beliefs about writing, we administered a 4-point Likert-type scale survey, which was adapted from the Reading Mindset Measure (Al Otaiba et al., 2020; Tock et al., 2021). The Reading Mindset Measure was originally developed for upper elementary students and focused on reading. Adaptations were made to both the Likert-type scale and items.

First, we simplified the original 6-point Likert-type scale into a 4-point Likert-type scale (1 = *Definitely disagree*, 2 = *Kind of disagree*, 3 = *Kind of agree*, 4 = *Definitely agree*). Likert-type scales for younger age groups are often simplified, ranging from 3-points to 5-points (Mellor and Moore, 2014). Following guidance that midpoints (e.g., 3-point or 5-point) should only be used when respondents are familiar with the topic (Chyung et al., 2017), we decided to use a 4-point scale. We further provided visual scaffolding (Reynolds-Keefer and Johnson, 2011) by accompanying the Likert-type scale with a visual of a thumb facing downwards to upwards. While past research has used visuals of happy/sad faces with young children (Wilson and Trainin, 2007), we felt that thumb signals would be more emotionally neutral compared to faces and more representative of degrees of dis/agreement. Thumb signals also provided participants with a non-verbal mode of communication, which we believed would encourage more honest responses and ease tension that some participants may experience in answering questions that felt personal.

Items were reworded to reflect motivational beliefs about writing. For example, the item "If a book is hard to read, I stop reading it." (Al Otaiba et al., 2020; Tock et al., 2021) was changed to "If a word is hard to write, I stop writing it." All seven items in the Reading Mindset Measure were reworded in this manner (see Supplementary Table 1). All items in the original Reading Mindset Measure assessed a negative orientation to motivational beliefs. As elementary-aged children and especially younger children are known to have difficulty disagreeing with negatively oriented items (Benson and Hocevar, 1985; Marsh, 1986), we additionally added three items that assessed a positive orientation to motivational beliefs (e.g., "I think I can keep getting better at writing words.") (see Supplementary Table 1).

In total, the 4-point Likert-type scale survey included 10 randomly ordered items. Trained testers read out each item, and participants circled their responses. At the end, the testers rated participants' level of understanding (1 = Did not understand the activity, 2 = May not have understood the activity, 3 = Clearly understood the activity). Composite scores were computed by reverse scoring negatively oriented items, then summing all 10 items (possible range: 10–40). Lower scores were intended to reflect a more negative orientation to motivational beliefs, and higher scores were intended to reflect a more positive orientation. See Figure 1 for a sample item and Supplementary Appendix A for the full measure with administration procedures.

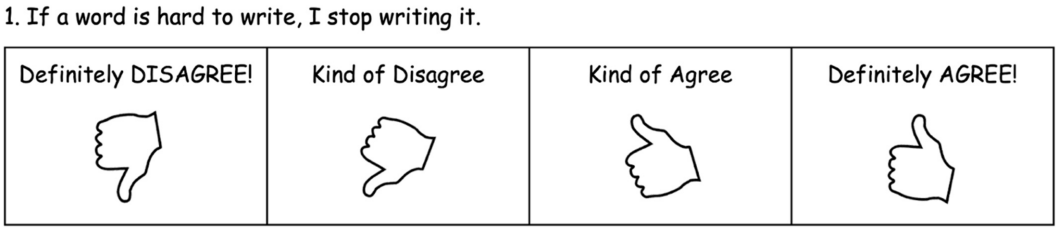

FIGURE 1
Sample item from a 10-item, 4-point Likert-type scale survey designed to measure kindergarteners' motivational beliefs about writing. The survey included items that measured negative orientations to motivational beliefs (n =7) and positive orientations to motivational beliefs (n =3). Testers worked individually with participants, reading out items to participants as participants circled their responses.

2.1.1.2. Assessment of writing

The Wide Range Achievement Test, Fifth Edition (WRAT-5) Spelling Subtest, Blue Response Booklet (Wilkinson and Robertson, 2017) was used to measure skills in writing letters and words. This standardized assessment has two parts: Letter Writing and Spelling. In Letter Writing, participants wrote their name, as well as specific letters. In Spelling, participants spelled words (e.g., "on," "make") that increased in difficulty. Writing skill was operationalized as the total number of correctly answered items.

2.1.2. Study procedures

A team of trained testers assessed participants one at a time during the school day. These testing sessions occurred in-person during the 2021–22 school year, as schools returned to in-person instruction after the peak of the COVID-19 pandemic. After data collection, assessment data were scored and entered, then analyzed using R Statistical Software (v4.2.1; R Core Team, 2022).

In order to examine the overall level of understanding on the survey task, we examined tester-reported ratings of participants' understanding. Specifically, we examined the proportion of participants who (1) did not understand the task, (2) may not have understood the task, and (3) understood the task. We used Cronbach's alpha as a measure of internal consistency, which we computed using the *psych* package (Revelle, 2022).

To understand how participants responded to the survey, we compared response patterns of participants who understood the task and those who did not understand the task. Specifically, we examined how they responded to positively and negatively oriented items. We ran a two-way ANOVA predicting response patterns by level of understanding (did not understand task/understood task) and item type (negatively/positively oriented) (e.g., in R: proportion of definitely agree ~1 + understanding + item type + understanding:item type). We used the *joint_tests()* function in the *emmeans* package (Lenth, 2022) to extract the results of the two main effects and the interaction effect. We further examined the skewness of response distributions using the *sur* package (Harel, 2020).

The relation between motivational beliefs and writing skills was examined by fitting a linear regression model predicting writing skills using the composite score of motivational beliefs (in R: writing skills ~1 + motivational beliefs). We did not add age as a control variable, given that all participants were in the same grade. Throughout data analysis, the *tidyverse* package (Wickham et al., 2019) was used for data wrangling and data visualization.

2.2. Results

2.2.1. Four-point Likert-type scale survey

Participants appeared to have varying levels of understanding on the survey task. Tester ratings were as follows: 35% of participants (n = 38) clearly understood the task, 33% (n = 36) may not have understood the task, and 32% (n = 35) did not understand the task. Tester ratings were not available for one participant, due to tester error. Internal consistency among the 10 items was moderate (α = 0.66).

In order to analyze how the participants responded to the 4-point Likert-type scale survey, we examined response patterns of the survey items. Given that at least a third of participants had difficulty understanding the task, we specifically looked at the distribution of responses by level of understanding. For ease of interpretation, we focused on the groups of participants who had the highest and lowest levels of understanding (i.e., those who clearly understood the task and those who did not understand the task). Figure 2 shows the response patterns of both negatively and positively oriented items in these two groups. For those who did not understand the task, the most popular response was *definitely agree* for both negatively oriented items (n = 119, 49%) and positively oriented items (n = 57, 54%). In contrast, participants who understood the task had a tendency to definitely disagree with negatively oriented items (n = 139, 52%) and definitely agree with positively oriented items (n = 96, 84%). In other words, the most popular response for negatively oriented items differed by group (i.e., *definitely agree* for those who did not understand the task and *definitely disagree* for those who understood the task); however, response patterns for positively oriented items were more similar, as both groups were most likely to definitely agree. Response patterns for each of the 10 survey items are included in Supplementary Figure 1.

These observations were in line with results from a two-way ANOVA. We predicted participants' response patterns by level of understanding (did not understand task/understood task) and item type (negatively/positively oriented). In a model predicting the proportion of times participants strongly agreed, there was no main effect of level of understanding, $F(1, 123) = 0.75$, $p = 0.390$, a main effect of item type, $F(1, 123) = 64.33$, $p < 0.001$, and an interaction effect between the two variables, $F(1, 123) = 25.77$, $p < 0.001$. For the proportion of times participants strongly disagreed, we found no main effect of level of understanding, $F(1, 67) = 0.05$, $p = 0.821$, no main effect of item type, $F(1, 67) = 0.17$, $p = 0.678$, and an interaction effect between the two variables, $F(1, 67) = 5.93$, $p = 0.018$.

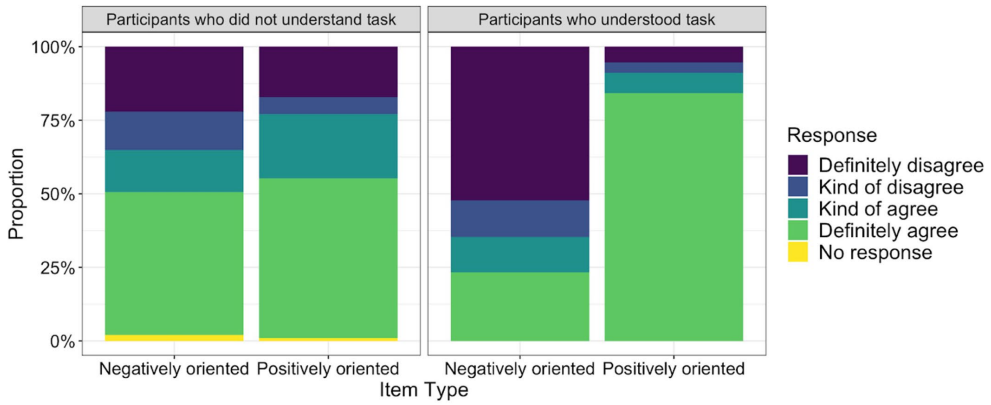

FIGURE 2
Response patterns of the 10-item, 4-point Likert-type scale survey by item type (negatively/positively oriented) and participants' level of understanding (did not understand task/understood task). Participants completed a 4-point Likert-type scale survey designed to measure motivational beliefs about writing. Testers rated how well participants understood the task (n =35 did not understand task, n =38 understood task). The survey included seven negatively oriented items and three positively oriented items. Within each item type and level of understanding, we calculated the proportion of times participants chose each response category (i.e., *Definitely disagree, Kind of disagree, Kind of agree, Definitely agree, and No response*).

Participants who clearly understood the task had a strong tendency to self-report positive orientations to motivational beliefs. After reverse scoring negatively oriented items, we examined the distribution of responses across all items and found that the distribution was skewed (skewness = −0.97, SE = 0.13). This skew was driven by participants' responses to positively oriented items. A highly skewed distribution was observed across positively oriented items (skewness = −2.64, SE = 0.23). Negatively oriented items led to more varied responses, resulting in a less skewed distribution (skewness = 0.59, SE = 0.15).

We further explored whether motivational beliefs were related to writing skills. Given tester ratings, we were not confident that all participants' survey data were valid. We therefore only included participants who appeared to clearly understand the task (n = 38). We found that motivational beliefs were not significantly related to writing skills, $F(1, 36) = 3.54$, $p = 0.068$, $r = 0.30$.

2.3. Study 1 summary

In Study 1, we examined the use of a 4-point Likert-type scale survey to measure kindergarteners' motivational beliefs about writing. Despite the adaptations we made to the original survey designed for older children, the survey was difficult for many participants to complete. There was a noticeable trend among at least a third of the participants to agree with all items, regardless of whether the items were negatively or positively oriented. Survey responses, especially those for negatively oriented items, may have been affected by acquiescence bias. Responding to negatively oriented items with varying degrees of dis/agreement is likely to have been too cognitively taxing for many of the participants. While these findings may suggest that positively oriented items are generally a better measure of kindergarteners' motivational beliefs, positively oriented items also led to highly skewed response distributions. Compared to positively oriented items, negatively oriented items may have provided a more sensitive measure of motivational beliefs in participants who clearly understood the task. Across all items, many participants also reported in ways that reflected positive orientations to motivational beliefs, possibly due to social desirability bias. Motivational beliefs were not related to writing skills. Altogether, these results and implications prompted the use of another set of assessment formats that set the stage for Study 2.

3. Study 2

3.1. Motivation for Study 2

In Study 2, we tested three additional assessment formats of motivational beliefs about writing. We aimed to make these assessment formats more developmentally appropriate by making tasks simpler, more straightforward, and more flexible. These assessment formats were designed to address the challenges that surfaced in Study 1 and to explore methods that could enhance the validity of responses. First, we examined a binary choice survey to explore the utility of a survey with a simpler response format that was more neutral and less cognitively taxing. Second, we examined a challenge preference task to explore the possibility of assessing motivational beliefs through a more concrete, task-based, behavioral assessment. Third, we took a step back, using a more open-ended, semi-structured interview to leverage the voices of kindergarteners and observe the ways in which they interpreted questions meant to capture their motivational beliefs.

3.2. Materials and methods

3.2.1. Measures

3.2.1.1. Assessments of motivational beliefs about writing

3.2.1.1.1. Binary choice survey

For the binary choice survey, testers read aloud short descriptions of two hypothetical characters with different motivational beliefs about writing, after which participants decided who they were most

like. One character embodied more positive orientations to motivational beliefs, and the other character embodied more negative orientations. Participants were given the option to say that they were like neither character. At the end, testers rated participants' overall level of understanding (1 = Did not understand the activity, 2 = May not have understood the activity, 3 = Clearly understood the activity).

In an effort to make response choices more neutral and less cognitively taxing, the response format of the binary choice survey was adapted from previous surveys designed for young children [e.g., Motivation for Reading Scale (Baker and Scher, 2002); Motivation for Reading and Writing Profile (Mata, 2011); Literacy and Writing Motivation Survey (Schrodt, 2015; Schrodt et al., 2019)]. Presenting two characters in a narrative style allowed for a more neutral presentation of response choices compared to degrees of dis/agreement. We also believed that this format would be more accessible for young children, who are often familiar with having stories read to them.

A cartoon representation of the two characters accompanied the testers' narration of the two characters. The cartoon characters were adapted from a previous survey (Reynolds-Keefer and Johnson, 2011). The two characters only varied by height and width, allowing them to be distinguished from one another but similar enough to ensure that the visuals would not cause response bias.

Different names were selected for the two characters in each of the items. In previous work, two names were used continuously throughout the survey, such as in the case of the Literacy and Writing Motivation Survey (Schrodt, 2015; Schrodt et al., 2019), where the name "Ziggy" was used to embody more positive motivational beliefs, and "Nash" for more negative motivational beliefs. However, we felt that using the same names across all items could cause response bias for two reasons. First, participants may catch onto who is the more desirable character. Second, participants may gravitate toward a single character to remain consistent with their response of who they are most like. We also decided to give the characters culturally relevant names, as we thought that presenting too many made-up names could be cognitively taxing. We ensured that none of the names were any of the participants' names. In this manuscript, we refer to the character with a more positive orientation to their motivational beliefs as *Character A*, and the character with a more negative orientation as *Character B*. *Characters A* and *B* were randomly ordered for each item and were not associated with a specific cartoon.

Altogether, the binary choice survey included a total of nine items intended to reflect the same constructs as the 4-point Likert-type scale survey in Study 1. We transformed the 4-point Likert-type scale survey to fit the narrative style of the binary choice survey by adapting some items from the Literacy and Writing Motivation Survey (Schrodt, 2015; Schrodt et al., 2019). In consultation with testers from Study 1, we left out a few items from the 4-point Likert-type scale survey that had caused confusion. We further made wording adjustments and added additional items to ensure that the binary choice survey items also aligned with the semi-structured interview questions (see Supplementary Table 2). Following Schrodt et al.'s (2019) procedures, a composite score was calculated by counting how many items reflected a positive orientation to motivational beliefs. Given that there were nine items, scores ranged from 0 to 9. Items were randomly ordered, and participants were randomly assigned to one of the four forms. See Supplementary Appendix B for the full measure with administration procedures.

3.2.1.1.2. Challenge preference task

The challenge preference task was adapted from the Writing Challenge Task (Schrodt et al., 2019, 2022). The Writing Challenge Task was designed to expand upon typical self-report measures by aiming to capture the complexities of motivational beliefs behaviorally. We expected such behavioral tasks to be more developmentally appropriate, as they would allow participants to engage in short, concrete tasks that are more relatable (Wilson and Trainin, 2007). Our challenge preference task followed a similar procedure to the Writing Challenge Task but was shorter given the limited time we had for our testing sessions.

In the challenge preference task, participants completed short, concrete tasks, where they were asked to draw or write certain shapes, letters, or words that increased in difficulty. After each task, participants chose whether they wanted to complete a task that was more difficult, or a task that was the same level as the one they just completed. Testers did not tell participants whether their answers were correct after each task. There were five levels of difficulty in total: (1) shapes, (2) letter sounds, (3) CVC words (consonant-vowel-consonant words, e.g., "hat"), (4) two-syllable words, and (5) multi-syllable nonsense words. At the end, the testers rated participants' level of understanding (1 = Did not understand the activity, 2 = May not have understood the activity, 3 = Clearly understood the activity). For our analyses, we examined three variables derived from this task: the highest level completed (range: 1–5), overall challenge preference profile, and preference after correctly answering an item. See Supplementary Appendix C for the full measure with administration procedures.

3.2.1.1.3. Semi-structured interview

To examine kindergarteners' perceptions of writing and motivational beliefs, we conducted semi-structured interviews. Interviews have been used in previous studies to examine motivational beliefs in kindergarteners (e.g., Nolen, 2001; Kim and Lorsbach, 2005; Hall and Axelrod, 2014; Schrodt et al., 2019). Interviews can be helpful to understand motivational beliefs from sociocultural perspectives and leverage student voices (Hall and Axelrod, 2014). More broadly, there have been calls to move beyond quantitative methods to gain a richer understanding of motivational beliefs using qualitative methods (Kim and Lorsbach, 2005).

In the semi-structured interview, testers verbally asked seven sets of questions related to motivational beliefs about writing (e.g., "First, I want you to think about some students who know how to write really well. Why do you think they know how to write well?"). Participants verbally responded to these questions. Testers asked follow-up questions as needed but stayed closely to the interview questions. Questions were adapted from the interview measure in Schrodt (2015) and Schrodt et al. (2019) and were aligned with items in the binary choice survey (see Supplementary Table 2). Upon completion, testers rated participants' level of understanding (1 = Did not understand the activity, 2 = May not have understood the activity, 3 = Clearly understood the activity). All interviews were audio recorded and ranged in length from 3 to 8.5 min. See Supplementary Appendix D for the full measure with administration procedures.

3.2.1.2. Assessment of writing

The same writing assessment from Study 1 (WRAT-5) was used in Study 2. See Study 1 for more details.

3.2.2. Study procedures

Testers worked individually with participants during the school day. Participants were randomly assigned to one of the three assessment formats. 38 participants completed the binary choice survey, 37 completed the challenge preference task ($n = 4$ invalid due to tester error), and 37 completed the semi-structured interview ($n = 3$ interview recording lost due to tester error). Due to tester error, one participant completed both the challenge preference task and semi-structured interview. Given that the questions in the challenge preference task and semi-structured interview varied greatly, we decided to analyze data from both assessments.

The writing assessment was scored, then data from the binary choice survey, challenge preference task, and writing assessment were entered and analyzed using R Statistical Software (v4.2.1; R Core Team, 2022). We used *t*-tests and chi-square tests to confirm that none of the variables of interest differed by condition (treatment/control). Participants' understanding of the assessment formats was examined in the same way as Study 1, using tester ratings.

For the binary choice survey, we used Cronbach's alpha as a measure of internal consistency. We studied participants' response patterns by examining the proportion of responses across items and within items. To investigate the relation between writing skills and motivational beliefs, we fit a linear regression model to predict writing skills using the composite score of the binary choice survey (in R: writing skills ~1 + motivational beliefs). We used *t*-tests to further explore whether specific survey items predicted writing skills.

For the challenge preference task, we examined three different measures of motivational beliefs that were derived from participants' responses: the highest level completed, challenge preference profile, and preference after correctly answering an item. Response patterns for these measures were examined in a similar manner to the binary choice survey. We explored the relations between writing skills and these measures using a linear regression model or *t*-test, depending on the measure.

For the semi-structured interview, audio recordings were transcribed by a research assistant, then coded by the first and fourth authors. For each set of interview questions, we first conducted *In Vivo* Coding (Saldaña, 2013), a coding method that uses participants' own language as codes, rather than codes developed by researchers. We then used Pattern Coding (Saldaña, 2013) to further organize the *in vivo* codes and identify emerging themes. Throughout this process, the researchers met regularly to discuss and take notes on these themes. Overall, this inductive approach to coding allowed us to identify themes that were grounded in participants' unique experiences, aligning well with our goal of understanding motivational beliefs from their perspectives.

Given that the interviews were short and conducted only once, the researchers took caution not to over-interpret the interview responses. Prior to coding the data, the researchers were involved with collecting the raw interview data. This experience provided valuable first-hand exposure to the data and an understanding of the broader context in which the interviews were conducted. When coding and discussing the interview responses, both researchers also drew upon their former experiences as lower elementary school teachers. This experience allowed the researchers to better comprehend the interview responses.

3.3. Results

3.3.1. Binary choice survey

Compared to the 4-point, Likert-type scale survey, the binary choice survey appeared to be easier to understand. Based on testers' ratings, 87% of participants ($n = 33$) clearly understood the task, 13% ($n = 5$) may not have understood the task, and 0% did not understand the task. Internal consistency of the items was low ($\alpha = 0.49$).

Despite randomizing which character type was presented first, participants tended to identify with *Character A*, which embodied more positive motivational beliefs. Across all items, participants chose *Character A* 72% of the time ($n = 245$). The responses for each of the items followed a similar pattern (see Figure 3). For seven of the nine items, over 70% of participants selected *Character A* (range: 71–92%).

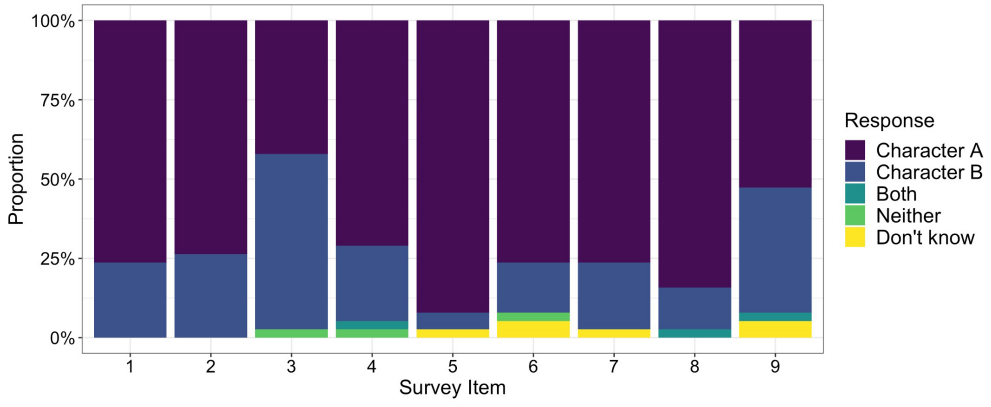

FIGURE 3
Response patterns of the 9-item, binary choice survey. Participants completed a binary choice survey by listening to narratives of two characters, then deciding which one they were most like. One of the characters embodied more positive orientations to motivational beliefs about writing (*Character A*), while the other character embodied more negative orientations (*Character B*). Some participants reported that they were like both characters, that they were like neither character, or that they did not know. Within each item, we calculated the proportion of participants who chose each response category (i.e., *Character A, Character B, Both, Neither, and Do not know*). Item numbers correspond with items included in the full measure in Supplementary Appendix B.

For the remaining two items, responses were more equally divided. For Item 3, 42% of participants resonated with *Character A* (prefers to spell challenging words), while 55% resonated with *Character B* (prefers to spell easy words). For Item 9, 53% of participants chose *Character A* (believes that their classmates who write well practiced a lot), while 39% chose *Character B* (believes that their classmates who write well have always been good at writing).

Some participants also had difficulty selecting from two binary choices (see Figure 3). Two participants responded that they resonated with both characters, and another three participants responded that they resonated with neither character. Three participants (one of whom also indicated *neither* for an item) reported that they did not know how to respond to some items.

We examined the relation between motivational beliefs and writing skills. Given the difficulty of calculating scores for participants who had answered *both*, *neither*, or *do not know* ($n = 7$), we conducted this analysis with data from the remaining 31 participants. Writing skills were not related to motivational beliefs, $F(1, 29) = 2.80$, $p = 0.105$, $r = 0.30$. We also analyzed whether writing skills could be predicted by the items with more variation in responses. After removing participants who had answered *both*, *neither*, or *do not know* (Item 3: $n = 1$, Item 9: $n = 3$), we found that there were no differences in writing skills between those who chose *Character A* and *Character B* (Item 3: $t(35) = -1.59$, $p = 0.120$; Item 9: $t(33) = -1.33$, $p = 0.193$).

3.3.2. Challenge preference task

According to tester ratings, the challenge preference task also appeared to be easier for participants to understand compared to the 4-point Likert-type scale survey. Unfortunately, we lost 36% ($n = 12$) of tester ratings, given design flaws to the assessment format that made it difficult for testers to remember to rate participants' level of understanding. Within the data that were available, 90% ($n = 19$) of participants clearly understood the task, 0% may not have understood the task, and 10% ($n = 2$) did not understand the task.

The highest level that participants completed on the challenge preference task varied: Level 1 ($n = 10$, 31%), Level 2 ($n = 7$, 21%), Level 3 ($n = 5$, 15%), Level 4 ($n = 6$, 18%), and Level 5 ($n = 5$, 15%) (see Supplementary Figure 2A). This distribution was slightly positively skewed (skewness = 0.29, $SE = 0.41$). The highest level completed was not significantly associated with writing skills, $F(1, 31) = 3.58$, $p = 0.068$, $r = 0.32$.

We also examined whether participants had a consistent pattern to their challenge preference. Specifically, we examined how many participants (1) always chose questions that were at the same level, (2) always chose questions that were more difficult, and (3) chose questions that were just right (i.e., chose questions that were at the same level after completing tasks incorrectly and chose more difficult questions after completing tasks correctly). We found that 55% ($n = 18$) fit one of these profiles, with 10 participants always choosing same-level questions, four participants always choosing difficult questions, and four participants choosing just-right questions. However, 45% of participants ($n = 15$) had inconsistent, mixed preferences, making it difficult to conduct further analyses relating challenge preference profiles to writing skills (see Supplementary Figure 2B).

Given that all participants correctly answered the first question (i.e., "Draw a square."), we leveraged this opportunity to explore whether participants' challenge preference after correctly answering a question was related to their writing skills. 58% of participants ($n = 19$) subsequently chose a question that was at the same level, and 42% ($n = 14$) chose a more difficult question. We found no difference in writing skills between participants of these two groups, $t(31) = -1.12$, $p = 0.270$.

3.3.3. Semi-structured interview

The semi-structured interview appeared to be easier to understand than the 4-point Likert-type scale survey. Based on tester ratings, 74% of participants ($n = 25$) understood the task, 26% ($n = 9$) may not have understood the task, and 0% did not understand the task. Overall, the interview highlighted nuances that provided more context to participants' motivational beliefs. In this section, we describe the themes that we identified from the interview responses.

3.3.3.1. Positive orientations to motivational beliefs about writing

When motivational beliefs were referenced in participants' responses, they tended to reflect positive orientations to these beliefs. In particular, participants often referenced the importance of learning and practicing (e.g., "Once you make a mistake, you, you learn the next time.", "They [students who know how to write well] practice a lot, and they are really good now."). Many of these responses alluded to the understanding that dosage also matters: that they need to practice and learn a lot (e.g., "I've been practicing a *very* long time.", "I maybe practice at home a lot … I think I write 32 words every day.", "I've been practicing and practicing and practicing, and I, and I never gave up."). Questions also elicited responses related to self-efficacy (e.g., "I feel like I can do this. I say that to myself, and I feel like that."), writing enjoyment (e.g., "I super love to write."), positive self-perceptions (e.g., "I'm really good at writing words.", "I sound it out really good."), and persistence and hard work (e.g., "I just think of another way and do it again and again and again."). Some participants had unique ways of describing their positive beliefs. For example, one participant referenced a necklace they were wearing, noting how this "courage necklace … has a unicorn horn, and it's a unicorn that might give me [them] power."

Specific nuances to these positively oriented motivational beliefs surfaced through codes that often co-occurred with these beliefs. First, participants referenced learning and practicing in specific environments with specific people that guided them (e.g., "I was teached by my dad."). One participant shared their reasons for why they believed that one of their classmates was a less experienced writer: "Their parents probably didn't teach them um, their writing. They don't know very well. They didn't go to good schools. But they're starting to write better, but they write a 'd' like this. Lots of mistakes." In other words, participants described learning and practicing as more than just an internal, cognitive process; these processes were intertwined with their external, social environments.

Second, participants' positive motivational beliefs co-occurred with specific strategies that allowed them to have more agency in their learning. In particular, sounding out words was a specific writing strategy that many participants referred to. When asking participants why they think they are good at writing hard words, or why they think they can write hard words, they referenced specific strategies to sound out words (e.g., "I can listen to the sounds.", "I can hear the sounds and I know the 'c-h' and 's-h' is in there.", "I like know sometimes there might be a silent 'k' at the start or silent 'e' at the end."). Participants also reported using specific strategies when getting stuck or making

mistakes (e.g., "I just like sound it out, and then I keep writing with the sounds … I feel like I can do this. I say that to myself, and I feel like that.", "I try sounding it out very very slowly and take my time."). In addition to specific writing strategies, participants occasionally referenced self-regulation strategies. For example, they shared that they take a deep breath and concentrate to accomplish difficult tasks. Similarly, participants attributed concentrating and listening to the teacher as qualities that allowed them to become good writers.

3.3.3.2. Negative orientations to motivational beliefs about writing

Negative orientations to motivational beliefs were harder to capture. At times, participants responded to questions in ways that were intended to capture negatively oriented beliefs; however, the details that they included in their responses made us reconsider whether these responses were capturing negatively oriented beliefs after all. We identified four themes related to this finding, which we describe in the following paragraphs.

It was difficult to determine whether participants were expressing negative beliefs about their writing abilities, or a realistic attitude toward their current abilities as an emerging writer. Some participants responded that they are not good at writing hard words and that they cannot write hard, made-up words, because these words are tricky and have too many letters. While such responses may reflect negative beliefs, some participants further elaborated on such beliefs in ways that seemed to indicate a realistic assessment of their current writing abilities (e.g., "I don't know really really hard words like, like that one [hard, made-up word], but I, I can write like, like the words that have five or four or six letters in them."). By stating that they are not good at writing words or that they do not feel like they can write hard words, participants may have been reflecting on what they can and cannot do currently as a kindergarten writer.

Asking participants whether they can write hard, nonsense words also introduced another layer of complexity. Among those who reported that they cannot write these words, some participants alluded to or directly addressed the importance of knowing the meaning of the word in order to encode correctly (e.g., "You've never heard of it [this nonsense word], and like, there's a bunch of letters that go together, and … it's not real, so like, you don't know what it'll be and how to spell it.", "I don't even know what it [this nonsense word] means!," "It [this nonsense word] has too many letters, and it's not a word."). In other words, these participants demonstrated a conceptualization of encoding words that was dependent on knowing the meaning of these words, rather than how motivated they were to write these words.

When participants reported that they would seek help from others when getting stuck, it was challenging to discern whether this behavior represented negative beliefs, such as a lack of self-persistence, or a reasonable awareness of other support options that were available to them. Participants specifically referred to getting help from more experienced writers, such as their teachers, grown-ups, parents, and friends. One of the participants additionally referred to getting help from technology: "When I'm writing, I ask my mom what's the spelling, or I have a *Bixby* that, that has an *Alexa* [virtual assistant] and I, I can say 'how do you spell that word?'" It is possible that many participants viewed help from experts, whether from people or technology, as an additional resource to guide their development as emerging writers.

Finally, some participants believed that mistakes were bad for their learning, but the various reasons they provided did not seem to stem from their motivational beliefs. One of the participants shared that mistakes could make them incorrectly learn the spelling of certain words:

> [Mistakes are] bad, because sometimes I keep doing it over and over and over again … I get memorized to that, and I like think it's the correct thing, and I'm like, I know this is right. Like that happened, happens when I write *mommy* and *daddy*. I just learned that there's two "m"s before the "y." And I was always writing it for *daddy* "d-a-d-y" and for *mommy* "m-o-m-y," but now I know for *daddy*, it goes "d-a-d-d-y" and *mommy*, "m-o-m-m-y."

Participants also expressed a concern that mistakes can cause them to get stuck. Others described how mistakes can cause confusion (e.g., "You might forget where you are.", "It [your writing] maybe not make sense."). Such reasons were justified and challenged the assumption that these participants hold negatively oriented motivational beliefs, simply because they stated that mistakes are bad for their learning.

3.3.3.3. Kindergarteners' perceptions of writing

In addition to the findings that directly addressed the goals of the interview, there were other related findings that further provided insight on the ways participants perceived writing. While some participants referred to spelling and writing words and sentences, others used their own words to express these processes. For example, they described "getting all the letters in" to refer to correctly spelling a word, and "making the wrong letter" and "putting some of the letters wrong" to indicate misspelling a word. To refer to the act of writing a word, they used the phrase "make the word," while rewriting a word was described as "just erase it and make a something that is, is new." Additionally, the act of writing a sentence was expressed as "making the sentence with like nineteen letters." Some participants also seemed to conflate letters with words, such as when they named specific letters when asked what words they like to write.

Participants' responses to the interview questions also highlighted the many intricate layers of the writing process. Many of them stated that sounding out and spelling words were the hardest aspects of writing, but others described additional challenges, such as writing sentences, using correct punctuation, working on handwriting, concentrating, drawing pictures to accompany their writing, and dealing with fatigue in their arms from writing a lot. Similarly, participants' characterization of hard words also ranged. While a majority of participants viewed hard words as long words with many letters, as well as those that are difficult to spell and do not follow simple letter-to-sound correspondences, there were others that expressed additional characteristics of hard words. For example, hard words were associated with long words whose meanings may be compromised if they cannot fit onto a single line:

> If there's a lot of letters … I might kind of be focused like if I run out of space, … you would have to like, like go off the line, or you would have to go on another line … if you go on another line, it would kind of break apart and you wouldn't like, really know how to read it.

Even at this young age, participants held an understanding of the complexities of the writing process, which were intertwined with meaning making, as well as other cognitive and motor processes that went beyond simply encoding words.

Some participants also demonstrated an awareness of their classmates' writing abilities. In some of the interview questions, participants were prompted to think about some students who know how to write well, as well as students who do not know how to write well. While we did not intend for participants to think of or share the names of specific students with the testers, some participants shared names of their classmates. Furthermore, one participant even shared that students who know how to write well "always get compliments. They're like, really good students." By the end of the school year, some participants had already begun to develop a perception of their classmates' writing abilities.

3.4. Study 2 summary

Overall, the three assessment formats tested in Study 2 appeared more developmentally appropriate than the 4-point Likert-type scale survey that we examined in Study 1, given the testers' ratings of whether participants understood these three tasks. The response options in the binary choice survey were designed to be more neutral and less cognitively taxing, compared to the 4-point Likert-type scale survey. These changes likely helped more participants understand the task. However, the response options may have been oversimplified, posing a challenge in fully capturing the nuances of motivational beliefs. Participants also appeared to have an easier time understanding the challenge preference task, highlighting the promise of using a task-based, behavioral assessment in measuring motivational beliefs about writing. However, about half of the participants showed an inconsistent pattern to their challenge preference. More research is needed to further investigate whether kindergarteners' motivational beliefs can indeed be captured through their performance on this task. Motivational beliefs, as measured by the binary choice survey and the challenge preference task, were not related to writing skills. The semi-structured interview highlighted nuances that provided more context to participants' motivational beliefs and their experiences with writing. The interview further provided an opportunity to reevaluate behaviors that have been previously assumed to reflect negative orientations to motivational beliefs. Participants' responses served as an important reminder that their beliefs are intricately woven into their lived experiences.

4. Discussion

Across two studies, we iteratively tested a total of four assessment formats to explore ways to better capture kindergarteners' motivational beliefs about writing. In Study 1, we found that a 4-point Likert-type scale survey was too difficult to complete for most participants. In Study 2, conducted about seven months later, we examined three additional assessment formats, which we designed to be more developmentally appropriate. We found that the binary choice survey, the challenge preference task, and semi-structured interview were much easier for participants to complete compared to the 4-point Likert-type scale survey. The semi-structured interview appeared to be the most appropriate approach to capturing participants' motivational beliefs in that it provided additional opportunity to listen to their voices. What surfaced from exploring these assessment formats was the overarching theme that kindergarteners' thoughts appear to be multifaceted, contextually grounded, and hard to quantify.

These results are in line with the broader research base exploring the developmental appropriateness of using Likert scale surveys with young children. Mellor and Moore (2014) provide an overview of this research, noting difficulties in both the task of responding on a scale and the wording of the items. Even simple scales, such as a 3-point scale, can pose difficulties for young children who gravitate toward the extreme ends of the Likert scale. This behavior is especially prevalent when children answer abstract questions (e.g., how they feel; Chambers and Johnston, 2002). Furthermore, young children often have difficulty answering negatively oriented statements on a Likert scale (e.g., answering "true" for all statements; Marsh, 1986). These difficulties are in line with our results from the 4-point Likert-type scale survey, which appeared to be too cognitively taxing for participants.

Interestingly, among participants who were able to complete the 4-point Likert-type scale survey, there were stark differences in their responses to positively and negatively oriented items. These participants were more likely to answer toward the extreme ends on positively oriented items. However, on negatively oriented items, responses were more variable. Compared to positively oriented items that may have elicited quicker, possibly shallower responses, negatively oriented items may have promoted a deeper level of reflection among these participants. Indeed, negatively oriented items have been used more frequently than positively oriented items in related fields. Dweck's shortened, 3-item mindset survey (Dweck et al., 1995) includes items that are all negatively oriented, compared to a longer version that includes both positively and negatively oriented items (Yeager and Dweck, 2020). While negatively oriented items may provide a more sensitive measure of motivational beliefs, they are also more cognitively taxing, limiting the number of kindergarteners who are developmentally ready for these types of items.

While we hoped that the binary choice survey would be an alternative way to measure motivational beliefs, we had difficulty striking the right balance between simplicity and sensitivity. Many more participants were able to understand this task, perhaps because it was developmentally aligned with young children's tendency to think dichotomously (Gelman and Baillargeon, 1983). However, some participants ended up responding with *both* or *neither*, suggesting that motivational beliefs are multifaceted and difficult to assign to two rather arbitrary extremes. The composite scores that we computed from the binary choice survey were also limited, given that there were only two points on the scale.

We found it difficult to accurately operationalize motivational beliefs using the challenge preference task. Following Schrodt et al.'s (2019, 2022) Writing Challenge Task, we operationalized motivational beliefs about writing as the highest level completed on the task. However, this measure may have been confounded with writing skills. For example, participants with stronger writing skills may have completed higher levels on the challenge preference task, not because they were more motivated, but because they were more experienced writers. In fact, we observed a nonsignificant but positive trend between the highest level completed and writing skills. While prior

research has interpreted such positive relations as indicative of a link between motivational beliefs and writing skills (Schrodt et al., 2022), it is important to acknowledge that this positive trend may simply be due to a confounding factor.

To disentangle participants' writing skills from their challenge preferences, we attempted to operationalize motivational beliefs about writing in different ways. One approach we used was to examine participants' challenge preferences after answering tasks correctly and incorrectly. We hypothesized that there could be three types of participants: those who always preferred tasks at the same level, those who always preferred more challenging tasks, and those whose preferences depended on whether the previous task was completed correctly. We found that many participants exhibited inconsistent patterns. While this does not come as a surprise given that human behavior is not always consistent, it is possible that we may have observed more consistent patterns if we had provided feedback after each item or asked participants about their confidence in their answers. Without these procedures, it was unclear whether participants were aware of their correct or incorrect responses. The results of the surveys and challenge preference task altogether highlight the difficulty of quantifying, categorizing, and operationalizing kindergarteners' motivational beliefs.

The semi-structured interview provided an additional opportunity to understand writing and motivational beliefs from kindergarteners' perspectives. Identifying participants with negatively oriented motivational beliefs was strikingly difficult. In typical survey measures, negatively oriented beliefs are associated with certain behaviors and thoughts, such as getting help from a teacher, feeling incompetent in writing, and believing that mistakes are detrimental to learning. While some participants expressed such behaviors and thoughts, their underlying reasons consistently pushed against the narrative that they simply lacked motivation. Instead, their responses embodied the characteristics of realistic, self-aware writers, reflective of what they are *currently* capable of as emerging writers, rather than what they *permanently* think of themselves. Participants' interview responses further highlighted confusions around nonsense words, which differed from their broader understanding of everyday writing situated within a larger sociocultural context of meaning making. Participants also described writing processes in unique, developmentally appropriate ways that differed from the language used in the surveys. These findings underscore the need to critically reexamine common practices used to capture motivational beliefs in young children and to further reflect on the possible assumptions and interpretations that are being made from them.

The interview responses further highlighted the ways in which participants' motivational beliefs were deeply intertwined with their learning environments. Aligned with the writer(s)-within-community model (Graham, 2018), participants viewed writing as an active, engaged process that not only includes themselves but the surrounding writing community. Participants referenced learning and practicing in specific locations (e.g., home, school) with specific people (e.g., family members, teachers) who supported their development as writers. In fact, one of the participants even mentioned the use of technology to help them write, further reminding us of the importance of considering the constantly evolving, sociocultural context of learning environments in the 21st century. The interview responses also served as a reminder that positive motivational beliefs are shaped by participants' experiences; knowing how to independently use concrete strategies, such as sounding out words and regulating emotions, seemed to play a critical role in promoting these positive motivational beliefs. In other words, these beliefs were likely fostered by environments that supported participants' growth as independent writers. Together, these findings highlight the situated, multifaceted nature of motivational beliefs.

4.1. Limitations

Our results reflect motivational beliefs about writing in a specific group of kindergarteners attending public schools in Northern California. Conducting these studies in public schools allowed us to work with a racially and socioeconomically diverse group of kindergarteners. However, our findings may not generalize to those beyond our sample. Notably, we did not have representation from Black or Native American communities. Motivational beliefs and people's writing experiences are situated within broader communities, and thus, are likely to be influenced by an array of social, cultural, political, and historical factors. Additionally, it is important to acknowledge the larger societal context of the COVID-19 pandemic during the 2021–22 school year. Many participants likely had not attended preschool and were entering a social setting such as school for the first time. Our findings may have been impacted by this context, as participants were likely not familiar with school-specific practices, such as completing assessments and using non-verbal hand signals such as a thumbs-up to show agreement. Wearing masks also made overall communication difficult. More research is needed to further understand the experiences of kindergarteners beyond our sample.

Our studies were embedded within a larger writing intervention study, with Study 1 conducted at the beginning of the school year and Study 2 conducted at the end of the school year. Although we did not identify any differences related to the intervention provided in the larger study, the embedded nature of Studies 1 and 2 may have impacted findings. A 4-point Likert-type scale survey is likely to have posed difficulties even at the end of kindergarten, given that Likert-type scales are known to be difficult to use in even higher grade levels, such as second grade (Marsh, 1986). However, it is unclear how developmentally appropriate the binary choice survey, challenge preference task, and semi-structured interview would be at the beginning of kindergarten.

Small sample sizes may have hindered our ability to find statistically significant relations between motivational beliefs and writing skills. In Study 2, we opted to limit the sample size to examine three different assessment formats. Across all analyses, we observed weakly correlated, nonsignificant relations between motivational beliefs and writing skills. Previous studies have reported weak-to-moderate, statistically significant relations (Camacho et al., 2021). Including a larger sample of kindergarteners may have provided us with additional power to detect relations between these variables.

4.2. Implications and future directions for research

Overall, our results highlight the importance of deepening our understanding of motivational beliefs about writing in the context of the early elementary years. As the results suggest, commonly used surveys are difficult for kindergarteners to respond to, and survey

items include assumptions of what *researchers* think are determinants of motivational beliefs in young children. Behaviors and beliefs, such as getting help from a teacher and feeling incompetent in writing, hold different meanings across contexts, such as between less experienced, developing writers and more experienced, skilled writers. We must be careful of assuming that phenomena we observe in a particular group of people, such as older children, carry the same meaning in other groups, such as younger children, and furthermore, that such phenomena can be measured validly in the same way across different populations.

Our results fit into a larger body of work that has demonstrated the importance of studying motivational beliefs within local, sociocultural contexts (e.g., Nolen, 2001, 2007; Hall and Axelrod, 2014; Graham, 2018). Although motivational beliefs are formally considered a cognitive aspect of writing (Hayes, 1996), participants' accounts of motivational beliefs were deeply rooted in their everyday experiences, so much so that it was impossible to disentangle cognitive factors from sociocultural factors. Given such findings, it is not surprising that motivational beliefs are difficult to study in a vacuum, disengaged from their sociocultural contexts, with measures that assume that beliefs can be quantified and meaningfully placed on a single, linear spectrum. As Rowe (2023) points out in her closing paragraph of a chapter on early childhood writing, researchers should "follow the lead of young writers" (p. 199). If kindergarteners are sharing transdisciplinary accounts of motivational beliefs, researchers should also integrate sociocultural and cognitive perspectives to gain a more meaningful understanding of motivational beliefs.

In particular, it will be important to consider how interviews and observations can enrich future studies with kindergarteners. In Study 2, we decided to conduct semi-structured interviews, so that there was more alignment between the interview questions and the survey items, thereby allowing for an easier comparison of different assessment formats. While we asked probing questions to better understand participants' line of thinking, we stuck closely to the predetermined interview questions. Interestingly, none of the participants explicitly identified themselves as writers or authors, nor did they reference storytelling or sharing stories, likely because our interview questions did not prompt such responses. In the future, it may be important to conduct more child-centered, unstructured interviews. For example, artifact-based interviewing is known to be a useful way to interview young children (cf. Danby et al., 2011). Researchers working with young multilingual children should further consider linguistically responsive interviewing techniques (cf. Kwon, 2021). Additionally, future research can benefit from incorporating interviews with family members, especially in light of the importance of considering sociocultural contexts (cf. Mortier et al., 2021). Observations will also be helpful in further studying how motivational beliefs dynamically play out in places such as the classroom (cf. Nolen, 2001, 2007) and in examining whether the opinions that young children self-report reflect what they internalize on a day-to-day basis in applied settings.

In fact, we encourage qualitative methods to be considered in research with all age groups. While older children may be better able to answer on a Likert-type scale, interviews and observations would nevertheless reveal a wealth of information that is likely to provide a richer, more accurate story of their motivational beliefs as well. For example, in discussions around growth mindset, there is a popular narrative that children who are "low-achieving" often are "less motivated" and benefit from mindset interventions to improve their academic performance[1]. While there is also the understanding that children must be given a learning environment that allows them to successfully put these beliefs into action in the first place (Yeager and Dweck, 2020), this important piece of information is often overlooked. Some people in the public[2] have noted that "BI&POC [Black, Indigenous, and People of Color] experience systemic oppression and are more likely to develop a 'fixed mindset,'" and that "if educators teaching 'growth mindset' do not take young people's environment into account, particularly, youth experiencing white supremacy, anti-Blackness, poverty, patriarchy, and ableism, then they are engaged in glorified victim blaming" (Growth Mindset section). There is sure to be a side to motivational beliefs that we have not given children a chance to tell. Through interviews and observations, we can get closer to giving children the space to tell their stories and study motivational beliefs within social, cultural, political, and historical contexts.

On a broader scale, we suggest that the field reorient its goals for studying motivational beliefs about writing. Some previous studies have explored motivational beliefs to examine its potential in predicting writing performance (e.g., Camacho et al., 2021; Schrodt et al., 2022). Additionally, studies have further examined whether interventions aimed at enhancing motivational beliefs can supplement writing instruction and improve writing skills (e.g., Schrodt et al., 2019; Camacho et al., 2023). Yet what we found through the survey measures and interview was evidence suggesting that many kindergarteners already have positive orientations to their motivational beliefs. While this result may in part be due to social desirability bias, this finding has been reported in prior research (e.g., Mata, 2011), including an ethnographic study that went beyond self-report measures to examine motivational beliefs (Nolen, 2001).

Beyond focusing on the predictive value of motivational beliefs and the effectiveness of interventions targeting these beliefs, a bigger emphasis should be placed on examining the underlying factors that shape these beliefs in the first place. In a broader body of work, literacy motivation is known to decline as children get older, with those in lower grades more motivated than those in higher grades (Gambrell and Gillis, 2007). This same phenomenon has specifically been observed in writing as well (Knudson, 1992). This overall decline of motivational beliefs over time serves as an important reminder that negatively oriented beliefs are not purely cognitive, innate beliefs. Instead, these beliefs are dynamically shaped by the surrounding environment. Nolen (2007) conducted a longitudinal, mixed-methods study examining changes to young children's motivational beliefs from first to third grade. Such approaches to studying motivational beliefs may help uncover factors that prevent children from maintaining positively oriented beliefs as they advance through school.

Kindergarten provides an interesting window to examine how the first years of school begin to shape young children's motivational beliefs. In the interview, some of the participants demonstrated an awareness of their classmates' writing abilities, even going as far as

1 Barshay, J. (2022, December 5). *PROOF POINTS: Does growth mindset matter? The debate heats up.* The Hechinger Report. https://hechingerreport.org/proof-points-does-growth-mindset-matter-the-debate-heats-up/.

2 Class Trouble. (2020, February 1). *A guide to coded language in education vol. I & II.* https://classtrouble.club/blogs/resonance-archives/a-guide-to-coded-language-in-education-vol-i.

sharing that "good students" are those who "always get compliments." It is possible that this awareness gradually results in social comparisons that further influence children's motivational beliefs (cf. Nolen, 2001; Mata, 2011). It would be interesting to explore how this awareness forms and what role teachers play in positioning certain students as "good writers." Such findings will be helpful in improving the field's approach to studying motivational beliefs, steering the conversation toward shortcomings in children's learning environments and perhaps even teacher ideologies, rather than flaws in children that must directly be "fixed" via motivation-based interventions.

4.3. Implications for education practice

Amid increased public attention on motivational beliefs, along with limited research on young children's motivational beliefs about writing, we offer education practitioners a word of caution. Public media has spread the overly simplified notion that teaching children to hold positive motivational beliefs improves academic performance (see footnote 1). This simplified message makes it easy to lose sight of the greater social, cultural, political, and historical barriers that prevent certain children from putting their motivational beliefs into action. Especially in the kindergarten years, we saw little evidence suggesting that young children hold negatively oriented motivational beliefs. Given these findings, practitioners may consider focusing their attention on providing learning environments that allow young children to *maintain* positive beliefs. For example, in the interview, participants shared a variety of strategies that helped them persist through challenges, from sounding out words to using technology. Providing instruction that lets children hold more agency in their writing may promote positive motivational beliefs about writing.

Practitioners must also be careful of mistakenly assuming that some of their students "lack motivation" based on what *they* think reflects behaviors of motivation. For example, we found that being frustrated at mistakes and asking for help were not necessarily indicators of "giving up," even though the literature may suggest so. Such assumptions can be especially dangerous in the classroom, as practitioners' misinterpretations may position specific students as "capable learners" and others as "struggling." In fact, such positioning can also be shaped by practitioners' ideologies around language, race, and disability (McDermott, 1993; Hikida and Martínez, 2019). Practitioners' beliefs may therefore impact which children can hold positive motivational beliefs.

4.4. Conclusion

Through Studies 1 and 2, we explored a variety of both quantitative and qualitative assessment formats of motivational beliefs about writing. This mixed-methods approach allowed for a unique analysis; data from each of the assessments complemented one another to tell a more coherent story of kindergarteners' motivational beliefs. It can be easy to lose sight of the big picture when studying motivational beliefs in a vacuum, such as through surveys and task-based, behavioral assessments. To develop a fair and more meaningful understanding of motivational beliefs that can be applied to school settings, we must not rush to quantify motivational beliefs in young children with the goal of simply considering how these beliefs may predict writing performance. We must instead expand our explorations, integrating qualitative methods to deepen our understanding of kindergarteners' motivational beliefs in context and to further examine the aspects of their environments that shape these beliefs in the first place. Such changes to the way we study young children's motivational beliefs about writing are likely to reveal insights that will push the field to reconsider the ways we think and talk about motivational beliefs in older children as well.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Stanford University. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

MT and CL planned and designed the studies. SA and CP provided input on the research design. CL and LB recruited and led communication with schools. MT, LB, and BH collected data. MT entered data and conducted statistical analyses. MT and BH conducted interview analyses. MT led the initial draft of the manuscript. CL and BH wrote sections of the manuscript. All authors revised and reviewed the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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Writing motivation and ability profiles and transition during a technology-based writing intervention

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Students exhibit heterogeneity in writing motivation and ability. Profiles based on measures of motivation and ability might help to describe this heterogeneity and better understand the effects of interventions aimed at improving students' writing outcomes. We aimed to identify writing motivation and ability profiles in U.S. middle-school students participating in an automated writing evaluation (AWE) intervention using MI Write, and to identify transition paths between profiles as a result of the intervention. We identified profiles and transition paths of 2,487 students using latent profile and latent transition analysis. Four motivation and ability profiles emerged from a latent transition analysis with self-reported writing self-efficacy, attitudes toward writing, and a measure of writing writing: Low, Low/Mid, Mid/High, and High. Most students started the school year in the Low/Mid (38%) and Mid/High (30%) profiles. Only 11% of students started the school year in the High profile. Between 50 and 70% of students maintained the same profile in the Spring. Approximately 30% of students were likely to move one profile higher in the Spring. Fewer than 1% of students exhibited steeper transitions (e.g., from High to Low profile). Random assignment to treatment did not significantly influence transition paths. Likewise, gender, being a member of a priority population, or receiving special education services did not significantly influence transition paths. Results provide a promising profiling strategy focused on students' attitudes, motivations, and ability and show students' likeliness to belong to each profile based on their demographic characteristics. Finally, despite previous research indicating positive effects of AWE on writing motivation, results indicate that simply providing access to AWE in schools serving priority populations is insufficient to produce meaningful changes in students' writing motivation profiles or writing outcomes. Therefore, interventions targeting writing motivation, in conjunction with AWE, could improve results.

KEYWORDS

motivation, self-efficacy, writing, middle school, automated writing evaluation (AWE), latent profile analysis

1. Introduction

Writing is a key skill for academic success but results from national tests paint a discouraging picture about U.S. middle-schoolers' writing performance. In the last National Assessment of Educational Progress (NAEP) writing assessment in 2011, proficiency rates for writing were alarmingly low; only 27% of eighth graders performed at or above the proficient level. Rates were lower for Black and Hispanic/Latinx students (only 10 and 13% at or above proficient, respectively), and students from low-income households as indicated by their

receiving free/reduced-priced lunch (FRL; only 12% at or above proficient) (National Center for Education Statistics, 2012). In addition, boys have historically underperformed girls in writing (Reilly et al., 2019), and the intersection of gender, race, and socio-economic status may exacerbate or ameliorate relative risk of writing difficulty. Given this scenario, intervention is urgent, especially for these populations.

A potential avenue for intervention is to improve students' motivation and attitudes toward writing as these characteristics are essential for writing development given the significant cognitive and motivational resources required to initiate, sustain, and monitor writing behaviors (Deane, 2018; Graham, 2018). Further, motivation and attitudes toward writing are highly predictive of writing ability (Graham et al., 2018). Previous studies have emphasized that measures of motivation and attitudes toward writing can be used to identify struggling writers (Coker et al., 2018), and can be impacted by interventions to improve writing ability. For example, technology-based writing interventions can support writing instruction and positively impact writing ability (Ekholm et al., 2018) and motivation (Morphy and Graham, 2012). A meta-analysis found that word processing had large, positive effects on struggling writers' motivation to write (ES = 1.42) and moderate effects on writing ability (ES = 0.52) (Morphy and Graham, 2012). One promising technology-based writing intervention is *automated writing evaluation* (AWE). AWE is software that provides immediate, automated feedback, often in conjunction with evaluative scores (Hockly, 2019; Strobl et al., 2019; Deeva et al., 2021). AWE has shown promise for increasing students' persistence at solving problems in their writing (Wilson and Czik, 2016), their motivation to revise (Moore and MacArthur, 2016), and their writing self-efficacy (Wilson and Roscoe, 2020).

However, this begs the question of how best to characterize students' motivation and attitudes toward writing (Camacho et al., 2021a). This is especially important in middle school when students' motivation and attitudes toward writing significantly worsen (Wright et al., 2020). Moreover, it is important to understand what motivation and writing ability look like for students more likely to struggle with writing (i.e., Black and/or Hispanic students who receive FRL). Furthermore, research is needed to help understand how motivational profiles may change over time and in response to intervention, particularly promising technology-based interventions such as AWE.

1.1. Theoretical framework

1.1.1. Writing motivation constructs

Writing motivation is a complex umbrella for numerous constructs and definitions. Overall, it refers to the "orientation to writing that is triggered, stimulated, and to some degree manipulated by the attractive and challenging features of the activity that emerge in a specific situation" (Boscolo et al., 2012, p. 31). There have been multiple approaches to parse the components of writing motivation and there is an ongoing debate on how to conceptualize it and assess it (see Abdel Latif, 2019 for a discussion). Accounts such as Graham's (2018) and Graham et al. (2022) define writing motivation as a multidimensional construct, comprised by a set of different beliefs: about identity as a writer, reasons for writing, the value of writing, writing goals, interests and attitudes toward writing, competence as a writer, reasons for succeeding in writing, and beliefs about the community setting in which one writes.

Empirical studies have aimed to untangle the constructs under writing motivation. A recent systematic review on the topic found at least 24 different constructs that have been measured as writing motivation in the past decades (Camacho et al., 2021a). The most well-researched constructs were self-efficacy for writing and writing attitudes (Abdel Latif, 2019; Camacho et al., 2021a). These constructs had strong, positive relationships with writing ability. Specifically, self-efficacy had the strongest relation ($r = 0.60$) but writing attitudes ($r = 0.15$–0.34), and enjoyment of writing ($r = 0.32$) had positive associations too (Camacho et al., 2021a).

Self-efficacy refers to the judgment of one's ability to conduct a task and is often a "cognitive mediator" for actions (Bandura, 1982, p. 126). Applied to writing, self-efficacy refers to the confidence one has to complete certain writing tasks successfully (Bruning et al., 2013). Writing self-efficacy has been the most researched construct in the realm of writing motivation (Camacho et al., 2021a), and as such, there are multiple conceptualizations and assessments (Abdel Latif, 2019).

Bruning et al. (2013) critiqued early accounts of self-efficacy because they measured the trait globally, based only on writing activities and outcomes. This approach ignores the psychological and linguistic features of writing that can impact the definition of self-efficacy. Hence, Bruning et al.'s (2013) model of writing self-efficacy accounts for these multiple underlying factors and proposes three dimensions of self-efficacy. First, *conventions* refer to the confidence in the writer's ability to comply with generally accepted writing standards in a language while putting ideas into writing. This dimension includes, for example, spelling, morphology, sentence combining, etc. Second, *idea generation* refers to the confidence in the writer's ability to generate ideas while writing, and the ability to correctly connect them. This dimension accounts for the cognitive processes involved in writing and is closely related to semantics and schematics. Finally, *self-regulation* refers to the confidence in the writer's ability to successfully navigate the many dimensions, subtasks, and barriers in the writing process. This dimension relates to the management, monitoring and evaluation of writing. These three dimensions of self-efficacy in writing were moderately and positively related to attitudes about writing ($r = 0.22$–0.50) and writing ability ($r = 0.20$–0.38; Bruning et al., 2013).

Attitudes about writing refer to positive or negative affect toward writing or aspects of it (Graham, 2018; Camacho et al., 2021a). Positive attitudes toward writing have been directly associated with improved writing ability and this construct has been deemed more malleable than other motivational constructs (Graham et al., 2007). Writing attitudes tend to decline over the years (Ekholm et al., 2018). Furthermore, attitudes toward writing, measured as how much one likes or dislikes writing, have been shown as an independent motivation construct related to both self-efficacy and writing ability ($r = 0.13$, Bruning et al., 2013; MacArthur et al., 2016).

Writing self-efficacy and attitudes toward writing are well-defined, independent constructs under writing motivation, and the relations between them and with writing ability has been largely established (Abdel Latif, 2019). Therefore, profiling with measures of these constructs along with a measure of writing ability can allow us to explore in more detail the relations among them, how these constructs interact in a priority population, and how responsive they are to a writing intervention.

1.1.2. Profiles of students' motivation and ability in relation to writing

Though the relations between motivation and writing ability continue to maintain significance to writing researchers (Camacho et al., 2021a), relatively few studies have investigated the explicit profiles of students as writers. Those that have undertaken profiling have done so based on a variety of measures including ability and motivation—the former being the most prevalent in relative terms. The early work of Roid (1994) utilized cluster analysis to identify 11 unique patterns of student writing across various analytic domains, though inconsistencies existed within clusters. Later work saw the qualitative characterization of clusters of writers as "high/expert" or "low/poor" based on stable performance in domains ranging from spelling, grammar, and semantics (Wakely et al., 2006) to problem-solving, attention, self-monitoring, and language (Hooper et al., 2006). Such cognitive and linguistic measures aptly constitute the ability of a student writer. More recently, Coker et al. (2018) found that discrete profiles of writers based on similar metrics emerge as early as first grade. Of the five profiles derived by their latent profile analysis (LPA), students identified as "At Risk" consistently scored lower on factors related to quality/length, spelling, mechanics, and syntax. Similar profiles have even been identified among preschool children along related dimensions (Guo et al., 2018). Yet, as Coker et al. (2018) point out, measures of ability (often via assessments alone) fail to capture all the factors that influence writing success.

Accordingly, researchers have also explored student-level differences in motivation and its subsequent impact on writing outcomes, though these efforts have largely utilized methodologies that do not explicitly profile (e.g., MANOVA). For example, Troia et al. (2012) arguably approximated potential profiles of writers' motivation, activity, and writing ability with consideration for the moderating effects of grade-level, sex, and ability for students in Grades 4 through 10. They found that motivation as measured by a beliefs survey showed a significant positive effect on narrative quality.

Troia et al. (2022) followed their prior research with a comprehensive investigation that explicitly profiled students in Grades 4 and 5 using LPA with various, interrelated dimensions of writing including ability, cognitive processes, motivation, and affect. Measures of writing ability included transcription fluency, vocabulary, spelling, mechanics, as well as general essay planning and quality. Cognitive measures included measures of discourse knowledge, working memory and word-reading skill because reading is fundamental for text interpretation and influences text length and quality. Finally, writing motivation was measured with the *Situated Writing Activity and Motivation Scale*, which directly addresses explicit aspects of motivation and both self-efficacy and outcome expectations for skills and tasks. The authors' five-profile model suggested that in addition to the globally weak and globally proficient writers found in prior ability-focused research, there existed average-ability writers who varied significantly from each other on levels of motivation, perhaps moderating differential writing proficiency to some extent. Interestingly, globally proficient writers were nearly identical to both motivated and unmotivated average writers in most regards (e.g., component skills, working memory), except that the ability to demonstrate essay planning was uniquely sophisticated for only globally proficient writers.

De Smedt et al. (2022) also aimed at identifying writer profiles of Belgian high-school students using dimensions of writing that go beyond writing ability. Using a hierarchical cluster analysis, the authors identified two distinct clusters based on a scale measuring autonomous motivation (e.g., writing for enjoyment), internally imposed writing motives (e.g., writing to avoid the guilt of not writing), and externally imposed motives (e.g., writing to get a reward from a teacher), and a measure of students' writing process. One of the identified clusters included process-oriented students with high autonomous motivation, whereas the second cluster included students that were less process-oriented and with less autonomous motivation. Similarly, Van Steendam et al. (2022) profiled Dutch high-school students based on their process configurations when completing source-based writing tasks. However, they did not include measures of motivation in their profiles.

Ng et al. (2022)'s clustering strategy exclusively used writing motives as the clustering variables. The authors found seven distinct clusters of Chinese fourth-grade students that differed on the extent to which they were motivated by curiosity, involvement, grades, competition, emotion, boredom, or social recognition. Clusters ranged from extremely motivated writers with high scores across all seven motives, to unmotivated writers with low scores across all motives. Other clusters had varying degrees of motives such as some students were focused on performance while others were predominately motivated by curiosity and involvement. This study used a strong combination of motives to cluster students, but it did not examine writing outcomes as part of the models.

Hence, further efforts to profile writers based on motivation and ability as they relate to writing are warranted, especially given motivation's notable—and arguably understudied—role in the writing process (Boscolo and Gelati, 2019) and its complex relationship with writing proficiency (Ekholm et al., 2018). Moreover, recent contributions to profiling focused exclusively on students in upper elementary grades (Ng et al., 2022; Troia et al., 2022) or high school students (De Smedt et al., 2022; Van Steendam et al., 2022). Thus, there exists no research on how student writing ability/motivation profiles may differ at the middle-school level.

1.1.3. Automated writing evaluation

AWE is intended to help students learn to write by accelerating the practice-feedback cycle (Kellogg et al., 2010) and supporting the cognitive and affective processes undergirding writing development. AWE feedback can range from basic (e.g., right or wrong answers) to highly complex, rich and individualized suggestions to improve writing (Fu et al., 2022). For example, AWE can provide detailed feedback on high-level traits (e.g., organization, development of ideas or style) alongside direct corrections of grammar and spelling mistakes, and suggestions for further learning such as video lessons teaching specific aspects of writing (e.g., Wilson and Roscoe, 2020). Other examples of more elaborate AWE feedback include explaining why an answer is right or wrong, or providing hints to guide students in their revisions (see a complete list in Fu et al., 2022).

AWE feedback is usually provided to students in and by the AWE software. However, learner-teacher interaction features allow for communication between students and teachers, and for teachers' feedback to supplement the automated feedback (e.g., Wilson and Czik, 2016; Link et al., 2022). Several studies have explored the differential effects of teacher-, peer-, and computer-generated feedback (see Fu et al., 2022 for a systematic review on the topic). Although findings indicate significant positive effects of each feedback modality,

teacher feedback generally has a stronger effect: Graham et al. (2015) report an average weighted effect size of 0.87 for teacher feedback compared to 0.38 for computer feedback. However, taken together, findings in this area suggest that blended feedback from AWE and a teacher or peer can lead to better writing outcomes (Fu et al., 2022).

By providing students with immediate feedback, students learn writing ability criteria. Knowledge of this evaluation criteria is fundamental to students being able to identify areas of improvement when reviewing their writing, and to revise their writing productively (MacArthur, 2016). Increased knowledge of evaluation criteria also may have benefits to students in terms of their confidence as writers (i.e., their self-efficacy). For instance, exposure to AWE feedback is associated with improvements in middle school students' ability to accurately evaluate their writing ability (i.e., their calibration accuracy) and their self-efficacy for self-regulating the writing process (Wilson et al., 2022). Indeed, a quasi-experimental study found that middle schoolers using AWE to compose multiple essays had significantly greater self-efficacy for writing at follow-up compared to students using GoogleDocs after controlling for baseline self-efficacy (Wilson and Roscoe, 2020).

The immediacy of AWE feedback, as well as its potential for gamifying the writing process, may support improvements in students' writing motivation, too. Several studies have found that elementary, middle, and secondary students report being more motivated to draft and revise their writing when using AWE (Warschauer and Grimes, 2008; Grimes and Warschauer, 2010; Ware, 2014; Moore and MacArthur, 2016; Wilson et al., 2021b). Indeed, evidence from a quasi-experimental study revealed that students using AWE self-reported significantly greater persistence for solving problems in their writing than students using GoogleDocs to compose. However, despite the general positive trend, several studies have reported negative associations between AWE feedback and writing motivation. For example, students may feel overburdened by the amount of feedback, perceive AWE feedback as less trustworthy than their teachers' feedback, or feel discouraged when they receive vague feedback or low scores (see Wilson et al., 2021a; Fu et al., 2022).

With respect to improving students' writing ability, several syntheses and meta-analyses indicate that AWE may be an effective writing intervention (Stevenson and Phakiti, 2014; Graham et al., 2015; Fu et al., 2022; Li, 2022). For instance, Graham et al. (2015) reported an average weighted effect size of 0.38 on writing ability for four studies of computer-based feedback. Li (2022) reported an overall effect (*g*) of 0.43 of AWE on writing ability for 25 studies published between 2000 and 2022. However, as with findings on motivation, there are exceptions to the trend of positive effects of AWE on writing outcomes. Individual differences in students' literacy and language skills, as well as their motivation and attitudes toward writing, may moderate the effects of AWE on writing outcomes (Fu et al., 2022). Thus, the extent to which adolescents with different writing motivation/ability profiles respond uniformly to an AWE intervention remains to be seen.

1.2. Present study

Students exhibit heterogeneity in writing motivation and ability. Prior research has shown that this heterogeneity can be characterized into distinct profiles. However, prior research has often profiled writers based on measures of ability alone (Coker et al., 2018). Rarely have researchers profiled writers based on measures of both motivation and ability (c.f., Troia et al., 2022), yet such profiles might better describe the heterogeneity in students' writing development. Further, such profiles might assist in better understanding the effects of promising technology-based writing interventions like AWE that are aimed at improving students' writing outcomes, as students with different writing motivation and ability profiles may respond differently to an AWE intervention.

The present study addresses this gap through a randomized control experiment in which a sample of middle schoolers who were predominantly Black or Hispanic/Latinx and received FRL were randomly assigned to a business-as-usual English language arts (ELA) comparison condition or to an intervention condition in which they had access to the AWE system *MI Write* during their ELA instruction. We focus on this population because they are often overrepresented as struggling and low-performing writers (National Center for Education Statistics, 2012). We aim to answer the following research questions:

1. What are the writing motivation and ability profiles of diverse middle school students?
2. Are the identified profiles invariant across a school year and across different demographic groups?
3. What are the within-person and within-sample transition paths between these profiles across a school year, and what is the effect of an AWE intervention on these transitions?
4. Are there differences in students' writing motivation and ability profiles and transition paths according to demographic predictors?

2. Materials and methods

2.1. Participants

We collected data from 2,487 students in Grades 7 and 8 (51.9% female) who were taught by 37 teachers participating in the randomized controlled trial. Three school districts in the Mid-Atlantic and Southern U.S. were invited to participate in the RCT because 50% or more of their student population was considered a *priority population*[1], as defined at the time by the funding agency of this project (i.e., students were Hispanic/Latinx or Black and/or experiencing poverty as indicated by receiving FRL).

All seventh and eighth grade teachers across the 14 schools were invited to participate in the study and only two teachers opted out of participating after consenting (5.1% attrition, which is considered low by What Works Clearinghouse, 2017). Most students in the sample were in the eighth grade (68.4%). Students receiving special education comprised 6.2% of the sample. The sample included very few English-learners (ELs; 2.6%), as the school districts typically did not include

1 This term has since been updated by the funding agency and is now termed "communities in focus."

TABLE 1 Participant demographic information by intervention group.

	Comparison (BAU)		Intervention (MI)		Overall	
	n	%	*n*	%	*n*	%
Grade 8	715	58.3	986	78.3	1,701	68.4
Female	648	52.8	643	51.0	1,291	51.9
Priority population	951	77.5	1,027	81.5	1,978	79.5
Special education	76	6.2	109	8.7	185	7.4
English language learner	32	2.6	44	3.5	76	3.1
Total	1,227	49.3	1,260	50.7	2,487	100

n, number of participants; %, percentage of participants in group.

ELs in their general education ELA courses. Table 1 displays participant demographics.

Intervention and comparison group subsamples did not differ with respect to gender ($\chi^2_{(1)} = 0.79$, $p = 0.374$) or EL status ($\chi^2_{(1)} = 1.64$, $p = 0.200$). However, the treatment group included a significantly higher proportion of students in the priority population ($\chi^2_{(1)} = 6.12$, $p = 0.013$, +4% difference) and students who received special education services ($\chi^2_{(1)} = 5.45$, $p = 0.020$, +3% difference).

Pretest equivalence on the writing motivation and writing ability measures was examined using independent sample *t*-tests. At pretest, students in the comparison and intervention groups did not differ in their self-efficacy for conventions ($p = 0.055$, $d = 0.08$), idea generation ($p = 0.062$, $d = 0.08$), or self-regulation ($p = 0.076$, $d = 0.07$). Likewise, there were no significant group differences in liking writing ($p = 0.276$, $d = 0.04$) or writing ability scores ($p = 0.324$, $d = -0.04$).

2.2. Design

We employed a randomized control trial with two data collection time points: the beginning and the end of the school year of 2021–2022. Randomization was performed at the teacher level using random number generation. To account for the nested structure of the data (i.e., students nested within teachers, within schools, within districts), we blocked teachers at the district, school, and grade level. This ensured that all teachers in all schools had an equal probability of receiving the intervention. Blocks of teachers were then randomly assigned to either a treatment (AWE intervention using MI Write) or comparison (business as usual ELA instruction) group. The research project had IRB approval. A total of 19 teachers were randomly assigned to the intervention group; 18 teachers were randomly assigned to the comparison group.

2.3. MI write

MI Write[2] is an AWE system developed and marketed by Measurement Incorporated. It is designed to address the feedback burden on teachers, thereby allowing them to assign more writing and provide high-level feedback while allowing students to experience greater opportunities for writing practice and an accelerated practice-feedback cycle. This commercial tool is designed to be used by teachers and students in Grades 3–12 and provides a wide variety of features that support each agent in the writing process. MI Write uses an automated scoring engine, *Project Essay Grade* (PEG) to measure hundreds of linguistic indicators of writing ability that are used within a neural network to reliably predict human-assigned six trait scores (see Wilson et al., 2021b). Furthermore, PEG scoring produces specific grades and feedback depending on users' grade-band (Grades 3–4, 5–6, 7–8, 9–10, 11–12), and task genre (informational, narrative, persuasive/argumentative).

MI Write offers electronic graphic organizers, interactive lessons, system and custom writing prompts, peer review, and multiple revision opportunities to support students' deliberate writing practice (Palermo and Wilson, 2020). Secondly, MI Write's automated scoring engine, *Project Essay Grade* (PEG) provides students with quantitative and qualitative feedback to help them calibrate their performance and revise and improve their writing. Quantitative feedback comes in the form of scores for six traits of writing. Qualitative feedback associated with each of the six traits of writing comes in the form of meta-cognitive prompts (e.g., *Does your writing have a clear conclusion?*) and suggestions for improvement (e.g., *Although your story is well developed, think about whether you can add even more details to improve your story*).

In addition, MI Write provides immediate, text-embedded grammar and spelling feedback, enabling students to make necessary edits to their essays. Teachers also may supplement MI Write's feedback with summary comments and text-embedded in-line comments within their students' writing. Findings from prior research indicate that MI Write has promise for improving students' writing ability (Palermo and Thomson, 2018; Palermo and Wilson, 2020), self-efficacy and motivation to write (Wilson and Czik, 2016; Wilson and Roscoe, 2020; Wilson et al., 2022), and state test ELA performance (Wilson and Roscoe, 2020).

2.4. Measures

2.4.1. Writing motivation and beliefs survey

The writing motivation and beliefs survey included two scales. First, students completed the Self-Efficacy for Writing Scale (SEWS) (Bruning et al., 2013), where they rated their confidence level to complete 19 writing tasks on a scale from 0 (*Not confident at all*) to 100 (*Completely confident*). Items were divided into three subscales:

2 www.miwrite.com

Conventions (five items; e.g., "*I can spell my words correctly*"), Idea Generation (six items; e.g., "*I can put my ideas into writing*"), and Self-Regulation (eight items; e.g., "*I can use feedback to improve my writing*"). Reliability for all scales was high at both pretest ($\alpha_{Conv} = 0.88$; $\alpha_{Idea} = 0.92$; $\alpha_{SelfReg} = 0.91$) and posttest ($\alpha_{Conv} = 0.88$; $\alpha_{Idea} = 0.93$; $\alpha_{SelfReg} = 0.91$).

Second, students reported their level of agreement with four statements about liking writing in the Liking Writing Scale (LWS; Bruning et al., 2013). Ratings ranged from 0 (*Strongly Disagree*) to 3 (*Strongly Agree*). Participants answered items such as "*I usually enjoy writing*," and reverse-coded items such as "*I do not like to write*." Higher scores in the LWS indicate higher liking of writing. This scale had good reliability at pretest ($\alpha = 0.84$) and posttest ($\alpha = 0.86$).

2.4.2. Writing ability

Students wrote an argumentative essay in response to a source-based writing prompt at pretest and posttest (see prompts and links to sources in the Supplementary material). The prompt asked students to argue for or against certain uses of technology in society, specifically the use of computer-guided robots in the workplace (pretest prompt topic) and the use of voice-activated assistants (posttest). Students were given up to 75 min to read the sources, take notes, and plan, draft, and review their essay before submitting their essay electronically via Qualtrics. This genre was chosen because of its relevance to academic writing (MacArthur et al., 2015) and college readiness (Ray et al., 2019). Moreover, argumentative or persuasive writing using sources was part of the middle school ELA curricula of all three participating school districts. Therefore, all students had some previous experience with this type of writing.

Students' prompts were scored for writing ability by PEG. PEG scores students' writing on six traits: development of ideas, organization, style, word choice, sentence fluency, and conventions (range = 1–5). PEG also produces an Overall Score (range = 6–30) which is formed as the sum of the six traits. We adopted the Overall Score as the measure of writing ability in the current study because the individual trait scores were highly correlated (range $r = 0.94$–0.99), limiting their utility to provide unique information in a profile analysis. The PEG scoring system has been deemed valid and reliable in previous studies (Shermis, 2014; Wilson et al., 2019, 2022). Moreover, the Overall Score had high internal reliability at pretest ($\alpha = 0.99$) and posttest ($\alpha = 0.99$).

However, since we were using the PEG Overall Score as the sole measure of writing ability in the current study, we additionally sought to establish its convergent validity with a separate, validated human-scored measure of students' argumentative writing quality, specifically the Smarter Balanced argumentative performance-task rubric for Grades 6–8. Smarter Balanced refers to the name of a consortium of US states and territories that utilize the Smarter Balanced assessment for yearly accountability assessments aligned with the Common Core state standards. This rubric was selected by the funding agency for use in our study because an independent panel of assessment experts deemed it to have excellent construct coverage and evidence of reliability and validity for the grade-level and across demographic subgroups. The rubric assesses organization/purpose, evidence/elaboration, and conventions. Ten percent of the entire corpus of baseline and follow-up essays were double scored among a pool of 12 raters to establish inter-rater reliability of the human scoring, which was strong: 57% exact agreement, 95% adjacent agreement, and $r = 0.77$. The Smarter Balanced scores were highly correlated with the PEG scores at both pretest ($r = 0.78$) and posttest ($r = 0.84$). Thus, this evidence supports the convergent validity of the PEG scores, indicating that PEG scores were not only reliable, but they provided a valid inference regarding students' writing ability.

Table 2 presents descriptive statistics on motivation and ability measures at both time points. All measures of self-efficacy and the measure of writing ability significantly increased for the larger sample between pretest and posttest. However, liking writing significantly decreased at posttest. Standardized mean differences are reported in Table 2.

2.5. Procedure

This study was conducted during the 2021–2022 school year, during which lingering effects of the COVID-19 pandemic were still evident. We recruited school districts whose student body included over 50% Black or Hispanic/Latinx or students receiving FRL (i.e., students within the priority population). In the summer of 2021, ELA teachers provided consent to participate and all students in their Grade 7 and 8 rosters were given the opportunity to opt out of the study.

Prior to fall 2021, all participating teachers were trained by the research team to apply the pretest evaluation in their class. The research team was available for assistance. No participating teachers nor students had prior experience using MI Write. Therefore, teachers in the intervention condition followed a professional development plan during the year of implementation that consisted of one 2-h initial training in MI Write, and three professional learning sessions and at least five monthly coaching sessions (each 45–60 min) throughout the school year with Measurement Incorporated staff.

TABLE 2 Descriptive statistics of outcomes of interest.

	Time point 1		Time point 2		Standardized mean difference
	N	*M (SD)*	*N*	*M (SD)*	*d*
SEWS-conventions	2,431	72.9 (20.9)	2,364	77.3 (19.2)	0.29***
SEWS-idea generation	2,431	60.5 (23.8)	2,364	65.1 (23.1)	0.22***
SEWS-self-regulation	2,431	64.8 (23.1)	2,364	68.5 (22.0)	0.19***
LWS	2,428	1.7 (0.7)	2,364	1.7 (0.7)	−0.10***
Writing ability	2,243	15.8 (4.8)	2,186	17.6 (5.0)	0.39***

N, number of participants; SEWS; Self-Efficacy for Writing Scale; LWS, Liking Writing Scale; *d*, Cohen's d. ***$p < 0.001$.

In October 2021, teachers administered the pretest in two sessions. In Session 1 (45 min), students completed the Writing Motivation and Beliefs Survey in Qualtrics (15 min) and reviewed two source articles for the argumentative essay. In Session 2 (45 min), students drafted and revised the argumentative essay. One school district completed the survey in 1 day and completed the entire writing task in a single 90-min session the following day to accommodate their schedule. In May 2022, teachers administered the posttest evaluation following the same protocol.

Across the 8 months of the study, students were intended to complete a total of eight pre-writing activities (i.e., MI Write electronic graphic organizers) and eight essays, revise each essay at least twice, engage in eight MI Write interactive lessons, and participate in three peer reviews. Teachers were expected to assign all these activities to students, and to provide feedback at least once to all student assignments submitted January through May (i.e., five assignments). MI Write logs collected data on all the aforementioned usage indicators for each teacher, specifically, the number of graphic organizers, prompts, lessons, and peer reviews teachers assigned, as well as the number of student essays teachers annotated. These logs were analyzed as a measure of fidelity of implementation. Teachers reported challenges meeting the implementation expectations stemming from teacher and student absences and remote and hybrid instruction.

2.6. Data analysis

All statistical models described in this section were estimated using Mplus 8.8 (Muthén and Muthén, 2018). There was no missing demographic data and the rates of missing survey data (7.5%) and essay responses (13.6%) were low, with differential attrition across treatment and comparison groups falling in the "Low" range for all measures (1.3% for survey measures and 5.6% for the essay) based on What Works Clearinghouse v.4.0 standards (2017). Thus, we used full information maximum likelihood (FIML) estimation in all models to handle missing data. FIML produces valid and unbiased parameters when data are assumed missing at random and have a multivariate normal distribution (Raudenbush and Bryk, 2002; Collins and Lanza, 2010; Cham et al., 2017).

2.6.1. LPA and profile invariance

To answer RQ1, we first estimated LPA models separately at each time point using scores from the three SEWS subscales, LWS, and PEG Overall Score (i.e., writing ability) as indicators of the latent profiles. We tested solutions ranging from 1 to 6 latent profiles, with increasingly complex model configurations of variance-covariance structures.[3] The optimal number of profiles was assessed with the Bayesian Information Criterion (BIC) for which lower values indicate better fit. A limitation of this criterion is that, with large sample sizes such as ours, it is likely that the value will not reach a minimum (Marsh et al., 2009). Therefore, we examined the gains associated with each additional profile in an "elbow" plot of the BIC values (Morin et al., 2011). Our final decision regarding the optimal profile solution was guided by theoretical interpretability, as is best practice (Johnson, 2021).

To answer RQ2, we tested whether the optimal profile solution remained invariant across time points. First, we linked the optimal profile solutions from each time point in a longitudinal model. We then tested profile invariance by comparing increasingly restrictive models (Morin et al., 2016; Morin and Litalien, 2017): (1) *configural* invariance (equal number of profiles identified at each time point), (2) *structural* invariance (equal profile means over time), (3) *dispersion* invariance (equal profile variances over time), and (4) *distributional* invariance (equal class probabilities over time). We repeated this process to test profile invariance across intervention (treatment vs. comparison) and demographic groups (i.e., separate models for gender groups, priority population groups, and special education groups) by fitting *configural* invariance, *structural* invariance, *dispersion* invariance, and *distribution* invariance models—note we did not test for invariance of the profile solution across EL and non-EL groups because of the very low percentage of ELs in our sample. Model fit was compared using BIC indices (Nylund et al., 2007).

2.6.2. Latent transition analyses and predictors

After establishing profile invariance, we addressed RQ3 by fitting a latent transition model to test transition probabilities across profiles over time. Furthermore, we investigated RQ4 through various multigroup LTA models (Muthén and Asparouhov, 2011; Morin and Litalien, 2017). We conducted multigroup analyses separately using four binary predictors: intervention group, gender, priority population, and special education status. Once profile invariance was ensured as described in Section 2.6.1, we compared an LTA model in which the transition probabilities were free to vary across groups with a model version in which these probabilities were constrained to be equivalent across groups. We determined that there was a significant effect of the predictor on latent transitions when the model with free transition probabilities had a lower BIC value (i.e., had a better fit) than the model in which the transition probabilities were constrained to be equal across groups.

3. Results

3.1. Latent profiles of writing motivation and ability and profile invariance

Table 3 presents correlations among profile indicator variables. Model fit indices from the LPAs at both time points are shown in Table 4. First, we explored the BIC indices of each profile solution within each type of variance–covariance structure (see Footnote 3 for definitions). As expected, BIC indices continuedly declined with the addition of profiles. Therefore, we explored declines in BIC values using elbow plots and preferred the final profile solution to produce a large gain in model fit (see plots in this project's OSF

3 The variance-covariance structure types are described based on the definitions by Johnson (2021): Type 1=indicator variances are equal across profiles, and covariances are constrained to zero; Type 2=indicator variances are freely estimated across profiles, and covariances are constrained to zero; Type 3=variances are equal across profiles and covariances are estimated and constrained to be equal across profiles; Type 4=both variances and covariances are freely estimated across profiles.

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TABLE 3 Correlations among outcome variables across time.

	1	2	3	4	5	6	7	8	9	10
1. SEWS-C 1	–									
2. SEWS-C 2	0.69	–								
3. SEWS-IG 1	0.67	0.48	–							
4. SEWS-IG 2	0.48	0.68	0.61	–						
5. SEWS-SR 1	0.72	0.54	0.82	0.57	–					
6. SEWS-SR 2	0.52	0.71	0.54	0.81	0.62	–				
7. LWS 1	0.20	0.25	0.48	0.33	0.48	0.33	–			
8. LWS 2	0.23	0.30	0.36	0.45	0.34	0.47	0.58	–		
9. WQ 1	0.34	0.34	0.21	0.23	0.29	0.31	0.21	0.22	–	
10. WQ 2	0.27	0.31	0.19	0.23	0.24	0.31	0.16	0.20	0.58	–

$N = 2{,}487$. SEWS-C 1 and -C 2 refer to the SEWS-Conventions subscale measured at pretest (1) and posttest (2). SEWS-IG 1 and -IG 2 refer to the SEWS-Idea generation subscale measured at pretest (1) and posttest (2). SEWS-SR 1 and -SR 2 refer to the SEWS-Self-regulation subscale measured at pretest (1) and posttest (2). LWS 1 and 2 refer to the Liking Writing subscale measured at pretest (1) and posttest (2). WQ 1 and WQ 2 refer to the writing ability scores measured by the PEG Overall Score at pretest (1) and posttest (2). All correlations are statistically significant at $p < 0.001$.

TABLE 4 BIC indices from LPAs of differing profile solutions and variance–covariance structures at each time point.

Profile solution	Type 1: profile invariant diagonal	Type 2: profile varying diagonal	Type 3: profile invariant non-diagonal	Type 4: profile varying non-diagonal
Time point 1 (pretest)				
1-profile	84582.34	84582.34	78987.93	78987.93
2-profile	80698.87	80150.44	78605.66	77942.05
3-profile	79478.07	78803.92	78450.16	77745.28
4-profile	79064.89	**78181.42**	78350.93	77736.94
5-profile	78881.22	78011.14	78301.00	77764.65
6-profile	78762.55	77907.54	78283.41	77812.60
Time point 2 (posttest)				
1-profile	81767.8	81767.8	76580.91	76580.91
2-profile	78017.62	77200.75	76064.98	75260.99
3-profile	76839.22	75838.01	75878.1	74996.31
4-profile	76445.95	**75243.66**	75740.26	74941.48
5-profile	76213.69	75050.78	75661.93	74906.18
6-profile	76117.16	74891.08	75613.89	–

The best-fitting solution (i.e., with the lowest BIC value) for each time point is in bold.

repository). Results for each variance–covariance structure were similar and BIC values flattened around four profiles for all structure types. Next, we compared BIC values across variance–covariance structures. The profile-varying non-diagonal structure had the lowest BIC value; however, we do not expect covariances to differ across profiles and thus chose a more parsimonious structure with the second lowest BIC (Johnson, 2021; Bauer, 2022). The optimal model was a four-profile solution with a profile-varying diagonal type variance-covariance structure. In this type of structure, indicator variances are allowed to differ in each profile, but they are "not allowed to co-vary over and above their association as part of the same profile" (Johnson, 2021, p. 124). The optimal profile solution was the same across time points.

Figure 1 displays the latent profile means and variances for the optimal model. Students in the *Low-Motivation and Ability (L-MA)* profile had the lowest scores on all indicators at both waves; means in this profile were well below the median for each indicator (e.g., a mean of 26 in self-efficacy for idea generation out of a possible score of 100). Next, students in the *Low/Mid-Motivation and Ability (LM-MA)* profile had slightly higher scores than the L-MA profile for all indicators at both waves. A *Mid/High-Motivation and Ability (MH-MA)* profile included students whose motivation and ability scores were higher than the previous profiles, and also higher than the median score for each indicator. Finally, a *High-Motivation and Ability (H-MA)* profile included students with scores near ceiling for self-efficacy indicators, and the highest scores on the LWS and in writing

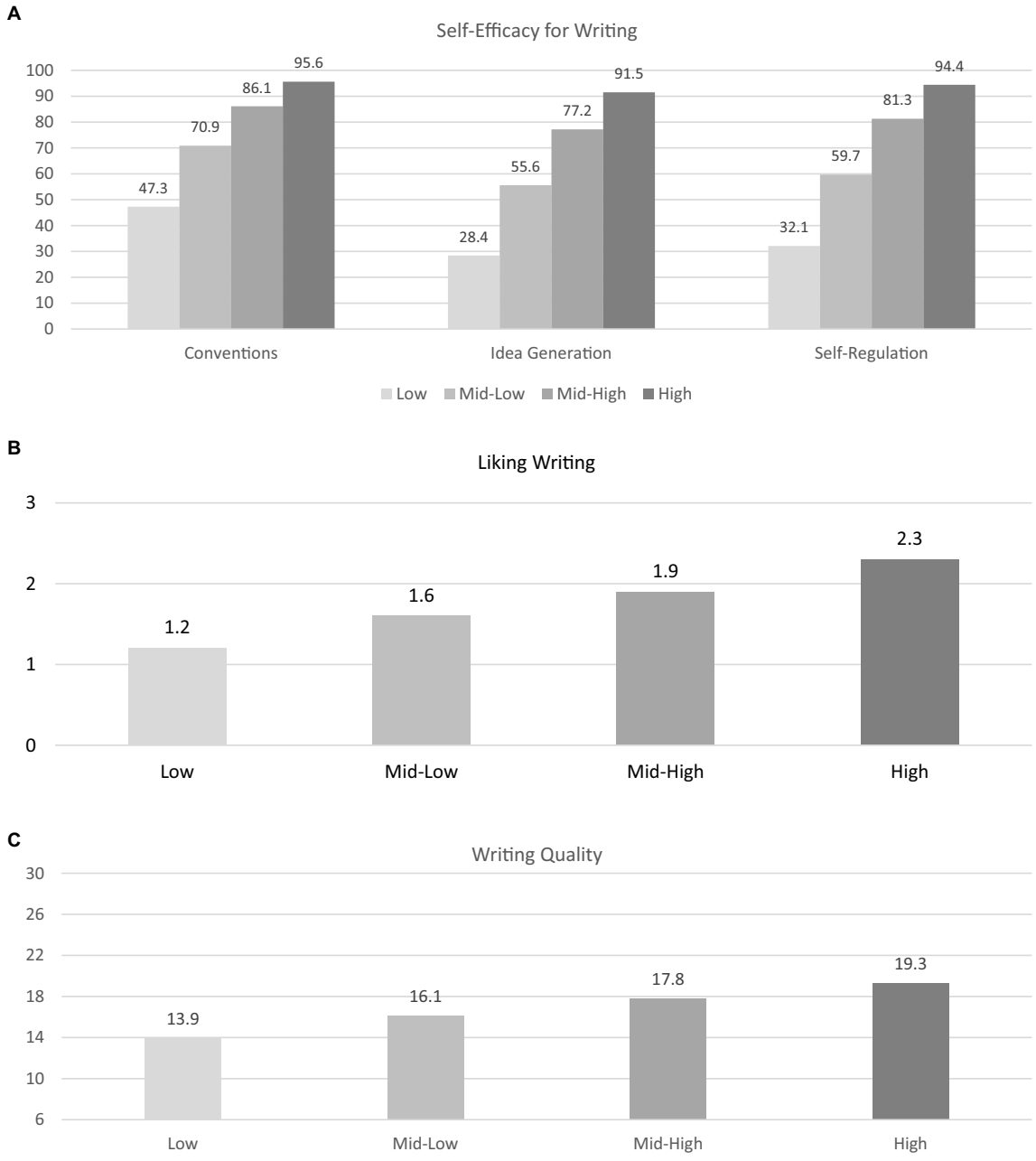

FIGURE 1
Profile means from the estimated model on **(A)** self-efficacy in writing, **(B)** liking writing, and **(C)** writing ability. *N*=2,487. Because of the differences in ranges and to facilitate interpretation, means are plotted separately for each scale. Ranges: self-efficacy for writing subscales (0–100), liking writing (0–3), writing ability as measured by the PEG overall score (6–30).

ability. Interestingly, students in the H-MA profile had writing ability scores only slightly above the median (i.e., 18 points within a range of 6–30).

Overall, most students started the school year in the LM-MA (38%) or MH-MA profiles (30.4%). The more extreme motivation and ability profiles included about a third of the sample, with students being more likely to start the school year in the L-MA profile (20.3%) than in the H-MA profile (11.3%). This distribution of students across profiles remained stable at the end of the school year, as indicated by the results of the invariance testing described next.

Indeed, we evaluated profile invariance across time points, treatment, and demographic groups by following the procedure described in Section 2.6.1. Table 5 shows BIC values for all profile invariance testing models. Changes in model fit as indicated by declining BIC values supported *distributional* invariance across time points. This suggests that the number of identified profiles, the profile means and variances, and the class probabilities (i.e., class sizes) remained stable across time points. Furthermore, invariance testing across treatment and demographic groups supported *dispersion* invariance, meaning the number of profiles, and profile means and

TABLE 5 BIC values for measurement invariance tests across time and demographic groups.

Predictor	Groups	Configural	Structural	Dispersion	Distributional
Time	Time 1 (pretest)	81865.85	81730.23	81590.70	**81571.30**
	Time 2 (posttest)	78776.82	78628.19	78554.24	**78539.48**
Intervention	Comparison	75534.66	75552.56	**75441.14**	75449.06
	Treatment	77101.87	77036.78	**76923.27**	76954.03
Gender	Male	73327.71	73312.15	**73196.93**	73216.27
	Female	78941.36	78914.70	**78792.69**	78807.83
Priority population	Non-priority	31459.11	31383.46	**31282.44**	31278.62
	Priority	120998.36	121051.11	**120934.29**	120972.87
Special education	General education	140167.01	140223.53	**140106.86**	140145.57
	Special education	11936.13	11872.16	**11829.68**	11822.39

The best-fitting solution (i.e., with the lowest BIC value) for each time point is in bold.

TABLE 6 Fit statistics of models comparing whether transition probabilities differed across groups.

	Free transition probabilities	Equal transition probabilities
Intervention group	155627.84	**155572.39**
Gender	155616.14	**155569.19**
Priority population	154692.03	**154645.94**
Special education status	153485.38	**153442.43**

The best-fitting solution (i.e., with the lowest BIC value) for each time point is in bold.

TABLE 7 Estimated latent transition probabilities across time points.

	Time 2 profile			
Time 1 profile	L-MA	LM-MA	MH-MA	H-MA
L-MA	0.549	0.390	0.059	0.002
LM-MA	0.085	0.568	0.318	0.029
MH-MA	0.018	0.163	0.597	0.223
H-MA	0.003	0.029	0.263	0.705

L-MA, Low-Motivation and Ability; LM-MA, Low/Mid-Motivation and Ability; MH-MA, Mid/High-Motivation and Ability; H-MA, High-Motivation and Ability.

variances were the same across treatment, gender, priority population, and special education groups. Although distributional invariance was not supported for demographic comparisons, that level of invariance was not desirable for our group invariance testing because the equality of class sizes is a highly restrictive assumption of little interest for researchers (Talley, 2020).

3.2. Latent transitions and predictors

The tests of transition probabilities by group showed no significant differences by assignment to intervention, gender, priority population status, or special education status. For each predictor, the model where transition probabilities were constrained to be equal across groups had lower BIC values and, therefore, fit better than a model with freely estimated transition probabilities (see Table 6). Given that the chosen predictors did not yield differences in transition probabilities, the transition probabilities described in this section approximately describe all students irrespective of their assignment to intervention, gender, priority population status, or special education status (see Table 7).

Overall, the most probable path was for students to remain in the motivation and ability profile where they started the school year. The most stable profile over time was the H-MA profile: 70.5% of students who started in this profile remained in it at the end of the school year. The other profiles were stable for approximately half of students (L-MA = 54.9%; LM-MA = 56.8%; MH-MA = 59.7%). For students in the L-MA, LM-MA, and MH-MA profiles, the next most probable transition was to move one profile higher. For example, approximately 30% of students in the L-MA profile moved to a LM-MA profile by the end of the school year.

The probabilities of students moving two or more profiles higher (e.g., from L-MA to MH-MA or to H-MA) were low (i.e., less than 6%) or extremely low (i.e., less than 1%), respectively. Approximately 26% of students in the H-MA profile dropped to the MH-MA profile, and only 16% of students in the MH-MA profile dropped to the LM-MA profile. Notably, the probabilities of students dropping to the L-MA profile were below 8% for all other profiles.

4. Discussion

The purpose of this investigation was to deepen the understanding of middle-school students' writing motivation and ability by identifying distinct profiles that could characterize the relations between these constructs during middle school. We focused on traditionally struggling writers and implemented our profiling strategy with a majority of Black and Hispanic/Latinx students who received FRL (National Center for Education Statistics, 2012). Furthermore, we investigated the invariance of these profiles over a school year and across various demographic groups (i.e., gender, priority population status, and special education status). After establishing profile invariance, we explored the differences in transition paths among profiles across a school year as a result of being assigned to an AWE intervention, and potential effects of gender, priority population status, and special education status.

4.1. Motivation and ability profiles of middle school students

Our study is the first to profile students based on writing motivation and ability during middle school. Notably, results from the LPA at both time points indicated four distinct profiles of writing motivation and ability: Low-, Low/Mid-, Mid/High-, and High-Motivation and Ability profiles. Consistent with prior research, the measures of self-efficacy, writing attitudes, and writing ability used in the profiling were strongly aligned with one another (Bruning et al., 2013; MacArthur et al., 2016; Camacho et al., 2021b). In other words, students with the highest levels of self-efficacy also liked writing the most and achieved the highest writing quality relative to other students in the sample. Therefore, the four profiles differed in terms of the level of each construct, but not the pattern of relations between the constructs as can occur with latent profiling (Johnson, 2021).

The profiles identified in this paper suggest that writing self-efficacy, attitudes, and ability are positively related. Previous studies have explored how writing self-efficacy and attitudes contribute to writing quality (e.g., Graham et al., 2019; Wijekumar et al., 2019; Camacho et al., 2021b), but no research to date had explored the relations among these constructs in a latent profiling strategy that allows them to change together and allows these interactions to change among groups of students. Therefore, our findings contribute to the ongoing debate about the multiple and distinct constructs under the umbrella term of writing motivation, and how these relate to one another and to writing performance (Abdel Latif, 2019). Moreover, our finding that all constructs have stable relations supports the idea that writing self-efficacy and attitudes may be reasonable constructs to target when aiming to improve students' writing performance. To elaborate on this finding, future research could include measures of other motivational constructs beyond self-efficacy and liking writing for building the profiles and ascertain whether motivation and attitudes remain as strongly linked within profiles as they were in the profiles identified in the present study. For example, it would be beneficial to use a comprehensive account of different writing motives, such as in the cluster analysis by Ng et al. (2022), that used the seven motives proposed by Graham et al. (2022): curiosity, involvement, grades, competition, emotion, boredom, or social recognition.

Our second research question assessed whether the identified profiles were applicable across demographic groups, but other studies using LPA have instead explored the effect of demographic variables on profile membership using students' most likely profile in a logistic regression (e.g., Troia et al., 2022). Nonetheless, this analytic procedure does not account for the classification error of the latent probabilities of being assigned to the other profiles in the model and can, therefore, yield biased model estimates (Bakk and Kuha, 2020). Given that our study assessed a slightly different question, and that we wanted to account for the classification error when exploring how the profiles looked like with various demographic groups, we opted to do a profile invariance analysis with several multigroup models (Muthén and Asparouhov, 2011; Morin and Litalien, 2017).

Results from our second research question indicated that the four identified profiles apply similarly to different demographic subgroups including gender, priority population status, and special education status. Previous profiling efforts identified particular writing ability profiles for at-risk students (e.g., Coker et al., 2018); thus, we hypothesized that motivation and ability profiles might differ across demographic groups. Our findings disproving differences in profiles imply that writing motivation and ability profiles using self-efficacy and attitudes toward writing measures look similar for boys and girls, priority and non-priority students, and special education and general education students at the middle school level. Thus, for purposes of screening students, our profiling strategy appears to be feasible and valid for wide application.

Moreover, we found that almost 40% of students started the school year in the Low-Mid profile (38%) or the Low profile (20.3%), which is consistent with prior LPA research conducted by Troia et al. (2022) with elementary school students. Taken together, these results unfortunately confirm the rather discouraging levels of writing motivation and ability among US students. However, profiling students within comprehensive and multidimensional models of writing that include measures of motivation and ability, and even cognitive processes or other beliefs, allows researchers and practitioners to have a better understanding of the starting point to intervene and, eventually, improve students' writing during in middle school.

4.2. Transition paths with and without predictors

To answer our third research question, we investigated the transition paths among profiles across a school year, first without including predictors (i.e., assignment to treatment and demographic predictors). Next, we included the predictors, but found that profiles were invariant and, thus, assignment to treatment and demographic characteristics did not influence how students transitioned across profiles in a school year.

Our finding that the most common path was for students to begin and end the school year in the same profile suggests students generally have stable writing motivation and ability within a school year. This transition path was especially prevalent for the H-MA students (70.5%), which is encouraging for students that start the year motivated and demonstrating strong writing abilities. However, these students are the minority: only 11.3% of students are in the H-MA profile at the beginning of the year.

Stability within profiles over the school year was slightly less common for students who began in the L-MA and L/M-MA profiles (54.9 and 56.8%, respectively). The next most probable path for these students was to improve slightly and move one profile up (approximately 30% of students transition in this path). While this suggests a trend of slight improvements, most students who start the year unmotivated and exhibiting weak writing skills retain these characteristics after a full year of instruction and additional aids (i.e., AWE intervention).

Taken together, these results present two challenges. First, the general stability of the high ability-motivation (H-MA) profile suggests that these students might lack room to grow in their motivation albeit they can improve in their writing ability. This highlights the need to design challenges to maintain students' motivation and improve their writing ability. Second, the general stability of the lower profiles reinforces the importance of developing interventions to offset the typical course of action, that is, students remain in their profile or worsen over time (as they advance through middle school and high school; Wright et al., 2020).

One such intervention could be using technology-based tools, like AWE, that provide students with more feedback on their writing abilities, and actionable steps to improve them. We investigated the effects of an AWE intervention using MI Write on transition paths; unfortunately, being assigned to receive this intervention did not change these paths. One reason for this might be the fact that our study was done in the context of an RCT, and in this paper we specifically evaluated whether assignment to treatment was impactful on motivation, not if adherence to treatment had an impact. However, it is reasonable that there is likely a threshold of AWE usage that is required before impacts on motivation and ability profiles are manifested. Future research should seek to identify this threshold. Also, additional research should be conducted with other technology-based writing interventions, such as intelligent tutoring systems (e.g., Wijekumar et al., 2022), to identify whether results are idiosyncratic to AWE or whether the motivational effects associated with such other interventions (Morphy and Graham, 2012) yield similar findings.

Secondly, and importantly, the intervention in this study did not incorporate explicit methods of improving writing motivation and was aimed primarily at improving writing ability through the provision of frequent, immediate, and informative automated feedback. Previous studies have suggested that AWE can support motivation (e.g., Moore and MacArthur, 2016; Wilson and Roscoe, 2020), but AWE by itself does not directly address motivation constructs (e.g., by providing feedback about attitudes or beliefs about writing). In contrast, other types of interventions that deliberately target writing motivation have shown some degree of positive results on writing motivation, for example self-regulated strategy development interventions, strategy instruction combined with a process approach, collaborative writing, creative writing, linguistic games, drama theater interventions, or interventions where teachers deliberately adopt motivation-enhancing strategies (see Camacho et al., 2021a for a review). Indeed, explicitly incorporating a goal-setting intervention with AWE has shown promise for improving adolescents' self-efficacy for self-regulation (Wilson et al., 2022). Our results prove that incidental motivational gains promised by AWE are not enough to create meaningful changes in motivational profiles. Hence, future intervention studies, especially those that focus on AWE, may benefit from adding components that specifically target writing motivation alongside components to improve writing ability.

4.3. Limitations and future directions

One limitation pertains to our participant sample and the demographic predictors used in the LPA. Participating schools in our study were exclusively those serving a high proportion of priority population students. While our findings based on this sample help to diversify current literature that has oversampled White, middle-to-high-income students, our priority vs. non-priority comparisons may not generalize to a different sample. Our findings are subject to similar limitations regarding special education status. Only 7% of our participants received special education services; therefore, a study with greater representation of students with disabilities would aid in understanding the motivation and ability profiles of these students.

The design employed as part of the present study has the strength of randomly assigning students to either an AWE intervention or to receive business-as-usual ELA instruction. Nonetheless, there were some limitations to consider when discussing our findings. First, the analyses in the present study focus on assignment to treatment and not necessarily on treatment itself. While we had specific usage guidelines and measures of fidelity of implementation, the limitations of teaching and collecting data during a global pandemic meant that some of the thresholds for fidelity were not met (see Wilson et al., 2023). Therefore, students in our sample received different dosages of the AWE intervention. Future studies should evaluate the impact of the intervention under different dosage conditions, as the nonsignificant effect of assignment to treatment found in this study might change when the dosage of treatment is considered. Results of our study should be interpreted akin to an intent-to-treat analysis (vs. a treatment-on-the-treated analysis), revealing the transition paths associated with *providing access to MI Write* but not necessarily indicating those paths that would be associated with different thresholds of MI Write usage.

Finally, the profiles of writing motivation and ability in our study are limited to a global measure of writing ability. This global measure was chosen to fit with the self-efficacy in writing and writing attitudes measures that asked students about their ideas about writing as a general process, and their skills as writers without specifying genres or processes. Previous studies have profiled students in writing ability using multiple detailed measures, for example spelling, grammar and semantics (Wakely et al., 2006); quality/length, spelling, mechanics, and syntax (Coker et al., 2018; Guo et al., 2018); and handwriting and typing fluency, punctuation, spelling, reading, vocabulary (Troia et al., 2022). Thus, future research on profiles of writing motivation and ability can be expanded to include detailed measures of writing ability, or even task- or genre-specific measures (see Troia et al., 2022) for a more comprehensive perspective on how motivation and ability relate in middle school students.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession

number(s) can be found below: https://osf.io/fgb7k/?view_only=953f94eab8674e7b9bb6be84d139a7d9.

Ethics statement

The studies involving human participants were reviewed and approved by Institutional Review Board University of Delaware. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

TC: conceptualization, methodology, writing - original draft, formal analysis, visualization, data curation. JW: conceptualization, methodology, writing - original draft, resources, supervision, funding acquisition. MM: writing - original draft, investigation. CP: software, resources, writing - review & editing, supervision, funding acquisition. HE and JC: project administration. AP: Investigation.

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Conflict of interest

CP, HE, and JC were employed by Measurement Incorporated.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The handling editor SG declared a shared affiliation with the author(s) AP at the time of review.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1196274/full#supplementary-material

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Self-efficacy for writing and written text quality of upper secondary students with and without reading difficulties

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Introduction: Self-efficacy for writing (SEW) and reading ability are some of several factors that may be related to the quality of written text that students produce. The aim of the current study was (1) to explore the variation in SEW and written text quality in L1-Swedish and L2-English among upper secondary students with different reading profiles in L1 (typical reading vs. reading difficulties) and with different study backgrounds (SB1year or SB2years = one or two years of studies of Swedish and English, respectively), and in the next step (2) to explore if individual variations in L1-reading and SEW may explain variation in written text quality.

Methods: Participants were 100 upper secondary students (aged 17–18) with different reading profiles operationalized as typical reading and reading difficulties. Data consisted of screening for word recognition and reading comprehension, text quality results from argumentative L1- and L2-writing tasks, school information on study background in Swedish/English, and students' responses from an online survey about SEW.

Results: As to SEW results, an ANOVA revealed significant main effects for reading profile and study background in L1, but in L2 there was only a significant main effect for reading profile. Written text quality results indicated that there was a significant interaction effect between reading profile and study background in L1, indicating that the significant main effect for reading profile on written text quality was influenced by the group of students with reading difficulties and SB1year. There was a significant main effect for reading profile and study background on written text quality in L2. Students with reading difficulties and SB1year were the most vulnerable group, and they had the lowest scores in L1/L2 SEW and written text quality in L1 and L2. Multiple regression results indicated that word recognition and SEW contributed significantly to L1-text quality, and word recognition, reading comprehension, and SEW contributed significantly to L2-text quality. Thus, this study sheds light on the under-researched area of L1/L2 SEW and text quality of students with reading difficulties at the level of upper secondary school.

Discussion: Pedagogical implications are discussed and highlight the need for writing instruction across subjects in upper secondary school and for extra writing support/scaffolding for students with reading difficulties and shorter study background in the language subjects L1 (Swedish) and L2 (English).

KEYWORDS

self-efficacy for writing, reading difficulties, written text quality, upper secondary school, argumentative writing, poor word recognition, poor reading comprehension, L1/L2

Introduction

There is a growing need for students to write well in L1 and L2 for participatory, educational, and professional purposes. In upper secondary school, students need to manage advanced levels of writing to be able to reach educational goals. Two factors that relate and contribute to writing performance are the writer's reading ability and self-efficacy for writing (SEW), which relates to their beliefs about their own capability to perform a writing task (Bruning et al., 2013; Shanahan, 2016; Graham, 2020). However, the reciprocal relationships between reading ability, SEW, and writing performance are complex, and research findings are somewhat unclear. SEW has been found to be a strong predictor of written text quality in several studies included in Camacho et al.'s (2021) systematic review, whereas others have observed no association between SEW and written text quality (De Smedt et al., 2018, 2023).

Students with learning difficulties, which often include aspects of reading difficulties, may have lower self-efficacy in several domains (including writing) than peers without such difficulties (Saracoglu et al., 1989; Hampton and Mason, 2003; Baird et al., 2009; Klassen, 2010; Ben-Naim et al., 2017). In turn, perceived self-efficacy may affect if these students see a task as a manageable challenge or an obstacle (Stagg et al., 2018; Zumbrunn et al., 2020; De Busk-Lane et al., 2023). Although some studies report that reading difficulties may affect students' SEW (Klassen, 2002a) and that students with reading difficulties have lower SEW than typical achievers (e.g., Slemon and Shafrir, 1997), other studies have found no difference between the two groups (Graham et al., 1993). In contrast, some research has suggested overly optimistic beliefs among students with reading difficulties (e.g., see Klassen's overviews, 2002a,b).

As regards reading ability and written text quality, reading and writing are closely and reciprocally connected (Graham, 2020), and reading is considered a key resource which supports the composition of written text (Hayes and Berninger, 2014; Connelly and Dockrell, 2016). Similarly, the shared knowledge theory (Shanahan, 2016) assumes that reading and writing draw on similar sources, and the two skills can be viewed as "two buildings built on a common foundation" (p. 195). In the same vein, past scholarship has indicated that students' reading difficulties may affect their writing performance in the sense that their reading difficulties may spill over on and compromise their writing (Berninger et al., 2008; Torrance et al., 2016; Kim, 2020). Several studies have revealed that students with word recognition difficulties and students with reading comprehension difficulties may struggle with L1 and L2 writing (Cragg and Nation, 2006; Herbert et al., 2020; Kormos, 2020; Graham et al., 2021; Sehlström et al., 2022). Although writing research is a burgeoning field of study, the writing of students with reading difficulties is under-researched (Berninger et al., 2008; Wengelin et al., 2014). Thus, there is a need to address this research gap, and, for instance, Graham et al. (2018a) "encourage writing researchers to include measures of reading in their studies" (p. 654). Especially at the level of upper secondary school, research is scarce.

To sum up, students with reading difficulties have been shown to have lower self-efficacy in many domains, but little is known about the SEW of upper secondary students with reading difficulties. Reading difficulties are of interest in this context as they may affect both SEW and written text quality, and SEW may, in turn, impact written text quality. Research findings are, however, not conclusive, and very little is known about the relationship between reading difficulties, SEW, and written text quality at the level of upper secondary school. Given the strong interconnection between reading and writing (Shanahan, 2016; Graham et al., 2018b; Kim, 2020) and the challenges that students with reading difficulties may face when writing (Graham et al., 2021), it is of particular interest to examine these students' SEW (Schunk, 2003). This information could then be utilized to inform instruction, and to facilitate students' reflections on their own writing, which is conducive to writing performance.

In this exploratory study, we investigate SEW and written text quality in Swedish (L1) and English (L2) in two groups of Swedish upper secondary students: one with typical reading and one with reading difficulties. To cater for the effect of length of study time and course complexity, study background in language subjects is included as a variable. Furthermore, we investigate how word recognition, reading comprehension, and SEW relate to written text quality in L1 and L2.

Theoretical and empirical background

Self-efficacy for writing and reading difficulties

The agentic and motivational concept of self-efficacy has been used in many fields to refer to metacognitive appraisals, which are domain-specific, future-oriented, and malleable (Klassen, 2002b; Botting et al., 2016; Schöber et al., 2018). Bandura (1997) conceptualizes self-efficacy as a person's beliefs about their capabilities to accomplish a task successfully. If an individual has a slightly higher self-efficacy than ability, they may approach a demanding task with the view that it is a challenge within reach of their ability, and they will consequently be motivated to invest more time and effort. However, if an individual's self-efficacy is low, they may regard the same assignment as something unachievable, which may result in making less effort or even giving up (Bandura, 1997; Carroll et al., 2009). On the other hand, too high self-efficacy in relation to ability may lead to an overestimation of one's capability and to a simplistic approach not acknowledging the complexity of a task, which, in turn, may render simplistic or lower results. According to Bruning and Kauffman (2016), a person's self-efficacy is shaped, among other things, by their experiences of performing a task successfully (enactive experiences), and by learning from observing others perform the same task (vicarious experiences). Also, emotional states, such as feeling good or anxious, and others' feedback, suggestions, and encouragement may influence levels of self-efficacy. Generally, the self-efficacy of young students with reading difficulties tends to be low in several domains (Saracoglu et al., 1989; Ingesson, 2007; Klassen and Lynch, 2007; Baird et al., 2009; Ben-Naim et al., 2017). Many students with reading difficulties find aspects of metacognition challenging and they may be unaware of the importance of reflecting on aspects of knowledge and their own learning process, which is a cornerstone in metacognition (Klassen, 2002a, 2008; Butler and Schnellert, 2015). In the domain of writing, self-efficacy refers to students' metacognitive perspectives and self-perceptions of their own writing ability. Some scholarship has found that students with reading difficulties tend to have lower self-efficacy for writing (SEW) than their typically achieving peers (Slemon and Shafrir, 1997), whereas other studies

have indicated no differences in SEW between the two groups (Graham et al., 1993). Findings have also suggested that students with learning difficulties, which often include reading difficulties, have overly optimistic beliefs about their writing (Klassen, 2002a, 2008). Klassen's (2002a) systematic review of students with learning difficulties and their SEW found that "five of six studies showed these students to overestimate their writing capabilities" (p. 97). A majority of participants were either younger students or university students.

The author states that there are several factors that underpin this unrealistic optimism. Firstly, self-efficacy is "construed as a form of metacognition" (Klassen, 2002a, p. 98). Students with learning difficulties often have problems with metacognition and metacognitive aspects of learning, which may partly be related to task misunderstandings and poor self-evaluation. Secondly, it is believed that these students have a more simplistic view of the actual writing process, whereas students without such difficulties have a more mature understanding of writing processes and task difficulty (Graham et al., 1993). Furthermore, responding to SEW tasks can be a challenge for students with learning difficulties as they have to process the statements and evaluate their own writing capacity in little time (Klassen, 2002a). Deficient estimation of SEW may lead to inappropriate strategies, faulty task understanding, and difficulties with self-regulating, including monitoring progress. Moreover, the findings of De Smedt et al. (2023) revealed that students who viewed writing as something innate and fixed, tended to eschew from revealing possible difficulties in writing, which, in turn, may be detrimental to their SEW.

Further, little is known about L2 SEW of students with reading and writing difficulties. Kormos and Nijakowska (2017) state that on top of "native language processing problems, students with specific learning difficulties often experience additional difficulties in acquiring additional languages […] Self-efficacy beliefs can have a powerful effect on both teachers' and students' actions and thoughts" (p. 31). Likewise, Ruegg (2018) discovered that strong SEW increases the chances of successful language learning and that structured teacher feedback on students' L2 (English) writing enhanced students' L2 writing self-efficacy. Leaving the specific focus on reading difficulties and SEW, we now turn to the reciprocal relationship between SEW and written text quality from a general perspective.

Self-efficacy for writing and written text quality

Being able to reflect on one's writing – strengths, challenges, self-regulation – is conducive to writing performance (Pajares, 2003; Knospe, 2017; Camacho et al., 2021). Previous research has revealed that SEW plays an important role for writing performance and written text quality (Shell et al., 1989; Pajares, 2003, 2007; Pajares et al., 2007a,b; Graham et al., 2018a; Camacho et al., 2021). Increased SEW is related to positive writing outcomes (Pajares et al., 2000; Bruning et al., 2013).

Past scholarship on SEW has mostly been undertaken by means of experimental studies, for example, interventions with pre- and posttests, or by means of correlational studies (Bruning and Kauffman, 2016). In one of the pioneering empirical studies looking into the relationships between SEW and performance, McCarthy et al. (1985) found that university students' SEW explained about 15% of the variance in their writing scores on expository tasks. The study focused on writing mechanics in terms of composing an essay with no major spelling mistakes or run-on sentences. Similarly, several other findings indicate that SEW predicts students' writing performance, including across grades (Shell et al., 1989; Pajares and Johnson, 1994; Pajares, 2003, 2007; Pajares et al., 2007b). In the same vein, Graham et al. (2018a) found that writing attitudes and SEW accounted for unique variation in text quality among their middle school students. The authors summarized what is known about the topic stating that SEW predicts individuals' writing performance when it comes to measures designed by researchers after controlling for other factors such as reading, motivational beliefs, gender, poverty, and language proficiency.

Regarding the educational levels that previous research has investigated, studies have mostly focused on younger students and university students. For instance, in Camacho et al.'s (2021) systematic review of published, peer-reviewed articles between 2000 and 2018 covering grades 1–12, only 7 out of 62 samples included lower secondary or upper secondary students. Among several factors, the authors focused on the relationship between SEW and writing performance. Findings indicated that most studies found positive associations between SEW and writing performance. The systematic review also focused on grade level differences, but results are inconsistent, with some findings suggesting a decline in SEW in adolescence, and other findings suggesting an increase in adolescents' SEW.

The early models for assessing SEW were unidimensional with only one factor catering for SEW, but later, Pajares (2007) conceived a two-factor model, which included basic skills and complex composition skills. More recently more fine-grained models have been designed (e.g., Bruning et al., 2013; Ekholm et al., 2015; Zumbrunn et al., 2016).

The influential self-efficacy for writing scale model of Bruning et al. (2013) included three non-hierarchical factors: (1) ideation, (2) writing conventions, and (3) self-regulation, i.e., management, monitoring, and evaluation. Henceforth, Bruning and colleagues' self-efficacy for writing scale is referred to as SEWS, whereas the construct of self-efficacy for writing is referred to as SEW. Employing SEWS, the authors' findings indicated that the three components of SEW – ideation, writing conventions, and self-regulation – were positively associated with text quality. In the same vein, meta-reviews have suggested that the three factors affect and account for variability in text quality in both L1 writing (Graham et al., 2018a; Camacho et al., 2021) and L2 writing (Sun et al., 2021). Many studies have employed Bruning et al.'s (2013) SEWS model. For instance, Soylu et al. (2017) found associations between SEW conventions and text quality in the form of American state assessment persuasive writing scores in an untimed writing session over a 2-day period regarding their upper secondary school sample. Zumbrunn et al.'s (2020) findings were similar for their mixed groups of elementary and lower secondary students, but the authors used an adapted version of SEWS. Associations have also been observed between SEW self-regulation and writing scores among Portuguese lower secondary students (Limpo and Alves, 2017), and between SEW content and text quality among Belgian upper elementary students (De Smedt et al., 2016). However, the latter study found no such relation between the other two factors and text quality. Similarly, the scores of Belgian students attending the academic track of upper secondary school revealed that there were no significant relations between students'

SEW and their argumentative text quality (De Smedt et al., 2023). However, writing is a complex activity, and De Smedt et al. (2023) reason that, in addition to SEW, other factors, such as language, basic writing skills, writing strategies, writing instruction and socio-economic status, may also contribute to text quality. As stated earlier, the studies under this subheading did not focus specifically on students with reading difficulties.

Less is known with respect to SEW in relation to L2 writing in English as a foreign language, especially as regards older students (Siekmann et al., 2023). Previous research has observed positive correlations between university students' SEW and their L2 writing performance, and that SEW impacted writing performance more in L2 than in L1 (Sun et al., 2021, 2022). In the same vein, SEW has been found to predict both accuracy and complexity in university students' narrative essays in L2 (Zabihi, 2018). Yet, findings are not conclusive (Siekmann et al., 2023), and, in terms of upper secondary students, research on these aspects is particularly scarce.

Scholarship also draws attention to the reciprocal aspects of self-efficacy perceptions and text quality (e.g., Pajares, 2007; Camacho et al., 2021). Pajares et al.'s (2000) study indicated that text quality contributed significantly to SEW. Similarly, Raoofi et al.'s (2017) group of university students with high writing proficiency had significantly higher SEW than the group with low-achieving peers. Thus, on the one hand, if a writer perceives writing as challenging, it is likely that their SEW is lower. On the other hand, making progress with one's writing is not only about making progress with one's writing skills and competence, but it is also about writing confidence. In other words, when facing a writing assignment, the perception of reality and one's ability to reflect on the task at hand can decide and enhance sustained achievement motivation (Bouffard-Bouchard et al., 1991). Consequently, aspects of writing skills as well as aspects of SEW go hand in hand and need to be taken into account in parallel when exploring the complex relation between SEW and writing performance. As there is a close relationship between reading and writing, reading difficulties and written text quality are expanded on below.

Reading difficulties and written text quality

With respect to the reciprocal reading – writing relationships, the shared knowledge theory (Shanahan, 2016) assumes that reading and writing draw on similar knowledge. Kim (2020) expanded this theory and developed the interactive dynamic literacy model which investigates the relation between reading and writing in greater detail. At the most basic level, Kim's model can be likened to an iceberg whose tip is writing (spelling/written text production) and reading (decoding/written text comprehension). Below the surface are shared underlying emergent literacy, language and cognitive skills which make lexical-level (spelling/decoding) and discourse-level literacy (written composition/reading comprehension) possible. To develop lexical-level literacy skills, it is of paramount importance to be able to establish correct phonological, orthographic, and morphological representations. In turn, these emergent literacy skills depend on the underlying components of phonological processing skills (Melby-Lervåg et al., 2012) and morphological awareness (Rastle, 2022). Developing discourse-level literacy skills, on the other hand, depends on underlying components such as higher-order cognition and regulation, including inference-making, monitoring, goal setting, self-assessment and self-reinforcement, as well as foundational language skills (vocabulary and grammar) and discourse-level oral language (connected language). To conclude, both lexical-level and discourse-level oral language with their underlying components are a prerequisite for successful reading and writing. However, if one or both break down, reading comprehension and written composition will be affected negatively. In other words, considering that, to a certain extent, it is the same underlying component skills that affect reading and writing, it is not unexpected that students with reading difficulties also struggle with writing.

Students with word recognition difficulties have been found to struggle with spelling and lexical-level processing (Sumner et al., 2014; Wengelin et al., 2014; Torrance et al., 2016). Spelling difficulties tax working memory, partly for lack of automation and partly for avoidance strategies involving altering sentences to eschew words that are difficult to spell. In turn, these avoidance strategies and lack of automation may result in fewer cognitive resources available for discourse-level processing, for example, planning, conceptual development, text organization, and lexical and grammatical complexity (Wengelin, 2007; Wengelin et al., 2014; Torrance et al., 2016; Hebert et al., 2018; Sumner and Connelly, 2020). However, the transparency of the orthography of a language moderates the effect of poor word recognition, and, for instance, in shallow orthographies, students learn to spell and decode earlier. In contrast, these spelling and decoding skills are learnt later in deep orthographies, e.g., English (Seymour et al., 2003), which then may impact "the development of higher level processes, such as meaning-making processes in reading and writing" (Wengelin and Arfé, 2017, p. 29). Moreover, word recognition difficulties can also make it difficult for students to read through the text-written-so-far and detect what needs to be revised, which may be detrimental to their text quality (cf. Hayes and Berninger, 2014).

Students with reading comprehension difficulties have challenges with various levels of language, for example, words, sentences, and discourse (connected language), which in turn may affect and compromise their writing performance. Researchers agree that poor reading comprehension may have a negative impact on written text quality (Herbert et al., 2020; Kim, 2020). More specifically, students with poor reading comprehension have difficulties primarily at discourse-level, in such areas as text organization, for example, coherence, cohesion, cohesive devices (Cox et al., 1990; Cragg and Nation, 2006; Carretti et al., 2013, 2016; Re and Carretti, 2016; Sehlström et al., 2022), and lexical and grammatical complexity and syntactic diversity (Carretti et al., 2013, 2016; Re and Carretti, 2016). Content and conceptual development may be affected too. As to spelling, this group's performance has almost been on a par with control groups (Cragg and Nation, 2006; Re and Carretti, 2016), but research has also found opposite results (Sehlström et al., 2022).

Writing in L2 adds an even greater cognitive challenge than writing in L1 for many students with reading difficulties (Kormos, 2012; Sehlström et al., 2022). Students with word recognition difficulties struggle with spelling due to lower automation levels of lexical-level skills. Deep orthographies, such as English, may take an extra toll on struggling spellers. Thus, these aspects may result in greater attention to formal aspects at the lexical-level at the expense of discourse-level processing (e.g., organization). Herbert et al. (2020) used the simple view of reading to define L1 and L2 groups with

typical reading, poor word recognition, and poor comprehension in grades 4–6. The reading assessment of the L2 group – whose L1 was Portuguese, Punjabi, Tamil, Urdu, Chinese, and Russian – was carried out in their L2 (English). The results revealed that poor spelling, weak coherence and cohesion, and less complex language constituted the L2 writing features of the students with poor word recognition in L2. Similar effects were found concerning the subgroup with poor reading comprehension in L2, for example, poor coherence and cohesion, and less complex language. With respect to students with reading comprehension difficulties, in a recent Swedish study (Sehlström et al., 2022), it was found that the written text quality scores in L2 (English) of Swedish upper secondary students with reading comprehension difficulties in L1 were significantly below those of their peers with typical reading development, and especially challenging areas were discourse-level aspects such as cohesion and language use. However, in contrast to previous studies, spelling was significantly lower compared to the spelling levels of peers with typical reading. On the whole, though, scholarship on the effect of poor word reading or poor reading comprehension on older students' L2 writing is scant (Herbert et al., 2020; Kormos, 2020; Sehlström et al., 2022).

To conclude, given that SEW is related to writing performance and that students with reading difficulties often are struggling writers, the relationship between reading ability and SEW is a fruitful avenue of investigation as both competence and confidence play a role in writing performance, especially in upper secondary school when reading and writing demands are high.

The current study

This study investigates the text quality in argumentative writing and SEW in L1 (Swedish) and L2 (English) of upper secondary students with and without reading difficulties in L1. A factor that needs to be taken into account when exploring writing performance, is that students in Swedish upper secondary schools may have varying study backgrounds in the language subjects Swedish and English – the primary school subjects for explicit teaching of reading and writing. In Sweden, after the nine-year compulsory school including nine and six years of studying Swedish and English respectively, most students go on to the non-compulsory three-year upper secondary school attending vocational or higher education preparatory programs. The number of years that students then study L1-Swedish and L2-English is partly determined by the study program they attend. Higher education preparatory programs include a minimum of two years of Swedish and English. Most vocational programs include one year of Swedish and English, although some vocational students may opt for a second year too. The courses Swedish 1 and English 5 are studied in year 1, whereas the courses Swedish 2 and English 6 are studied in the second year. In other words, students study Swedish and English either only during year 1 (most vocational programs) or during years 1 and 2 (some vocational programs and all higher education preparatory programs). Thus, second-year upper secondary students who are the focus sample of the current study may have different study backgrounds in Swedish and English. However, all students have at least studied Swedish and English for a year, and by doing so, they have all had practice in writing argumentative texts, which are in focus in year one in upper secondary school. To account for the possible impact of differences in course study time and course complexity, study background is included as a variable in the study.

Against the above backdrop, and, as reading is a major resource for writing (Hayes and Berninger, 2014; Shanahan, 2016; Kim, 2020), it is fruitful to explore the quality of texts written by students with reading difficulties. This is especially true if one considers that between 15 and 20% of the population may find it difficult to read and comprehend texts (International Dyslexia Association, 2020). Little is known about the text quality in argumentative L1 and L2 writing and SEW of upper secondary students with reading difficulties, in particular in relation to variations in study background in the language subjects in school. The aim of this study is (1) to explore the variation in written text quality and SEW in L1-Swedish and L2-English among upper secondary students with different reading profiles in L1 (typical reading vs. reading difficulties) and with different study backgrounds in language subjects, and in the next step (2) to explore if individual variations in L1-reading and SEW may explain variation in written text quality. The research questions read:

1. What are the effects of reading profile and study background in language subjects on written text quality and self-efficacy for writing in L1 and L2?
2. To what extent can word recognition, reading comprehension, and self-efficacy for writing explain variation in written text quality in L1 and L2?

Methods

Participants

Participants were recruited from an upper secondary school located in a rural area in Sweden. One hundred and fifty-nine students (aged 17–18) constituted the total sample, of whom 100 students had a complete dataset regarding this study's questions, reading, SEW, and text quality. The participants ($n = 100$) had Swedish as their first language. Fifty students were girls, and 50 students were boys. According to official statistics, the municipality's unemployment rate is similar to that of the nation, and the annual median income is slightly below the national level, whereas the rate of citizens with a degree from post-upper-secondary education is more than 10% below that of the nation (Ekonomifakta.se, 2021).

Students were screened for word recognition (Olofsson, 1998) and reading comprehension (Järpsten and Taube, 2018). Means and SDs from the norm-referenced manuals have been used when calculating z-scores. Based on the screening outcome, students were divided into two reading profiles – students with typical reading (TR, word recognition and reading comprehension: $z \geq -0.59$) and students with reading difficulties (RD, word recognition and/or reading comprehension: $z \leq -0.6$). After attrition, there were 67 participants in the TR group (girls: 36, boys: 31) and 33 participants in the RD group (girls: 14, boys: 19). Forty-eight students attended higher education preparatory programs (TR = 37; RD = 11) and 52 students were in vocational programs (TR = 32; RD = 20). Based on the time participants had studied Swedish and English in upper secondary

TABLE 1 Means, standard deviations, and two-way between-groups analyses of variance exploring the effect of reading profile and study background for reading measures in Swedish (L1) year 2.

	Typical reading Mean (SD)		Reading difficulties Mean (SD)		F (η_p^2)		
	SB1year	SB2years	SB1year	SB2years	Reading profile	Study background	Interaction
	n = 10	*n* = 57	*n* = 11	*n* = 22			
Word recognition (z)	0.10 (0.45)	0.33 (0.62)	−1.20 (0.87)	−0.85 (0.56)	61.41*** (0.390)	3.34 (0.034)	0.15 (0.002)
Reading comprehension (z)	0.42 (0.57)	0.59 (0.56)	−0.18 (0.84)	0.04 (0.95)	10.74** (0.102)	1.24 (0.013)	0.89 (0.000)

Significant effect at the $p < 0.01$ level. * Significant effect at the $p < 0.001$ level. SB1year, study background 1 year, Swedish and English in year 1 only; SB2years, study background 2 years, Swedish and English in years 1 and 2.

school, they were divided into two study background levels. Study background 1 year (SB1year) involves studies of Swedish and English in year one only, and study background 2 years (SB2years) indicates studies of Swedish and English during years 1 and 2. In Table 1, there is an overview of the participants in each reader subgroup, study background level and their reading scores in year 2.

Table 1 also presents a two-way between-groups analysis of variance to explore the impact of reading profile and study background on word recognition and reading comprehension in year 2. Since Levene's test of equality of error variance indicated that the variance of the dependent variables was not equally distributed (word recognition, $p = 0.018$; reading comprehension, $p = 0.043$), a more stringent significance level ($p < 0.01$) was set. As expected, there was a significant main effect for reading profile on word recognition [F (3, 96) = 61.41, $p < 0.001$] and reading comprehension [F (3, 95) = 10.74, $p = 0.001$]. However, there were no significant main effects for study background on word recognition [F (3, 96) = 3.34, $p < 0.07$] or reading comprehension [F (3, 95) = 1.24, $p = 0.27$] with only small effect sizes. The interaction effect between reading profile and study background was neither significant for word recognition ($p = 0.69$) nor for reading comprehension ($p = 0.89$).

Measures/materials

Word recognition in L1

Phonological decoding

Participants read triplets of pseudo-words silently and were then asked to mark the pseudo-word that sounded like a real word (Olofsson, 1998). The total number of correctly marked homophones within the time limit (2 min) was the total score.

Orthographic recognition

Participants read pairs of words silently (Olofsson, 1998). Each pair had one word that was spelled correctly, whereas the other one was a pseudo-homophone of the target word. The total number of correctly marked words within the time limit (2 min) made up the total score.

A composite measure of phonological decoding and orthographic recognition was used in this study with the internal validity 0.79 (Cronbach's alpha).

Reading comprehension in L1

Participants were asked to read silently three factual texts (Järpsten and Taube, 2018). After each text, there was a multiple-choice task that tapped different literal aspects of the text as well as inferential content. Students had thirty-five minutes to complete the task. The total score was the sum of correct answers (maximum 21 points).

Written text measures in L1 and L2

The conceptual and structural design of the writing assignments was inspired by the Swedish and English language national writing assessment tests, which are set as timed tasks. The national writing assessment tests follow the form of summative writing assignments and are performed individually without collaboration or support/aid. Students wrote one argumentative text in L1-Swedish and L2-English, respectively, on two occasions. Students were instructed to take a stand on a suggestion from the principal at their school: School days should start at 10:00 am and end at 5:30 pm, and mobile phones should be banned during the whole school day.

Written text quality was examined using a slightly adapted version of Jacobs et al.'s (1981) analytic rating system covering seven commonly used categories in writing research: content, organization, cohesion, vocabulary, language use, spelling, and punctuation. The scale used in this study involved, as in the original version, four bands from very poor to excellent: 1 (*very poor*), 2 (*poor to fair*), 3 (*average to good*) and 4 (*very good to excellent*). To cater for a more fine-grained rating approach, half-marks were also awarded (1.5, 2.5, and 3.5). Detailed criteria were used to separate each band (see Supplementary Table 1 or Sehlström et al., 2022 for more information). In this study, a composite measure based on the outcome of the seven categories constituted text quality, and the scale's internal consistency (Cronbach's alpha) of the composite measure was very good for both the L1 (0.98) and L2 (0.97) texts. The texts were scored by two research assistants who were trained and blind to students' reading profile and demographics. The interrater reliability was established through independent double-scoring of 20% of the texts. The intraclass correlation coefficients (ICC) were good for all seven aspects ranging from 0.76 to 0.92.

Self-efficacy for writing in L1 and L2

We measured participants' SEW by using Bruning et al.'s (2013) well-established self-efficacy for writing scale (SEWS), which includes three SEW factors: ideation, writing conventions, and self-regulation. Prompts and the 16 SEW statements are listed in Supplementary Table 2.

In line with much of past scholarship (Pajares et al., 2001; Bandura, 2006; Grenner et al., 2021; De Smedt et al., 2023), we employed a visual analog scale ranging from 0–100.

The original SEWS statements were translated into Swedish by the first author. To ensure the accuracy of the Swedish translation, the Swedish translation was translated back into English by a member of the research team (associate professor of English). Next, we piloted the Swedish version with eleven randomly chosen students and two teachers from a different upper secondary school in another municipality. The final version was adapted in accordance with pilot students'/teachers' ideas and suggestions, which also included improvements of the layout. In the current study, SEWS had good internal consistency as the Cronbach's alpha coefficient was 0.88 for SEWS in Swedish and 0.93 for SEWS in English. Students' composite score of the three factors was used to indicate level of SEW.

Procedure

The study was conducted in accordance with the Swedish Act relating to research involving humans (SFS 2003:460, 2003) and the ethics guidelines of the Swedish Research Council (Stafström, 2017). Prior to data collection, the school's principals and teachers gave their oral consent and students gave their written consent to participate in the study. Word recognition and reading comprehension were assessed in groups of 30–50 students during three separate sessions by a member of the research team or by a teacher at the school in the spring semester of the second year of their three-year voluntary upper secondary school program. Tasks that measured word recognition and reading comprehension were administered and scored according to the standard procedures in the manuals (Olofsson, 1998; Järpsten and Taube, 2018). The writing assignments were carried out in the form of two separate impromptu writing sessions at the students' school in groups of 30–50 students, also during their second year. Students wrote one of the argumentative assignments in Swedish and the other in English. The order of language and assignment was counterbalanced in a Latin square design. They had 45 min to write their texts using the Scriptlog keystroke-logging software (Frid et al., 2014) on their laptops. The process data have not been investigated in this study, but they have been examined in other studies. No spelling aids or dictionaries were allowed. Three weeks after their last writing session, students filled in the web survey about self-efficacy for L1- and L2-writing.

Data analyses

A two-way between groups ANOVA was used to explore the effects of reading profile (typical reading vs. reading difficulties) and study background (1 year of Swedish/English vs. 2 years of Swedish/English) on written text quality and self-efficacy in L1 and L2 (RQ1). Analyses of skewness revealed values between −0.41 and −0.96 for the dependent measures in the ANOVA. No extreme outliers were identified in the boxplots. Levene's test for the dependent measures was non-significant, all p-values >0.29, indicating equal variance across groups for all the dependent measures. The significance value was set at $p < 0.05$ for all comparisons. Effect sizes for the ANOVA are reported as partial eta squared (η_p^2; small effect = 0.01, medium effect = 0.06 and large effect = 0.138, Cohen, 1988).

Multiple regression analysis was used to explore to what extent word recognition, reading comprehension and self-efficacy for writing can explain variation in written text quality in L1 and L2 (RQ2). No extreme outliers were identified in the boxplots among the dependent or independent variables. The significance value was set at $p < 0.05$.

Results

The effects of reading profile in L1 and study background on L1 text quality and SEW

The descriptive statistics for text quality and self-efficacy for writing in L1 and the results of the two-way between-groups ANOVA are presented in Table 2.

Generally, students with SB1year scored lower in text quality than peers with SB2years, and SB1year-students with RD received the lowest text quality scores of all groups. There was a significant interaction effect ($p = 0.004$) between reading profile and study background in Swedish, indicating that the main effects for reading profile [F (1, 95) = 10.79, $p = 0.001$] and study background [F (1, 95) = 40.16, $p < 0.001$] were influenced by the group of students with reading difficulties and study background 1 (see Figure 1).

As to SEW, the general pattern is that students' level of reading skills plays a role for their SEW, as does study background; SB1year-students with RD had the lowest score of all groups. More specifically, there were no significant interaction effects ($p = 0.07$) between reading profile and study background in relation to writing self-efficacy. There was a statistically significant main effect for reading profile [F (1, 96) = 7.22, $p = 0.008$] and for study background [F (1, 96) = 6.75, $p = 0.011$] with medium effect sizes (partial eta squared: reading profile = 0.070; study background = 0.066) (see Figure 2).

The effects of reading profile in L1 and study background on L2 text quality and SEW

Table 3 shows the descriptive statistics for text quality and self-efficacy for writing in L2 and the results of the two-way between-groups ANOVA.

A general observation is that both groups with SB2years performed better than their peers with SB1year when it comes to L2-text quality. The lowest text quality scores of all groups were observed in the SB1year-group with RD. There were no statistically significant interaction effects between reading profile and study backgrounds for text quality ($p = 0.717$) and writing self-efficacy ($p = 0.208$). There was a statistically significant main effect for reading profile [F (1, 92) = 13.77, $p < 0.001$] and study background [F (1, 92) = 19.40, $p < 0.001$] with large effect sizes (partial eta squared: reading profile = 0.13; study background = 0.17). A visualization of L2-text quality scores can be seen in Figure 3.

For writing self-efficacy, the global picture indicates the highest scores among both groups with typical reading regardless of study background, followed by the two SB1year-groups. As can be seen in Figure 4, writing

TABLE 2 Means, standard deviations, and two-way between-groups analyses of variance exploring the effect of reading profile and study background on written text quality and self-efficacy for writing in Swedish (L1).

	Typical reading Mean (SD)		Reading difficulties Mean (SD)		F (η_p^2)		
	SB1year	SB2years	SB1year	SB2years	Reading profile	Study background	Interaction
	$n = 10$	$n = 56$	$n = 11$	$n = 22$			
Text quality	2.12 (0.68)	2.58 (0.54)	1.28 (0.52)	2.54 (0.45)	10.79** (0.102)	40.16*** (0.297)	8.52** (0.082)
Writing self-efficacy	61.36 (14.29)	65.63 (21.62)	35.76 (24.38)	60.84 (26.14)	7.22** (0.070)	6.75* (0.066)	3.39 (0.034)

*Significant effect at the $p < 0.05$ level. **Significant effect at the $p < 0.01$ level. ***Significant effect at the $p < 0.001$ level. SB1year, study background 1 year, Swedish and English in year 1 only; SB2years, study background 2 years, Swedish and English in years 1 and 2.

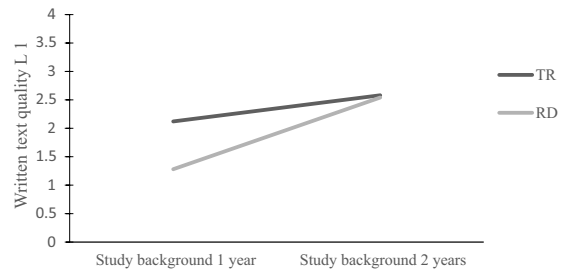

FIGURE 1
Written text quality in L1 for students with different reading profiles and study backgrounds in language subjects.

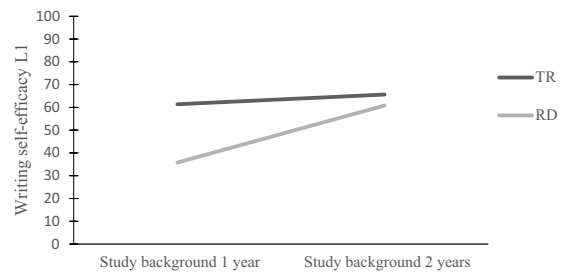

FIGURE 2
Self-efficacy for writing in L1 for students with different reading profiles and study backgrounds in language subjects.

self-efficacy was lowest for the SB1-group with RD. There was a significant main effect for reading profile [F (1, 96) = 7.38, p = 0.008], with medium effect size (partial eta squared = 0.07), but there was no main effect for study background [F (1, 96) = 2.01, p = 0.160].

Relations between reading skills, SEW, and text quality in L1 and L2

Table 4 shows to what degree variation in text quality in L1 and L2 can be explained by word recognition, reading comprehension, and SEW. The total variance in text quality in L1-writing explained by the model was 25%, F (3, 94) = 11.81, $p < 0.001$. The individual predictors were examined further and indicated that word recognition ($p = 0.010$) and writing self-efficacy ($p = 0.002$) were the only significant predictors of text quality in argumentative L1-writing.

The total variance in text quality in L2-writing explained by the model was 47%, F (3, 91) = 29.10, $p < 0.001$. The individual predictors were examined further and indicated that word recognition, reading comprehension, and writing self-efficacy all contributed significantly ($p < 0.001$) to the quality in argumentative L2-writing.

Discussion

In the current study, research question 1 focused on exploring the effect of reading profile (reading difficulties, RD vs. typical reading, TR) and study background (SB1year vs. SB2years) in Swedish (L1) and English (L2) on the outcome variables written text quality and self-efficacy for writing (SEW) in Swedish and English. Research question 2 focused on testing if a model that included word recognition (L1), reading comprehension (L1), and SEW (L1/L2) as predictor variables, reached significance in explaining the variance in written text quality in argumentative tasks in Swedish and English.

Reading profile and study background effects on written text quality in L1 and L2

In regard to L1 and L2 written text quality, the general picture is that all four subgroups produced texts within the lower bands (very poor or poor to fair) regardless of reading profile and study background. Students with typical reading and two years of study background in Swedish and English in upper secondary school (SB2years) performed best among the subgroups. However, there were also individual variations within the groups, and although the group means were relatively low, there were individuals performing well. These findings indicate that argumentative writing was challenging for most students in the study and findings are in line with previous research (Ferretti and Lewis, 2013; Traga Philippakos and MacArthur, 2020). In the same vein, educational statistics (National Center for Education Statistics, 2012) have revealed low scores for the majority of upper secondary students' argumentative texts in American large-scale assessments. Landrieu et al. (2022) conclude that the "argumentative writing proficiency of students appears to be highly substandard" (p. 2). However, the global picture apart, there are interesting group differences that are worth scrutinizing.

Zooming in on L1 text quality, the group with reading difficulties and SB2years performed on a par with the group with typical reading and the same study background. This suggests that reading difficulties may not imply extra challenges in writing for those

TABLE 3 Means, standard deviations, and two-way between-groups analyses of variance exploring the effect of reading profile and study background on written text quality and self-efficacy for writing in English (L2).

	Typical reading Mean (SD)		Reading difficulties Mean (SD)		F (η_p^2)		
	SB1year	SB2years	SB1year	SB2years	Reading profile	Study background	Interaction
	$n = 10$	$n = 54$	$n = 11$	$n = 21$			
Text quality	2.22 (0.54)	2.85 (0.58)	1.58 (0.74)	2.33 (0.68)	13.77*** (0.130)	19.40*** (0.174)	0.13 (0.001)
Writing self-efficacy	59.11 (16.72)	60.05 (24.70)	33.83 (24.32)	50.86 (29.46)	7.38** (0.071)	2.01 (0.021)	1.61 (0.016)

**Significant effect at the $p < 0.01$ level. ***Significant effect at the $p < 0.001$ level. SB1year = study background 1 year, Swedish and English in year 1 only; SB2years = study background 2 years, Swedish and English in years 1 and 2.

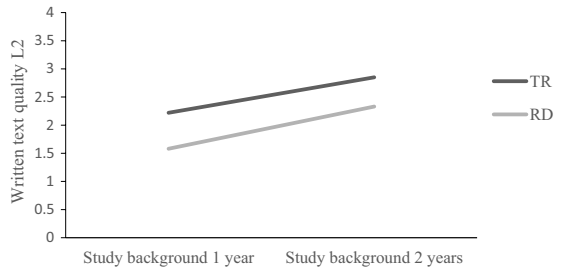

FIGURE 3
Written text quality in L2 for students with different reading profiles and study backgrounds in language subjects.

students who opt for a second year of studying Swedish and English in upper secondary school. In contrast, students with RD and SB1year in Swedish and English had significantly lower text quality compared with peers with TR and the same study background. Thus, in the group with SB1year, reading difficulties seem to tax text quality severely (cf. Figure 1 where interaction effects were observed). It is difficult to pinpoint what this difference between SB1year and SB2years depends on in relation to the students with reading difficulties. The results are probably due to a combination of reading difficulties and study program effects. Past research (Westman, 2009; Sturm, 2016) and statistics of national assessments in writing (SNAE, 2017a,b) indicate that students attending vocational programs find writing challenging, and so do students with reading difficulties (Graham et al., 2021). For instance, significant differences have been found in text quality between groups with reading difficulties and controls (Cragg and Nation, 2006; Carretti et al., 2013; Torrance et al., 2016). These studies have indicated that students with reading difficulties often struggle with coherence, cohesion, content, and mechanics, apart from writing texts of lower linguistic complexity when it comes to grammar and vocabulary (Wengelin, 2007; Carretti et al., 2013; Wengelin et al., 2014; Torrance et al., 2016; Sumner and Connelly, 2020). Previous studies have been carried out in elementary school (Carretti et al., 2013), lower secondary or upper secondary school (Wengelin et al., 2014; Torrance et al., 2016), or at university level/adults (Wengelin, 2007; Sumner and Connelly, 2020). Our study adds to the extant literature by showing that there may be an interaction between reading difficulties and study background at the level of upper secondary school. This interaction may then have the concomitant effect of reading difficulties making writing more challenging for students attending a vocational program with fewer courses in language subjects.

Regarding L2-English written text quality, there was a main effect for reading profile as well as for study background with no significant interaction effects. In other words, reading difficulties imply greater difficulties in writing a good text compared with peers with typical reading. Moreover, students with SB2years wrote better texts compared with students with SB1year (see also Figure 3). These findings are consistent with previous research, which has revealed that writing in L2 is challenging for students with reading difficulties identified in L1 or L2 (Herbert et al., 2020; Levlin et al., 2022; Sehlström et al., 2022). The study design of the earlier-mentioned studies varied in several aspects regarding age group, genre, and if reading difficulties were identified in L1 or L2. For example, Herbert et al. (2020) focused on students identified with reading difficulties in their L2 and students in grades 4–6, while Levlin et al. (2022) focused on students with reading difficulties in L1 and long-term effects on reading and writing in L2. In Levlin et al. (2022), students identified with reading difficulties in L1 in early elementary school performed low scores in the L2-writing part of the national assessment test in grade 9. In another study by Sehlström et al. (2022), it was found that upper secondary students with reading comprehension difficulties in L1 scored significantly below peers with TR in such categories as cohesion, language use, and spelling when writing in L2. The current study adds to previous studies by confirming that L2 writing continues to be challenging for students with reading difficulties in upper secondary school, and this is also the case for students attending higher education preparatory programs with more courses in language subjects.

There may be several reasons for students with reading difficulties in L1 having challenges with L2-writing. First, writing in an L2 adds an extra cognitive strain, by putting a greater load on working memory (Kormos, 2012), and this will probably take a heavy toll on students with reading difficulties since limited capacity in working memory is quite common (see overview in Cain (2022)). Second, many of these students have linguistic difficulties in L1 related to vocabulary, grammar, and discourse (connected language) (see overview in Cain (2022)), which in turn may impact translation of ideas into language in both L1 and L2 writing (Sehlström et al., 2022). Writing in L2 implies that the translation process may lead to having to translate from L1 into L2 too. It will then vary between individuals how challenging the translation process will be as it may depend on their linguistic experience in L2 (Lindgren et al., 2008). Third, spelling is another challenge for many students with reading difficulties. English is a very opaque orthography – more so than Swedish. This fact may

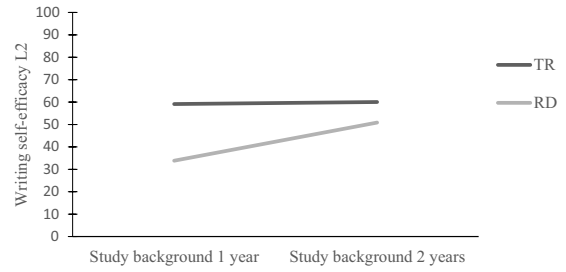

FIGURE 4
Self-efficacy for writing in L2 for students with different reading profiles and study backgrounds in language subjects.

TABLE 4 Regressions predicting written text quality in Swedish (L1) and English (L2).

	Beta	*t*	*P*	*F*	df	*p*	adj.R^2
Written text quality in L1							
Overall model				11.81	3,94	<0.001	0.25
Word recognition in L1	0.25	2.67	0.010				
Reading comprehension in L1	0.15	1.58	0.117				
Writing self-efficacy in L1	0.30	3.13	0.002				
Written text quality in L2							
Overall model				29.10	3,91	<0.001	0.47
Word recognition in L1	0.32	3.92	<0.001				
Reading comprehension in L1	0.35	4.32	<0.001				
Writing self-efficacy in L2	0.28	3.50	<0.001				

accentuate the secondary effects of spelling difficulties making students focus on lexical-level processing and missing out on global aspects such as discourse-level processing (e.g., coherence). In the current study, the students with reading difficulties had to a greater extent poor word recognition rather than poor reading comprehension at a group level. Thus, it can be deduced that aspects of the lexical-level skills may have been particularly challenging for many of the participants.

There was also a main effect for study background in relation to text quality in L1 and L2. Students with SB1year performed below students with SB2years, regardless of reading profile (see Figures 1, 3). One factor could be differences in time on task between the two study backgrounds, as more time on task is generally conducive to written text quality (Wengelin and Arfé, 2017). Students with SB1year had not studied Swedish and English during their second year when they wrote their essays – in contrast to the students with SB2years. All students with SB1year attended vocational programs. National statistics evidence that many upper secondary students struggle with L1 and L2 writing and especially so students in vocational programs. In the 2017 national assessment tests in Swedish and English, 16% of students failed to meet the knowledge requirements for writing in Swedish, and the corresponding figure for English was 7% (SNAE, 2017a,b). Failure rate specifically for vocational programs was 28% for writing in Swedish and 15% for writing in English. Thus, it is no surprise that students with SB1year had the lowest writing performance. Consequently, this group is the most vulnerable when it comes to L1 and L2 writing.

Another explanatory factor could be that self-selection and tactical choices are at work here (Edvardsson and Bruce, 2023). For instance, some students with reading difficulties may have avoided programs that include Swedish and English in year 2, whereas others may have opted for Swedish and English years 1 and 2 despite their reading difficulties due to better coping strategies. There may be many factors which affect the choice of study program, and it is difficult to express any certainty about the different factors that may have influenced students' choices in the current study. Students with reading difficulties and SB2years had basically similar reading levels as their RD-peers with SB1year. However, we do know that, for instance, SES-factors and parents' educational background may influence individuals' study choices (Korat and Schiff, 2005; Watson et al., 2016; Gil et al., 2019). These aspects were not possible to explore on an individual level in this study as no such data were available.

Reading profile and study background effects on self-efficacy for writing in L1 and L2

Since self-efficacy for writing (SEW) has been found to be related to writing performance (Pajares, 2003; Bruning et al., 2013; Graham et al., 2018b) and there is scarce knowledge about how reading difficulties may relate to SEW, our study also explored the effect of reading ability on students' SEW. The results revealed that reading profile in L1 had a significant main effect on SEW in both languages. Furthermore, study background had a significant main effect on SEW in L1 but not in L2. In other words, how long students had studied Swedish and English played a role for their SEW in L1 but not for their SEW in L2 in the current study.

Past research has indicated that adult university students with reading difficulties have lower self-efficacy than peers without such difficulties (Slemon and Shafrir, 1997; Stagg et al., 2018). The current study confirms the same SEW-patterns among upper secondary students with reading difficulties. Low SEW-scores in both L1 and L2 of our upper secondary students with reading difficulties, can also be seen in light of older students developing and deepening their skills in understanding and analyzing the complexity of tasks and skills, as opposed to younger students' generally strong self-efficacy with little differentiation between tasks (Klassen, 2002a; Pajares, 2007; Muenks et al., 2018; Grenner, 2021). Furthermore, the students with reading difficulties in L1 were challenged in their writing in both L1 and L2, and that may be reflected in a decreased SEW in L1 and L2. Some previous studies have found that students with learning difficulties overestimate their SEW (Graham and Harris, 1989a,b; Klassen, 2002a,b, 2008). However, the current study does not confirm that pattern. The differences in outcome may be due to a focus on younger students in previous studies (Graham and Harris, 1989a,b; Klassen, 2002a,b, 2008).

Our investigation also sheds light on the effect of study background in language subjects on SEW. The SB1year-group with reading difficulties had the lowest scores on SEW in L1 (approaching significant interaction effects, see Figure 2) and in L2. This outcome

suggests that these students have particularly low confidence in performing writing tasks. This group's low SEW is in line with their very low text quality results. Thus, reading difficulties in combination with little time on task and writing instruction are an unfortunate combination in terms of SEW and written text quality.

One explanation for the study background effects in L1 could be self-selection related to other factors than reading and writing performance. We did not find that the students with reading difficulties and SB1year had greater reading difficulties than their peers in the SB2years group (see Table 1). We cannot be certain about cause and effect as SEW and writing performance work reciprocally (Pajares et al., 2000; Camacho et al., 2021). For instance, we do not know whether SB1year-students with reading difficulties in the first place chose their programs and subjects because of low SEW or because of low reading and writing performance. The relatively higher L1 SEW estimation of the SB2year-group with reading difficulties may be related to students' time on task. It is reasonable to believe that their literacy studies (Swedish and English) in the second year have enhanced both their writing and metacognitive skills. The result could also be related to higher SEW from the beginning, before applying to upper secondary school. To conclude, our findings suggest that reading difficulties in combination with attending an upper secondary school program with little focus on language subjects are related to lower L1 SEW. With respect to L2, reading profile in L1 was related to SEW in L2. Once again, however, the group with the combination of study background one and reading difficulties was the most vulnerable group in terms of having the lowest confidence in writing in L2 (see Figure 4).

Factors explaining the variance in written text quality in L1 and L2

As to L1 written text quality, a regression model including word recognition, reading comprehension, and SEW explained in total 25% of the variation in text quality, with SEW and word recognition contributing significantly. This is in line with several of previous studies revealing an association between SEW and written text quality (De Smedt et al., 2016; Limpo and Alves, 2017; Soylu et al., 2017; Zumbrunn et al., 2020), albeit findings not being conclusive (De Smedt et al., 2018, 2023). Our results are also congruous with past scholarship which has suggested associations between lower-level transcription skills and written text quality (Graham and Santangelo, 2014; Limpo et al., 2017). It is well known that lexical-level skills may influence overall text quality (Berninger et al., 2002; Dockrell, 2009; Limpo and Alves, 2013; Sumner et al., 2014; Hebert et al., 2018; Kim, 2020) in elementary grades when spelling and word recognition are not yet automatized. The current study suggests that lexical-level skills (word reading) relate to general written text quality also at the level of upper secondary school even in a semi-transparent orthography as Swedish. This is probably due to the complex interaction between word recognition and spelling, and word recognition influencing overall text quality through spelling. As Kim (2020) describes in the interactive dynamic literacy model there is a strong association between reading and spelling on the lexical-level. For instance, underlying phonological processing skills are at work when reading and writing. Reading involves decoding words' phonological identity from written words, while writing involves encoding phonological information into written words. In addition, levels of word recognition proficiency may also have secondary effects on written text quality, by influencing the process of reviewing and revising the text-written-so-far (cf. Hayes and Berninger, 2014).

Contrary to the little research that exists (Cragg and Nation, 2006; Carretti et al., 2013), we observed little association between reading comprehension and written text quality in L1. This was not an expected outcome, since writing an argumentative task demands quite advanced vocabulary, grammar and discourse-level processing, as does reading comprehension (Kim, 2020). There may be several reasons for reading comprehension not contributing to text quality in the current study. It could be that the argumentative task did not require our students to engage in reading complex source materials, which might have added an extra cognitive load taxing reading comprehension. It could also be that the tasks focused on fairly everyday matters of a less complex nature demanding fewer aspects for ideational development, which, in turn, may have led to students not having to manage and use complex concepts and grammar.

With respect to L2-English written text quality, a regression model including word recognition (L1), reading comprehension (L1) and SEW (L2) explained in total 47% of the variation in text quality. Word recognition, reading comprehension and SEW contributed significantly to written text quality. Thus, reading comprehension in L1 proved to be significant for the variation in text quality in English, but not in Swedish. One likely explanation for this difference is the combination of the extra cognitive load that L2-writing involves and the cognitively taxing argumentative genre, which puts high demands on rhetorics when it comes to text organization and linguistic complexity, particularly so in a foreign language. These two aspects may explain why the comprehension component is important in this context. More specifically, although one would expect these aspects to impact Swedish (L1) text quality too, it is an even greater challenge to tackle these aspects successfully in L2 as students also have to translate their ideas into linguistic content in L2 (Lindgren et al., 2008). Thus, one can compare with Kim's (2020) model explained earlier and the interaction between reading and writing at the discourse-level.

To conclude, the findings of the current study indicate there is an association between reading in L1 and L1 and L2 text quality, which in turn lends support to and corroborates the shared knowledge theory (Shanahan, 2016) and Kim's (2020) interactive dynamic literacy model mentioned earlier. Both these theoretical frameworks assume that reading and writing share the same underlying linguistic proficiency. Phonological processing skills affect both word reading and spelling on a lexical level, and oral language and higher order cognitive skills affect reading and writing on a discourse level. Further, universal text attributes such as knowledge about characteristics of text, genre and rhetorics, may affect both reading and writing on discourse-level. Especially in upper secondary school, there are greater demands on language and higher order skills which may put constraints on writing performance on discourse-level. At this advanced level, students' writing is more concerned with the more complex knowledge-transforming instead of the more basic knowledge-telling (Bereiter and Scardamalia, 1987).

When it comes to SEW, the current results are consistent with past studies, which have indicated a relationship between SEW and written text quality (Pajares et al., 2007b; Bruning et al., 2013; Zumbrunn et al., 2020). In the same vein, Villalón et al. (2015)

state that SEW predicts high schoolers' writing performance more consistently than other motivational factors (writing apprehension, perceived value of writing) or self-belief (academic self-concept). However, earlier studies have used a wide range of measures for high schoolers' text quality (i.e., the outcome measure) in relation to SEW: (1) self-reported writing grades and statewide writing assessment scores (Bruning et al., 2013), (2) language arts teachers' estimation (rating) of students writing competence (Pajares et al., 2007b), and (3) high schoolers' ELA grades (Zumbrunn et al., 2020). The latter authors call for more studies that include scored samples of students' writing performance. Our study addresses the research gap and reveals that SEW also contributes to L1 written argumentative text quality also if text quality is based on manually scored samples at the level of upper secondary school. In regard to SEW in L2, few studies have investigated the relation between SEW and writing performance in L2. The little research that exists has mostly focused on younger students or university students and has found significant correlations between L2 SEW and L2 writing performance (Sun et al., 2021, 2022). Our findings contribute to the field by revealing associations between SEW and text quality in L2 also at the level of upper secondary school.

Limitations and future research

The interpretation of the results should be seen in light of a few limitations. First, our students wrote one argumentative task in Swedish (L1) and English (L2). Several tasks in the same genre in the same language would have allowed for greater generalizable claims (van Steendam et al., 2012). Thus, future research would benefit from heeding this advice, if possible. However, one has to bear in mind that writing several tasks may lead to fatigue for a special population that may find it burdensome to write. Thus, the risk for writing fatigue was the reason for our methodological decision to have students write one text in each language. Also, we did not want to intrude on students' timetable too much. Second, we did not have any information on how much writing instruction students received and the instructional context, which is a factor that relates to performance. Consequently, future studies should include information on writing instruction too. Third, as students' literacy contexts/habits influence their reading and writing, it would be fruitful to include contextual aspects such as students' reading and writing habits in relation to students' written text quality and SEW in future writing research. Fourth, in our study, students were not allowed to use any aids when writing their texts. Past research has shown that appropriate assistive technology may enhance the self-efficacy of students with reading and writing difficulties (Rousseau et al., 2017; Camacho et al., 2021). Thus, it would be of interest to investigate the effect of technological aids on upper secondary students' SEW and text quality by using an intervention study design.

Conclusion

A central finding is the especially weak text quality in L1 and L2 of students with reading difficulties and only one year of studies in upper secondary school in the language subjects Swedish and English. Reading plays a role for both L1 and L2 writing performance and covaries with study background. In other words, both reading ability and how long one had studied Swedish and English affected the outcome. Regarding L1-SEW, both reading profile and study background affected the outcome, while L2-SEW was affected only by reading profile. Word recognition was a significant predictor of L1 text quality, whereas both word recognition and reading comprehension were significant predictors of L2 text quality. SEW contributed significantly to written text quality in both L1 and L2. Thus, overall findings suggest lending support to the assumption that reading is a resource for writing (cf. Hayes and Berninger, 2014), and to the theoretical frameworks of the shared knowledge theory (Shanahan, 2016) and the interactive dynamic literacy model (Kim, 2020), which assume that reading and writing share the same underlying proficiency.

Our results highlight the need to give extra writing support/scaffolding in L1 and L2 to students with reading difficulties (especially with study background one year in language subjects in vocational programs). Considering the importance of writing for educational attainment at this level, the overall poor outcome of argumentative text quality regardless of reader subgroup underscores the need to give coherent form to writing instruction in all subjects across the curriculum in upper secondary school.

As it is of interest for teachers to understand students' own views of their writing challenges for feedback and feedforward, students' SEW reports can be used in writing instruction to improve the quality of such feedback/feedforward by teachers (or by peers). In other words, students' own SEW statements can help students put their own thoughts about their writing into words, which can help teachers identify each individual's perceived writing strengths and challenges (ideation, writing conventions, self-regulation etc.) and consequently give students appropriate and effective support/scaffolding. This approach may then also facilitate students' reflections on their writing and meta-discussions about writing in the school context, as it may enhance/scaffold students' own meta-language to talk about their writing.

Data availability statement

The datasets presented in this article are not readily available because of ethical considerations. Requests to access the datasets should be directed to the corresponding author.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1231817/full#supplementary-material

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Understanding the interplay between text quality, writing self-efficacy and writing anxiety in learners with and without migration background

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Writing presents considerable challenges to students' motivation. Yet there is a dearth of studies assessing the role of affect and motivation in writing performance for students with migration backgrounds (MB), who often underachieve in writing. Our study addressed this research gap by investigating the interplay between writing self-efficacy, writing anxiety, and text quality in 208 secondary students with and without MB using Response Surface Analyses. The data showed comparable levels of self-efficacy and, notably, lower writing anxiety levels among students with MB despite lower writing achievements. In the full sample, we observed positive correlations between self-efficacy and text quality and negative correlations between writing anxiety and text quality. When modeling efficacy and anxiety measures and their interplay to predict text quality, self-efficacy measures continued to account for statistically detectable unique variance in text quality, whereas writing anxiety did not. However, students with MB demonstrated differing interplay patterns, with less efficacious students with MB showing positive relations between writing anxiety and text quality.

KEYWORDS

writing, self-efficacy, anxiety, migration background, student beliefs and values, L2 learners, response surface analyses

1. Introduction

Writing is key for participating in political and societal discourses (Peltzer et al., 2022), succeeding in school (Graham and Perin, 2007), or finding adequate employment in the work sector (National Commission on Writing, 2004; Cellier et al., 2007; Aschliman, 2016). Yet, many teenagers struggle with writing comprehensive texts and fail to reach a satisfactory level of writing proficiency (e.g., National Commission on Writing, 2004). Writing can be particularly demanding for students with migration backgrounds (MB), some of whom may be writing in a second language (L2), which is arguably "one of the most challenging aspects of second language learning" (Hyland, 2003, p. xiii).

Students with MB, albeit by no means a homogenous group, often share a familial history of a migration experience, are more likely to be affected by poverty (OECD, 2010), and generally experience less favorable conditions for language development in the language of school instruction, particularly when that language is not spoken at home (Cummins, 2000; Kempert et al., 2016). In the United States, the National Commission on Writing warned that unless more attention is paid to writing

development, students from minority groups and English-language learners may be confined to "low-skill, low-wage, hourly employment" (National Commission on Writing, 2004, p. 19). This warning should also be taken seriously in European societies. Although writing attainment is not measured in large-scale assessments such as PISA, comparatively lower educational attainment in literacy of students with MB compared to students without MB have been amply documented in European countries (Baumert et al., 2006; Stanat and Christensen, 2006; OECD, 2010; Marx and Stanat, 2012; Ohinata and van Ours, 2012). Furthermore, studies focusing on writing reveal achievement disparities between students with and without MB and between first language (L1) and L2 writers (Silva, 1993; Neumann and Lehmann, 2008; Babayiğit, 2015).

Students' struggles with writing may not only be related to the cognitive challenges posed by writing *per se* but also to ensuing affective- and motivational states and lack of confidence (Bruning and Kauffman, 2016). Research suggests that minority learners often suffer from low writing self-efficacy beliefs or even writing apprehension (Pajares, 1996, 2003). Yet research exploring the relationship between affective-motivational aspects of writing and writing performance is scarce (Camacho et al., 2021), and researchers have paid little attention to students at-risk in writing, including students with MB. Addressing this critical gap in the literature, our study was designed to examine patterns of interplay between text quality, writing self-efficacy, and writing anxiety in students with and without MB. We draw on data from a larger feedback intervention project revealing that secondary students experience difficulties with establishing deep-level features in writing, such as text structure and coherence (Siekmann et al., 2022; Müller and Busse, 2023). In the current study, we were particularly interested in investigating the associated role of writing self-efficacy and anxiety as possible antecedents of writing performance prior to the intervention.

2. Theoretical background

2.1. Motivation, writing self-efficacy, and writing anxiety

Although the multidimensional concept of motivation has been defined in different ways, most motivational research concerns the direction and magnitude of (learning) behavior. Thereby addressing not only the question of why students choose to do something but also how long they persist and how much effort they expand on the activity (Dörnyei and Ushioda, 2011). Writing is a complex and cognitively demanding activity with high demands on working memory (Hayes and Flower, 1986; see also Kellogg, 1994; Kim, 2020); it takes sustained effort and years of practice to master it (Kellogg, 2008, 2018). Due to its cognitively challenging and time-consuming nature, it creates unique motivational challenges for many students (Bruning and Horn, 2000; Boscolo and Gelati, 2019; Camacho et al., 2021). Gaining a better understanding of the interplay between students' writing performance in relation to their motivational beliefs and emotional reactions to writing can provide needed insights into how writing operates and develops, and thus has the potential to inform writing practices.

While early cognitive models of writing neglected the role of motivation and affect (Hayes and Flower, 1986; Bereiter and Scardamalia, 1987), subsequent models of writing (Hayes, 1996; Graham, 2018) have justly acknowledged the essential role of motivational and affective variables for learners' task engagement and writing performance. Motivational beliefs are amenable to change and can be stimulated or curbed by external factors (e.g., the social and learning environment) as well as internal influences, which includes the constellation of beliefs writers hold in their long-term memory (for an overview of different beliefs affecting writing see also Graham et al., 2021).

The WWC (writer(s)-within-community) model (Graham, 2018), which provided the theoretical underpinnings for the current investigation, proposed that the contexts (i.e., communities) in which writing is undertaken and learned, as well as the cognitive capabilities, resources, beliefs, and affective reactions of students in these contexts shape and bound students' writing development. Motivational beliefs (e.g., self-efficacy, motives for writing, evaluations about the value and utility of writing, and judgments about why one is or is not successful) and emotional reactions (such as anxiety or apprehension) influence whether students engage in writing, how much effort they put forth, and the composing actions they undertake. Simultaneously, emotional and affective reactions to writing moderate writers' use of needed resources from long-term memory (including motivational beliefs) as well as the control and production processes involved in creating text. Further, motivational beliefs and emotions can act as antecedents or consequences to each other. For instance, students who are successful writers within a community are likely to become more efficacious about their writing, making them less anxious about writing. Anxiety in turn can negatively impact the writing process, eroding students' efficacy as writers. As a result, motivational beliefs and emotional reactions to writing cannot only influence each other, but also the text writers produce.

According to the WWC model, writers' motivational beliefs as well as their emotional and affective reactions toward writing are influenced by the varying communities in which they learn to write and their experiences as writers over time. Not only writing, but also motivational beliefs and emotional reactions to writing may therefore differ between students with and without MB. Firstly, students with MB may be subjected to different social, cultural, or historical circumstances which shape their writing experiences (e.g., writing is a tool for self-expression in one's culture and for educating one's mind in another culture, Graham, 2018). Secondly, many students with MB in countries like Germany are affected by poverty (Stanat and Christensen, 2006), which is likely to influence their literacy experience in general. Thirdly, students with MB in the first generation may have learned to write (at least in part) in communities that differ from those of non-migrant students and have less experience writing in the language of instruction (German in the current study).

As noted earlier, the writing motivational beliefs of focus in the present study was self-efficacy, which may be defined as context-specific capability beliefs regarding task performance (Bandura, 1997). Thus, writing self-efficacy beliefs relate to capability beliefs regarding communication via writing and mastering writing tasks (Klassen, 2002; Pajares, 2003). In contrast to self-concept in writing, self-efficacy is usually assessed at a skill–or task-specific level and must be carefully matched with respective writing assessment, as students may neither feel equally efficacious across different writing tasks (Pajares, 2003), nor across different stages of the writing process (Bruning et al., 2013).

According to social cognitive theory (Bandura, 1986, 1997), self-efficacy plays a vital role in the arousal of student anxiety, i.e., anxiety, which may embody apprehension but also avoidance behavior, is assumed to stem from the confidence with which individuals address (learning) activities. Consequently, it is assumed that individuals only experience anxiety when they feel inefficacious (Bandura, 1997). However, to date, research on self-efficacy and anxiety is limited in the writing domain. A

recent review on writing motivation (Camacho et al., 2021) identified 82 studies involving 24 motivational constructs, which were in almost one-half of the cases unclearly defined or not defined at all. Most studies focused on elementary students while middle school ($n = 14$) and high school students ($n = 7$) received less attention. Predominant in this review were studies on self-efficacy ($n = 37$), with very few studies investigating anxiety ($n = 2$). At the high school level (addressed in this study), only one study included measures of anxiety and self-efficacy. Collie et al. (2016) reported a small and negative correlation ($r = -0.17$) between the writing anxiety of boys and their efficacy. They further indicated that positive factors like efficacy were positively correlated to writing-related outcomes, whereas anxiety was negatively related. However, outcome variables did not involve actual writing tasks.

A study by Paul et al. (2021) found that writing efficacy mediated the association between writing anxiety and students' reported use of revision strategies for high school students who had average scores on measures of achievement goal orientation. Their findings were consistent with the theoretical position that writing anxiety depletes students' efficacy for writing, which is beneficial for triggering the use of self-regulation strategies in writing. This mediational effect was not found, however, for students who scored either low or high on all achievement goal orientation measures in writing. Further research is needed, particularly with adolescents, as writing becomes increasingly demanding in secondary school, and writing more extensive texts requires adequate planning, revising, and self-regulation strategies (Graham and Harris, 2000).

Existing research has shown that low motivation and debilitating motivational beliefs are common even among more mature writers, particularly among language learners and/ or learners from minority groups. For instance, studies have reported low writing motivation among Hong Kong L2 learners in secondary school (Lee et al., 2018); declining writing motivation among English learners from grades three to eight in the United States (Graham et al., 2021); declining self-efficacy from fifth to ninth grade in English learners in Singapore (Yeung et al., 2011), low writing self-efficacy and apprehensive feelings about writing in English-speaking Hispanic minority students entering high school in the United States (Pajares and Johnson, 1996; Pajares, 2003); and even low writing self-efficacy among high-achieving first-year university L2 learners in England (Busse, 2013).

While studies systematically exploring learner group differences in writing self-efficacy are scarce, fewer look at writing anxiety. It is well known, however, that some students suffer from apprehension unique to written communication which may even cause them to avoid writing courses and prefer occupations that are perceived as requiring little writing (Daly and Miller, 1975). Writing can be particularly anxiety provoking when conducted in a less familiar language, even for rather proficient language learners due to its inherent challenges to the learner's identity (Horwitz, 2000). When learners express themselves in a language they are less familiar with, they can feel vulnerable and scared of appearing less competent than usual (Noels, 2009; Taylor et al., 2012).

2.2. Relationship between writing self-efficacy, writing anxiety, and writing outcomes

It can be assumed that self-efficacy mediates the effect of other influences such as aptitude (Bandura, 1986), and studies have consistently shown positive relationships between self-efficacy and achievement in general (Multon et al., 1991; Brown et al., 2008; Honicke and Broadbent, 2016) as well as writing self-efficacy and writing performance in particular (Klassen, 2002; Pajares, 2003; Camacho et al., 2021). Additionally, regression analyses suggest that self-efficacy is one of the strongest motivational predictors of writing performance (Camacho et al., 2021).

Studies have further shown that writing anxiety is negatively related to the ability to carry out the writing process successfully and to performance on various measures of writing proficiency or skills (for an overview of early studies see Cheng, 2002; see also Richmond and Dickson-Markman, 1985). However, several variables affect the relationship between anxiety and writing performance (Cheng, 2002). Early evidence suggests that anxiety may be detrimental when writing narrative-descriptive topics involving feelings (Faigley et al., 1981), but such relations tend to disappear in argumentative essays where students who are high in apprehension and low in apprehension achieve similar results (Faigley et al., 1981; Madigan et al., 1996). Other studies further supported the contention that the effect of apprehension tends to disappear when self-efficacy was controlled (Pajares et al., 1999; for an overview see Pajares, 2003), providing some support for the argument that anxiety results from a lack of confidence (Bandura, 1997). However, recent data on writing self-efficacy, writing anxiety, and writing performance is notably lacking, especially for high school students where actual measures of writing performance were not administered (i.e., Collie et al., 2016; Paul et al., 2021).

Additional investigations examining the relationships between efficacy, anxiety, and writing performance are necessary because these linkages are not yet fully understood. We provide two examples to illustrate the diverse connections that may exist between efficacy, anxiety, and performance. One, the potential of self-efficacy to reduce the deleterious effects of anxiety (Paul et al., 2021) may not be realized for some students because they overestimate their writing capabilities (Graham and Harris, 1989; Graham et al., 1993). This can occur for a variety of reasons, including misperceptions by students of the demands of writing, inability to accurately assess their own capabilities, or purposefully overestimating capabilities for protective reasons (Bandura and Schunk, 1981). Whatever the cause, an inflated sense of efficacy is not likely powerful enough to fully constrain all of the negative effects of anxiety. Two, while excessive anxiety can inhibit students' performance on academic tasks (Pekrun and Stephens, 2012), moderate or normal levels of anxiety can be beneficial if it induces greater arousal or an optimal use of cognitive resources (Paul et al., 2021). Consequently, writing anxiety has the potential to enhance students' writing performance if it is experienced as eustress, even for students who are less confident about their writing capabilities.

2.3. The role of students' migration backgrounds in the relationship between self-efficacy, anxiety, and achievement

Self-efficacy beliefs are strongly influenced by personal accomplishments or mastery experience (Bandura, 1997). Lower levels of self-efficacy are likely to be evident among students with MB, as writing achievements are typically lower among these students, particularly those not speaking the language of instruction at home (for evidence from Germany, see Neumann, 2014, 2017; Müller and Busse, 2023). Yet, self-efficacy is vital for overcoming obstacles when

working on challenging tasks (Bandura, 1997). Particular challenges can arise for students with MB from insufficient language fluency which slows down retrieval of content from long-term memory, which is necessary for higher level thinking processes required for writing (Abu-Rabia, 2003; Weigle, 2005; Galbraith, 2009).

It is further likely that the extent to which self-efficacy is related to writing achievement for students with MB can vary as a function of different writing outcomes. In line with this assumption, a recent meta-analysis found the relationship between writing self-efficacy and writing achievement was stronger in L2 ($r = 0.441$) than in L1 ($r = 0.233$) learners (Sun et al., 2021). However, this study mostly focused on self-efficacy for writing when learning English as a foreign language (EFL), and the reported associations may not hold for students with MB or those learning a language other than English because self-beliefs and motivations may well be different for these students (Busse, 2017; Dörnyei and Al-Hoorie, 2017).

In contrast to findings with L2 students, research on academic self-efficacy and academic outcomes with migrant students in the United States have produced mixed results. For instance, a study with Hispanic students in the United States failed to detect a relationship between self-efficacy and grade point average (Niehaus et al., 2011), although self-efficacy was a significant predictor of math achievement and school attendance. In another study with Latino college students, self-efficacy only predicted college performance in second-generation immigrants, not first-generation immigrants (Aguayo et al., 2011). A systematic review of Latino youth in the United States by Manzano-Sanchez et al. (2018) reported that significant relationships are usually not found between self-efficacy and academic attainment for first-generation immigrants.

It is known that there are some cross-cultural differences regarding self-efficacy, including higher instances of self-efficacy in Latinos and lower ones in the self-efficacy of persons of Asian descent (Scholz et al., 2002). A logical extension of these findings is that the relationship between self-efficacy and educational attainment can differ according to cultural background (Brown and Lent, 2006). Even so, mixed results in studies comparing persons with heterogenous language levels may arguably also be linked to different language-levels of first- and second-generation migrants and to the use of different measurement instruments, as more global measures of self-efficacy may not be as useful to capture the relationship between self-efficacy and attainment (Brown and Lent, 2006; Manzano-Sanchez et al., 2018; see also Pajares, 2003).

In literacy research, studies have further reported disjunctions between self-efficacy and performance. For instance, minority students often show higher self-efficacy for reading than their peers but significantly lower achievement (Hornstra et al., 2013; Schöber, 2017). Furthermore, a study with secondary students in Germany revealed that academic self-efficacy did not predict attainment in reading and mathematics in students with MB, as opposed to students without MB (McElvany et al., 2018). Comparable data for writing self-efficacy is unavailable, but mismatches between generally positive writing self-efficacy beliefs and weak writing performance have been observed with low-proficient EFL writers in secondary school (Siekmann et al., 2023) as well as with minority children in primary school (Graham et al., 2005). One may thus assume that students with lower proficiency and/ or students with MB are not always able to assess their capabilities accurately (Graham and Harris, 1989).

Similarly, we could not identify studies on writing anxiety in students with MB. However, it has long been recognized that writing anxiety, particularly fear of making language mistakes, can impact writing achievement in language learners (Horwitz et al., 1986; Cheng, 2002). While decreasing writing anxiety in language learners should lead to better writing performance (Balta, 2018), prior investigations have produced mixed findings regarding the relationship between L2 writing anxiety and L2 writing performance (for an overview of early research see Cheng, 2002). Some studies failed to obtain a significant relationship between writing performance and writing anxiety (e.g., Lee, 2005), whereas writing anxiety positively predicted performance on writing tasks among L2 learners in other investigations (Payant et al., 2019). Contradictory findings could be due to ethnolinguistically diverse samples, but also to the use of different measures to assess anxiety and writing performance. Of particular importance to the present study, Cheng (2004), found negative correlations with the willingness to take writing courses, writing motivation, writing self-efficacy, and writing performance in L2 learners when using a measurement based on three subcomponents of writing anxiety (somatic, cognitive, and avoidance behavior). Her assessments for writing anxiety were employed in the current study.

Regarding the relationship between self-efficacy, anxiety, and achievement, another study with L2 learners (Woodrow, 2011) similarly showed that students with a higher level of self-efficacy tend to have lower writing anxiety levels. Yet, self-efficacy mediated the relation between writing anxiety and writing performance (Paul et al., 2021), which would align with social cognitive theory (Bandura, 1986, 1997) and tie in with non-language learners' results (Pajares, 2003). However, studies conducted to date concentrate on foreign language learners, whereas research on students with MB is notably missing.

3. The present study

The overall aim of the larger research project from which this study was derived was to support less proficient writers in composing full texts. In a previous study, we found that students with MB showed significantly lower achievement when writing in German, both in argumentative and instructional texts (Müller and Busse, 2023). In the current study, we focused our attention on these writing outcomes in German and extended this previous work by examining two motivational variables as key antecedents of writing performance. More specifically, we examined differences between students with and without MB in writing self-efficacy and writing anxiety, and the interplay between these two variables and text quality. Hence, we addressed the following research questions:

RQ1: Are there differences in writing self-efficacy and writing anxiety levels between students with and without migration background?

Findings regarding self-efficacy in students with MB are mixed. However, based on the tenets of the WWC model of writing (Graham, 2018, discussed earlier) and lower competence levels revealed in our previous study (Müller and Busse, 2023), we predicted that students with MB would evidence lower self-efficacy (H1a) in both self-efficacy scales (self-efficacy for establishing *structure and coherence* and self-efficacy for *evaluating and revising*) and higher writing anxiety (H1b) than students without MB.

RQ2: Are writing self-efficacy and writing anxiety predictors of text quality?

First, we examined bivariate relationships and hypothesized a positive relationship between the writing self-efficacy scales and text quality (H2a) and a negative relationship between writing anxiety and text quality (H2b) when the full sample is considered. Second, we investigated multivariate relationships of self-efficacy and anxiety for the full sample as well as their interplay when predicting text quality. We expected that writing self-efficacy would positively predict text quality (H2c), while the relationship between writing anxiety and text quality should disappear when self-efficacy is controlled for (H2d). Our predictions were based on the predicted value of efficacy for enhancing students' writing, as well as prior research showing that the effect of apprehension tends to disappear when self-efficacy is controlled for (Pajares et al., 1999; see also Pajares, 2003), and that writing efficacy can mediate the effects of anxiety on writing (Woodrow, 2011; Paul et al., 2021). Additionally, we wanted to shed light on the in-depth patterns of the interplay of both self-efficacy and anxiety when predicting text quality in order to explain possible changes in main effects in a multivariate model.

RQ3: Are there differences in the patters of writing self-efficacy and writing anxiety as predictors of text quality for children with and without migration backgrounds?

Finally, we examined multivariate relationships of self-efficacy and writing anxiety as well as their interplay when predicting text quality for students with and without MB separately but did not put forward a hypothesis regarding possible differences. Although stronger relationships between self-efficacy and writing outcomes in L2 learners than in L1 learners have been observed (see the meta-analysis by Sun et al., 2021), studies often fail to detect a relationship between self-efficacy and achievement in students with MB (see the systematic review by Manzano-Sanchez et al., 2018). Writing anxiety is usually negatively related to L2 writing performance (Cheng, 2002) but has also been observed to be a positive predictor of L2 writing (Payant et al., 2019). We did not make any predictions given the general scarcity of studies involving students with MB and writing achievement measures and the inconclusive evidence from existing studies.

4. Methods

4.1. Design and participants

The study was part of a larger writing feedback intervention project in Germany focusing on adolescents in lower and middle-performance track schools. These schools usually have large numbers of less proficient writers (see also Müller and Busse, 2023). For this article, we examined pre-intervention data and conducted a cross-sectional study drawing on a sample of 208 students in German classes in Year 9 ($M_{age} = 14.03$, SD_{age} 0.75; $n_{girls} = 91$, $n_{boys} = 112$). About half of the sample had migration backgrounds (first- and second- generation; see Table 1 for information on student characteristics), and about half of the sample either speaks German and another language or exclusively other languages than German at home.

4.2. Procedure and instruments

Data collection took place in early 2020. We assessed writing self-efficacy for establishing *structure and coherence* as well as self-efficacy for *evaluating and revising*. These measures were adapted from a scale by Busse (2013). A writing anxiety scale administered at the same time was adapted from a scale by Cheng (2004). All scales were based on a six-point Likert scale ranging from 1 (not true at all) to 6 (very much true) and showed satisfactory Cronbach's Alpha above 0.80 for the samples of students in this investigation (see Appendix 1).

Text quality was assessed by analyzing *structure* and *coherence* in an argumentative and an instructional text ($N = 415$ texts) written by students: For the argumentative text, we used an independent writing task from the TOEFL iBT® writing assessment, which was publicly available on the TOEFL website and was used in previous studies to assess students' writing competence (e.g., Fleckenstein et al., 2020). With this task, students were presented with a statement that they could agree or disagree with: "A teacher's ability to get along well with students is more important than excellent knowledge of the subject." When writing their response, students were asked to give reasons to support their opinion. For the instructional text, a prompt from a large-scale study of multilingual language development was administered (MEZ-project, e.g., Klinger et al., 2019), which had been adapted from an instrument developed for writing instructional texts (Reich et al., 2009). With this task, students had to write an article with instructions on how to build a gingerbread house and were provided with nine photographs showing them how to do this. Both of the writing tasks were consistent with curricular expectations for writing in Year 9 in German schools (KMK, 2004). All tasks and instructions were provided in German; texts were assessed according to structure and coherence. This focus draws on findings that structure and coherence are key aspects of text quality (e.g., Plakans and Gebril, 2017). The instrument to assess text structure and coherence in the present study was described in detail in previous works (Siekmann et al., 2022; Müller and Busse, 2023). Students could obtain a

TABLE 1 Sample characteristics.

	N	%
Gender		
Female	91	44.2
Male	112	54.4
Migration background		
Without	98	48.0
With	106	52.0
Family languages		
German	110	53.1
German and others	67	32.4
Other than German	30	14.5
Place of birth		
Germany	180	81.8
Other than Germany	28	12.7

Due to individual missing data, some subgroups do not add up to the total sample size of $N = 208$.

theoretical maximum of 17 points of which 8 points were administered for structure (for dividing the text into introduction, main body, and conclusion with relevant content and paragraph breaks) and 9 points were administered for coherence (for consistently referencing a thesis statement throughout the text, for providing ideas supported by appropriate explanations, and for logical connecting words).

4.3. Data analyses

This study used an existing sample, but *a posteriori* power analysis set at 90% power, with a 5% significance level, and a conservative small effect size ($f^2 = 0.15$) was conducted to determine minimal samples of students needed for this study. The outcomes of the power analysis revealed a minimum sample size of 70 participants for RQ1, 88 participants for RQ2 and 59 participants for RQ3, which were all smaller than the sample included in this investigation thus indicating sufficient power. All effect sizes will be presented using the standardized regression coefficient β and will be interpreted according to Funder and Ozer (2019), such that an effect between $0.05 < |\beta| < 0.2$ is interpreted as small, an effect between $0.2 \leq |\beta| < 0.3$ is interpreted as medium, and an effect $|\beta| \geq 0.3$ is interpreted as large. All models were computed using maximum likelihood estimation. Statistical analyses were conducted with R Studio (version 1.1.463; R Core Team, 2018) using the *tidyverse* packages (Wickham et al., 2019) for data management and cleaning. Multilevel mixed-effects models (i.e., multilevel correlations and multilevel *t*-tests) were run using *lme4* package (Bates et al., 2015) and response surface analyses were run using the *RSA* package (Schönbrodt and Humberg, 2021).

To investigate RQ1 with the hypothesis that students with MB would evidence lower self-efficacy (H1a) and higher writing anxiety (H1b) than students without MB, we conducted multilevel *t*-tests with students (level 1) nested in classes (level 2) to determine if there were significant differences in self-efficacy for *evaluating and revising*, in self-efficacy for *establishing structure and coherence* or in writing anxiety between students with and without MB. Means and standard deviations or standard errors will be presented for both groups as well as an effect size as standardized regression coefficient β for each variable.

To answer RQ2 multiple models were applied. First, we hypothesized positive bivariate relationships between text quality and self-efficacy for *evaluating and revising* (H2a), text quality and self-efficacy for *establishing structure and coherence* (H2a), and negative correlations between text quality and writing anxiety (H2b) and presented the full correlation matrix. To examine these bivariate relationships, multilevel bivariate correlations with students (level 1) nested in classes (level 2) were run. Relationships are presented as standardized regression coefficient β.

Second, we investigated the multivariate relationships between text quality, writing self-efficacy and writing anxiety. To do so, we investigated the main effects of self-efficacy and writing anxiety when predicting text quality. Generally, and based on existing literature, we hypothesized positive main effects of self-efficacy (H2c) but no significant main effect of writing anxiety (H2d) in a multivariate model. Then we explored the interplay of both variables to get further insights into these complex relationships. To do so, we run six polynomial regression and response surface analyses computing the interaction model for both self-efficacy scales in the full sample (Models A and D) in students with MB (Models B and E) and in students without MB (Models C and F). Within the interpretation process, the main effect of writing anxiety (regression weight b_1), the main effect of self-efficacy (b_2), and the interaction effect (b_4) will be interpreted. Further, regression weights (a_1–a_4) and the shape of the surfaces are considered (Humberg et al., 2019). The line of congruence (LOC) and the line of incongruence (LOIC), whose positions in the coordinate system are determined by the parameters a_1–a_4, provide further details about the interplay of self-efficacy and writing anxiety when predicting text quality. These values should be considered together with the Figures illustrating the visual representation of surface for interpretation. Here, a_1 gives information regarding a potential linear additive effect on the LOC, where positive parameters would indicate that both main effects add up when predicting text quality. The parameter a_2 indicates if there is curvature on the LOC, which needs to be interpreted together with the plot and shows whether the potential linear effect has a curvature shape or not. The parameter a_3 shows if the ridge is shifted away from the LOC and gives insight into the shape of the surface. The parameter a_4 shows if there is curvature on the LOIC, which would indicate that values with large differences between self-efficacy and anxiety lead to differences in text quality. All main and interaction effects are presented as a regression weight b and an effect size in the metric of β, while a_1-a_4 are presented in regression weights in the metric of the scales.

Polynomial regression and response surface analysis combine multiple regression with two independent variables to one dependent variable. Typically, the analysis goes along with a comprehensive framework for testing and interpreting the features of resulting three-dimensional graphed relationships. In Figure 1, we present how we interpret the model and how the surface can help. The 3D plot is built by writing anxiety on the x-axis, self-efficacy on the y-axis, and text quality on the z-axis. Writing anxiety and self-efficacy are scaled (grand mean) in the modeling process. In Figure 1, a flat surface is displayed for zero relationship between both predictors and text quality with an intercept of 7. The LOC lies between the points I and III, while the LOIC lies between II and IV. In addition, to better explain the pattern in our data and simplify our results, we used the extremes of self-efficacy and anxiety, which resulted in four groups illustrated by the corners of the surface I-IV: Students with low self-efficacy and low writing anxiety (I), students with high self-efficacy and low writing anxiety (II), students with high self-efficacy and high writing anxiety (III), and students with low self-efficacy and high writing anxiety (IV). Further, the main effects for specific values of the other variable can be illustrated. The green line can be interpreted as the main effect of self-efficacy for low anxiety levels and the purple line for high anxiety levels. The red line can be interpreted as main effect for anxiety, for high self-efficacy, and the brown line for low self-efficacy.

5. Results

First, some descriptive values are presented. Students' scores varied from 0 to 13 points in text quality ($M = 7.16$, $SD = 2.04$; theoretical maximum = 17 points) and text quality showed an ICC of 0.24, which shows that 24% of the total individual differences in text quality occurred at the class level. Students showed low levels in writing anxiety (range: 1–4.22, $M = 2.44$, $SD = 0.90$), and moderate

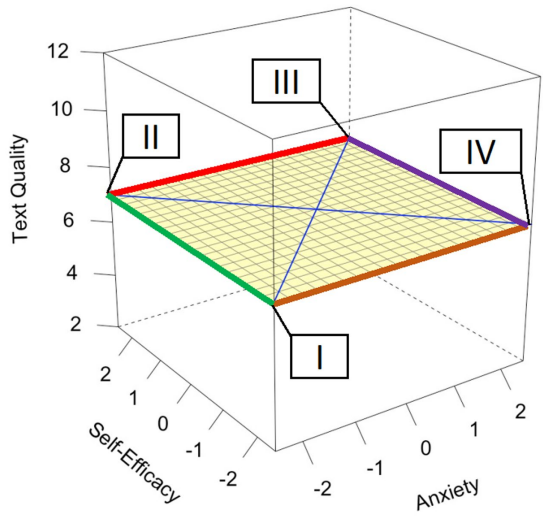

FIGURE 1
Illustration of the response surface analysis and how it can be interpreted.

TABLE 2 Multilevel correlations between text quality, writing self-efficacy, and writing anxiety.

	1	2	3	4
1. Text quality	1	0.31 ($p < 0.001$)	0.15 ($p = 0.03$)	−0.13 ($p = 0.029$)
2. Writing self-efficacy for *establishing structure and coherence*		1	0.62 ($p < 0.001$)	−0.48 ($p < 0.001$)
3. Writing self-efficacy for *evaluating and revising*			1	−0.42 ($p < 0.001$)
4. Writing anxiety				1

Correlations are multilevel correlations considering class as a nesting factor and are presented in the metric β.

levels in self-efficacy for *evaluating and revising* (range: 1.5–6, $M = 4.49$, SD = 0.87) and self-efficacy for *establishing structure and coherence* (range: 1–6, $M = 4.21$, SD = 0.92). To answer RQ1, multilevel *t*-tests were run. Contrary to our prediction for H1a, no significant differences were found for self-efficacy, neither regarding self-efficacy for *evaluating and revising* (with MB: $M = 4.20$, S.E. = 0.10; without MB: $M = 4.22$, S.E. = 0.10; $\beta = 0.02$, $p = 0.831$) nor regarding self-efficacy for *establishing structure and coherence* (with MB: $M = 4.55$, S.E. = 0.09; without MB: $M = 4.43$, S.E. = 0.09; $\beta = -0.07$, $p = 0.341$). Surprisingly, and contrary to our prediction for H1b, we even found slightly lower levels of writing anxiety among students with MB, differences were significant with a small effect size (with MB: $M = 2.59$, S.E. = 0.10; without MB: $M = 2.32$, S.E. = 0.10; $\beta = 0.15$, $p = 0.044$).

To answer RQ2, we first investigated multilevel correlations. Overall, and in line with H2a, text quality was significantly and positively related to self-efficacy, with the data showing a small effect size regarding self-efficacy for *evaluating and revising* and a medium to large effect size regarding self-efficacy for *establishing structure and coherence*. In line with H2b, writing anxiety negatively correlated with text quality, albeit with a small effect size. Writing anxiety was also negatively correlated to both self-efficacy scales with comparably large effect sizes (see Table 2).

Second, polynomial regression and response surface analyses were run to investigate the interplay of both writing self-efficacy scales and writing anxiety when predicting text quality. Results of the polynomial regression and response surface analyses are presented in Table 3 and Figure 2. In line with H2c, writing self-efficacy for *evaluating and revising* showed a significant main effect in the full sample, but with a small effect size ($\beta_{b1} = 0.132$, $p = 0.04$) in Model A, whereas self-efficacy for establishing *structure and coherence* showed a statistically significant main effect with a large effect size ($\beta_{b1} = 0.373$, $p < 0.001$) in Model D. We further found that writing anxiety was not significantly related to text quality (main effects in Models A and D). In contrast to the bivariate results and in line with H2d, the main effect of writing anxiety disappeared in the full sample when controlling for self-efficacy.

However, there were statistically significant negative interactions (b_4) in the two models that both followed a similar pattern that explain why the main effect of writing anxiety disappeared. The shapes of all interaction effects are illustrated in Figures 2A–F. For Model A and self-efficacy for *evaluating and revising,* there was no significant linear additive effect on LOC ($a_1 = 0.112$, $p = 0.67$) but a significant curvature on the LOC ($a_2 = -0.224$, $p = 0.049$); the ridge is shifted away from the LOC ($a_3 = -0.462$, $p = 0.008$) and there is a curvature on the LOIC ($a_4 = -0.224$, $p = 0.049$). For Model D and self-efficacy for establishing *structure and coherence,* there was a significant linear additive effect on LOC ($a_1 = 0.825$, $p = 0.003$) and a significant curvature on the LOC ($a_2 = -0.264$, $p = 0.021$); the ridge is shifted away from the LOC ($a_3 = -0.691$, $p < 0.001$) and there is a curvature on the LOIC ($a_4 = 0.264$, $p = 0.021$). This pattern indicates that the statistically non-significant effect of writing anxiety – in contrast to the bivariate results – can be explained by the fact that students with higher levels of self-efficacy (both scales) showed a negative relationship between anxiety and text quality, whereas students with lower levels of self-efficacy showed a positive relationship between anxiety and text quality.

Third, four polynomial regression and response surface analyses were run to investigate RQ3. When exploring differences between students with and without MB, differentiated effects were found, which are illustrated in-depth using response surface analyses (see Figure 2). In general, for students with MB, writing anxiety had a significant positive small to medium main effect on text quality (see Table 3). This main effect was present in combination with both self-efficacy scales. Additionally, there were positive and statistically significant additive effects for both writing anxiety and writing self-efficacy.

Specifically, for students with MB in Model B for self-efficacy for *evaluating and revising,* there was a statistically significant medium main effect ($b = 0.513$, $\beta = 0.289$, $p = 0.008$), and a significant medium main effect of writing anxiety ($b = 0.368$, $\beta = 0.208$, $p = 0.043$), but no significant interaction ($b = -0.250$, $\beta = -0.144$, $p = 0.144$). Further, there was a linear additive effect ($a_1 = 0.881$, $p = 0.007$), no curvature on the LOC ($a_2 = -0.250$, $p = 0.144$); the ridge was not shifted away from the LOC ($a_3 = -0.146$, $p = 0.428$) and there was no curvature on

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TABLE 3 Polynomial regression and response surface analyses regarding the interaction of writing self-efficacy (A, B, C: evaluating and revising, D, E, F: structure and coherence) and writing anxiety on text quality.

	b	SE	CI lower	CI upper	β	*p*
Full Sample						
A: self-efficacy evaluating and revising (R^2=0.05)						
Intercept	7.075	0.153	6.776	7.374	3.478	< 0.001
writing anxiety	−0.157	0.154	−0.459	0.145	−0.077	0.154
writing self-efficacy evaluating and revising	0.269	0.154	−0.033	0.572	0.132	0.040
writing self-efficacy evaluating and revising * writing anxiety	0.224	0.114	−0.446	−0.001	−0.114	0.049
D: self-efficacy structure and coherence (R^2=0.135)						
Intercept	7.064	0.141	6.787	7.341	3.473	<0.001
writing anxiety	0.067	0.157	−0.241	0.375	0.033	0.353
writing self-efficacy structure and coherence	0.758	0.164	0.436	1.080	0.373	<0.001
writing self-efficacy structure and coherence * writing anxiety	−0.264	0.114	−0.489	−0.040	−0.132	0.021
With migration backgrounds (*N*=98)						
B: self-efficacy evaluating and revising						
Intercept	7.626	0.199	7.236	8.015	4.325	<0.001
writing anxiety	0.368	0.181	0.012	0.723	0.208	0.043
writing self-efficacy evaluating & revising	0.513	0.194	0.133	0.893	0.289	0.008
writing self-efficacy evaluating & revising * writing anxiety	−0.250	0.171	−0.584	0.085	−0.144	0.144
E: self-efficacy structure & coherence						
Intercept	7.658	0.182	7.301	8.014	4.343	<0.001
writing anxiety	0.479	0.198	0.092	0.867	0.271	0.015
writing self-efficacy structure & coherence	0.751	0.149	0.460	1.043	0.423	0.001
writing self-efficacy structure and coherence * writing anxiety	−0.158	0.119	−0.391	0.074	−0.104	0.182
Without migration background (*N*=106)						
C: self-efficacy evaluating and revising						
Intercept	6.535	0.223	6.098	6.972	3.056	<0.001
writing anxiety	−0.493	0.271	−1.025	0.039	−0.230	0.069
writing self-efficacy evaluating and revising	0.162	0.238	−0.305	0.629	0.075	0.497
writing self-efficacy evaluating and revising * writing anxiety	−0.279	0.189	−0.649	0.091	−0.138	0.140
F: self-efficacy structure and coherence						
Intercept	6.476	0.196	6.091	6.860	3.029	< 0.001
writing anxiety	−0.193	0.230	−0.643	0.257	−0.090	0.401
writing self-efficacy structure and coherence	0.847	0.236	0.385	1.309	0.395	< 0.001
writing self-efficacy structure and coherence * writing anxiety	−0.518	0.229	−0.966	−0.070	0.191	0.023

b, estimate, SE, standard error, CI, Confidence Interval, β, standardized estimate, *p*, p value tested 2-sided.

the LOIC (a_4=0.250, p=0.144). For Model E, there was a significant large main effect for self-efficacy for *establishing structure and coherence* (b_2=0.751, β=0.423, p<0.001), and a medium main effect for writing anxiety (b_1=0.479, β=0.271, p=0.015), but no significant interaction (b_4=−0.158, β=−0.104, p=0.182). Moreover, there was a significant linear additive effect (a_1=1.231, p<0.001), but there was no curvature on the LOC (a_2=−0.158, p=0.182); the ridge was not shifted away from the LOC (a_3=−0.272, p=0.117) and there was no curvature on the LOIC (a_4=0.158, p=0.182). These patterns indicate that self-efficacy (for both scales) and– ounterintuitively–writing anxiety have a positive relation to text quality for students with MB and low self-efficacy levels, which would not have been found in the bivariate relationships alone nor in the full sample. However, the curvature on the LOC for self-efficacy for *evaluating and revising* shows that high levels of self-efficacy and/or anxiety do not change the relationship to text quality (*cf.* flat surface in the back of the cube; Figure 1B). Especially, for students with MB and high self-efficacy, writing anxiety shows no relationship with text quality, but for students with MB and low self-efficacy, higher anxiety relates to better text quality.

In contrast, for students without MB, there was no significant main effect for writing anxiety in both models (*p*s>0.05). However, in Model F there was a significant and large main effect in self-efficacy for *establishing structure and coherence* (b=0.847, β=0.395, p<0.001) and

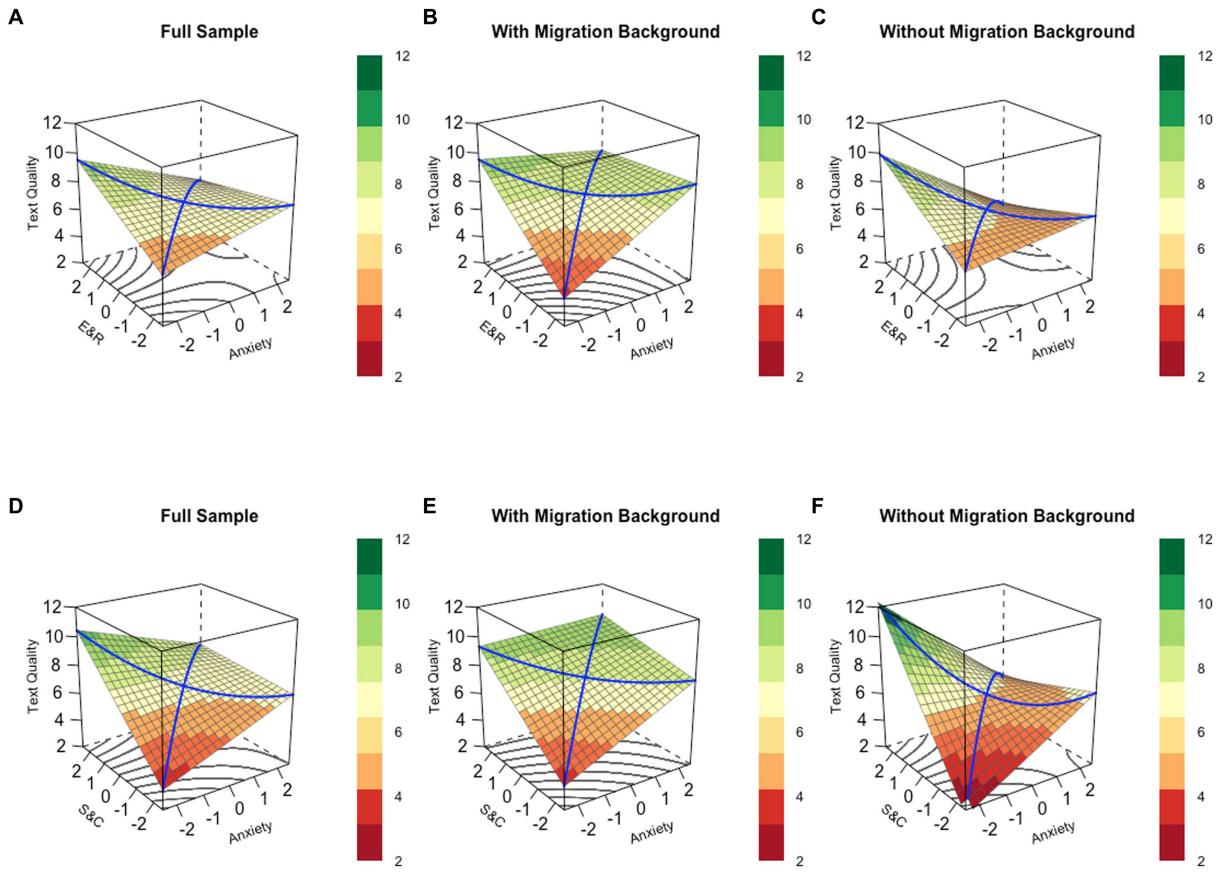

FIGURE 2
Interaction effects of the scaled writing self-efficacy [**(A–C)** self-efficacy for evaluating and revising, E&R: **(D–F)** self-efficacy for structure and coherence, S&C] and scaled writing anxiety on text quality based on response surface analysis. Values −2 to +2 indicate the range of 95% of the participants. For text quality, values originally ranged from 0 to 13. The surface is the predicted surface that help to interpret the statistical values. The blue lines are the line of congruence from bottom to top and the line of incongruence from left to right. Red color at the surface indicates low text quality, while green color indicates high text quality.

a significant interaction ($b = -0.518$, $\beta = 0.191$, $p = 0.023$). The interaction effect can be explained by these values: there is no significant additive effect on the LOC ($a_1 = 0.654$, $p = 0.096$), but a significant curvature on the LOC ($a_2 = -0.518$, $p = 0.023$); the ridge was significantly shifted away from the LOC ($a_3 = -1.040$, $p < 0.001$) and there was a significant curvature on the LOIC ($a_4 = 0.518$, $p = 0.023$). In Model C involving self-efficacy for *evaluating and revising*, there were neither statistically significant main effects, nor interaction effects for self-efficacy or writing anxiety ($ps > 0.05$). Further, there were no linear additive effects ($a_1 = -0.331$, $p = 0.460$), no significant curvature on the LOC ($a_2 = -0.279$, $p = 0.140$); the ridge was significantly shifted away from the LOC ($a_3 = -0.655$, $p = 0.008$) and there was no significant curvature on the LOIC ($a_4 = 0.279$, $p = 0.140$). These patterns indicated that self-efficacy (for both scales) and writing anxiety do not add up (i.e., adding up would mean that both main effects are separately important to predict text quality) and show a different pattern in students without MB. However, the curvature on the LOC for self-efficacy for *evaluating and revising* shows that for high levels of self-efficacy and/or anxiety the slope of the LOC falls to the rear (*cf.* bended surface in the back of the cube; Figures 1C,F). To sum up, writing anxiety shows no (Figure 1C) or a slightly positive relation (Figure 1F) to text quality in students without MB and low self-efficacy levels, but for students without MB and high self-efficacy levels, there is a negative relation between writing anxiety and text quality.

6. Discussion

The primary aim of this paper was to investigate the interplay between writing self-efficacy, writing anxiety, and text quality, as well as to explore possible differences in the relationships between these variables for students with and without MB. To answer RQ1, we investigated whether there were differences in students' writing self-efficacy and writing anxiety. To answer RQ2, we first analyzed the bivariate main effects of self-efficacy, writing anxiety, and text quality; second, we examined the multivariate main effects of these variables, and third, we analyzed their interplay with text quality in students with and without migration background. Despite evidence of lower writing attainment in students with MB (e.g., Müller and Busse, 2023), ours is the first study to systematically explore motivational differences in writing between students with and without MB.

Regarding RQ1, we found that students in the full sample felt moderately efficacious about writing, but writing anxiety was generally low. No differences between students with and without MB were

observed regarding self-efficacy. Students with MB even had slightly lower writing anxiety levels than those without MB. These findings are worth highlighting as students with MB in our sample had significantly lower writing attainments, as documented in a previous study (Müller and Busse, 2023).

The failure to find significant differences between students with and without migration background's self-efficacy was unexpected since the self-efficacy measures and writing outcomes were closely matched. Text quality was measured by assessing structure and coherence (see Siekmann et al., 2022; Müller and Busse, 2023), and self-efficacy focused on *establishing structure and coherence* and *evaluating and revising*. These results were inconsistent with prior investigations showing low self-efficacy beliefs among minority students (Pajares and Johnson, 1996) but align with research showing a relative disjuncture between low attainment and high self-beliefs and aspirations by students with MB (Kao and Tienda, 1998; McElvany et al., 2018). One possible explanation could be that students in lower track schools may assign little value to writing or have limited experience with writing which may result in uncalibrated self-perceptions. Results could also point to cross-cultural differences in academic self-efficacy, for instance, a study looking at sources of self-efficacy among students in Germany found that verbal and social persuasion appear to play a more important role than mastery experience in migrant students' self-efficacy than in non-migrant students (Gebauer et al., 2021). However, in a previous study, we also observed relatively positive self-efficacy beliefs among low-proficient EFL learners, which declined after a feedback intervention (Busse et al., 2020). We hypothesized that feedback might have destroyed students' illusions of competence (Kruger and Dunning, 1999). In another study, we observed increasing self-efficacy beliefs after a feedback intervention, although writing attainment did not improve (Siekmann et al., 2023). As both studies were conducted with low-proficient EFL learners, one may also assume that less proficient writers generally have difficulties adequately judging their capabilities, which may explain the discordance between self-efficacy and writing performance found in other studies with struggling writers (Graham et al., 2005; Anastasiou and Michail, 2013).

Regarding RQ2, we found medium to large positive correlations between text quality and self-efficacy for *establishing structure and coherence* and small correlations between text quality and self-efficacy for *evaluating and revising* in the full sample. In contrast, writing anxiety negatively correlated with both self-efficacy scales and text quality. Our results successfully replicated earlier research findings confirming that writing self-efficacy is a significant predictor of writing achievement (Klassen, 2002; Pajares, 2003) while stressing the importance of self-efficacy for *establishing structure and coherence* when measuring deep-level text quality. However, the role of anxiety should not be neglected as when investigating RQ3, an interesting interplay between self-efficacy and writing anxiety emerged that differed between students with and without MB. That is, for students without MB, the interaction effect indicates that for higher levels of self-efficacy, higher anxiety is generally associated with lower writing achievement levels. In contrast, lower self-efficacy and higher anxiety levels are associated with higher writing achievement for students with MB. While our data generally seem to support the notion that individuals experience anxiety when they feel inefficacious (Bandura, 1997), our deeper analyses suggest that the relationship between self-efficacy, writing anxiety, and writing performance is complex and varies across individuals.

To better explain the pattern in our data and simplify our results, we used the extremes of self-efficacy and anxiety, which resulted in four groups: Students with low self-efficacy and low writing anxiety, students with high self-efficacy and low writing anxiety, students with high self-efficacy and high writing anxiety, and students with low self-efficacy and high writing anxiety. We further distinguished between students with and without MB. We discovered that the relationship between self-efficacy, writing anxiety, and writing performance differs between these groups. Notably, anxiety had a positive effect on achievement in low-efficacious students with MB. The latter results are consistent with findings by Han and Hiver (2018) showing that EFL students in middle school with moderate to high levels of self-efficacy performed quite successfully on writing tasks despite elevated levels of writing anxiety. These findings may suggest that anxiety is not always harmful if it goes alongside adequate levels of self-efficacy. However, in our data, there was no effect on achievement in low-efficacious students without migration background. Similarly, anxiety did not seem to have an effect on performance among high efficacious students with MB. Practically, this suggests that educators and researchers may want to carefully monitor students' efficacy and anxiety for writing. For example, students who feel anxious about writing and display low self-efficacy, may need greater attention and assistance when writing and learning to write than anxious students who overall feel more efficacious.

In general, results suggest that students are diverse in their motivational and emotional experiences regarding writing. Future research should thus pay more attention to the interplay between writing self-efficacy and anxiety. The latter seems warranted when looking at students with MB, as self-efficacy and writing anxiety are essential variables when exploring achievement differences between students with and without MB, with self-efficacy for *establishing structure and coherence* being the stronger correlate within the self-efficacy measures. Although students with MB in our sample had heterogenous language backgrounds, our findings also tie in with results showing stronger relationships between self-efficacy and writing outcomes in L2 learners than in L1 learners (see the meta-analysis by Sun et al., 2021), and research stressing the importance of paying attention to writing anxiety in language learners (Horwitz, 2000; Cheng, 2002).

Our findings also underline that diverse (linguistic but also cultural) backgrounds may influence the relationship between self-efficacy, anxiety, and writing outcomes, thus extending previous works showing culture-specific differences in self-perceptions and their relation to achievement (e.g., Scholz et al., 2002; Brown and Lent, 2006; Manzano-Sanchez et al., 2018; Ng et al., 2022). Future studies with larger samples may further explore such differences among large migrant groups common in European countries (e.g., students with Turkish backgrounds in Germany who tend to underachieve, also compared to other migrant groups, Stanat and Christensen, 2006).

Although our work provides important insights into the under-researched area of writing motivation, we recognize several limitations in the study reported here. Firstly, this study is only cross-sectional and does not involve random assignment and thus–strictly speaking–does not allow for causal interpretations. Further analyses of data from T2 are necessary to explore the effect of self-efficacy and anxiety on writing

development. Moreover, the sample is drawn from students attending middle and lower-track schools. These schools have a less academic focus and tend to have higher percentages of socially disadvantaged students and students with MB. While our study thus provides valuable insights into students at-risk in writing, results may not be generalized. Future studies would have to explore whether the relationship between writing self-efficacy, writing anxiety, and text quality differ when exploring high-achieving students with and without MB. In addition, studies may want to explore these relationships with different outcomes and types of writing and as there may be genre-specific differences (Faigley et al., 1981; Madigan et al., 1996).

Most importantly, migration background is an umbrella term for a diverse student group. Our analyses would have provided more fine-grained results if we had distinguished between first- and second-generation migrants, as achievement results may differ; students in the first generation generally show lower attainment than students in the second generation (OECD, 2010). In addition, students who speak the test language at home usually show better results than students who do not (Stanat and Christensen, 2006). Our analyses showed that text quality was lower in students speaking exclusively another language at home than in students speaking German and another language at home (Müller and Busse, 2023). However, the relatively small percentage of students who exclusively speak another language at home ($n = 30$) would have limited our analyses. Future studies with large samples may explore family language use in more depth and the age of arrival in first-generation students. There could also be differences between students who are genuine L2 writers and those who learned how to write in Germany.

Last but not least, our results and conclusions must be interpreted against the background of the consumerability problem that always occurs when two scales with different meanings and with different scale interpretations are centered in the response surface analysis, and patterns within the interaction are examined. Here, self-efficacy and anxiety were measured using 1 to 6 Likert scales, but social desirability or individual scale interpretation might have led to different scale interpretations (i.e., it is not as accepted to be anxious compared to confident) by the participants when they filled out the questionnaires.

The strength of our study is that self-efficacy measures were closely matched to the writing assessment, which involved two different writing outcomes (instructional and argumentative texts). In addition, we provide insights into writing anxiety, thus addressing the scarcity of research on writing anxiety. While acknowledging the limitations of cross-sectional data, our findings overall seem to indicate that interventions may have to address writing anxiety in students with MB differently. In learners with low self-efficacy who also suffer from writing anxiety, interventions should not primarily aim at reducing writing anxiety and instead focus on increasing self-efficacy first. In students who suffer from writing anxiety but have higher levels of writing self-efficacy, interventions should first aim at reducing writing anxiety.

7. Conclusion

In general, our data corroborate findings revealing positive relationships between writing self-efficacy and writing achievement while adding insights into the interplay between writing self-efficacy, writing anxiety, and text quality. Our data suggest that there are motivational differences between students with and without MB. Writing self-efficacy and writing anxiety both seem to play a more important role in text quality when exploring students with MB than when investigating their peers without MB. We suggest that the effect of interventions could be increased if writing self-efficacy and writing anxiety are *a priori* assessed, as interventions could thus be adapted to differing student needs.

Data availability statement

The datasets presented in this article are not readily available because the authors do not have permission to share data. Requests to access the datasets should be directed to vbusse@uni-muenster.de.

Ethics statement

The studies involving human participants were reviewed and approved by Ethics Review Board of Department 5 of the University of Koblenz-Landau. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

VB conceived and supervised the overall project and wrote the first draft of the manuscript for this study. SG and TU contributed to the conceptualization of the study and to writing. NM executed the project, collected the data, organized the database and contributed to writing. VB and SG contributed to manuscript revision. TU conducted the statistical analyses and wrote the results section. All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendix 1

Overview of scales on perceptions of process-oriented writing and feedback practices.

Scale (number of items)	Items	Reliability (Cronbach's α)
Self-efficacy for *establishing structure and coherence* (4)	This is how I rate myself in terms of writing texts in German… *[So schätze ich mich ein in Bezug auf das Schreiben von Texten auf Deutsch…]*	0.886
	… I can write a good text in German *[…ich kann einen guten Text auf Deutsch verfassen.]*	
	… I can write a well-structured text in German. *[…ich kann einen gut strukturierten Text auf Deutsch verfassen.]*	
	… I can connect my ideas in a meaningful way. *[…ich kann meine Ideen sinnvoll verknüpfen.]*	
	… my German texts are comprehensible for the readers. *[…meine deutschen Texte sind nachvollziehbar für die Leser.]*	
Self-efficacy for *evaluating and revising* (4)	When I write a text in German, I am able to … *[Wenn ich einen Text auf Deutsch geschrieben habe, kann ich …]*	0.844
	… assess the strengths and weaknesses of my text well. *[.. die Stärken und Schwächen meines Textes gut einschätzen.]*	
	… revise the text on my own. *[... den Text selbständig überarbeiten.]*	
	… assess whether or not my text meets the requirements of Year 9 *[... einschätzen, ob mein Text den Anforderungen der 9. Klasse entspricht oder nicht.]*	
	… assess whether or not I have met the writing goals *[... einschätzen, ob ich die Schreibziele erreicht habe oder nicht.]*	
Writing anxiety (9)	This is how I feel when writing in German … *[So fühle ich mich beim Schreiben auf Deutsch …]*	0.821
Somatic (3)	… My mind often goes blank when I write in German. *[…ich habe of einen Blackout, wenn ich auf Deutsch schreibe.]*	
	… I tremble or perspire when I write in German *[…ich zittere oder schwitze, wenn ich auf Deutsch schreibe.]*	
	… I feel my whole body rigid and tense when I write in German. *[…ich fühle mich verkrampft, wenn ich auf Deutsch schreibe.]*	
Cognitive (3)	… If my German composition is to be evaluated, I would worry about getting a poor grade. *[…wenn ich weiß, dass mein Deutschaufsatz benotet wird, habe ich Angst vor einer schlechten Note.]*	
	… I'm afraid of my German composition being chosen as a sample for discussion in class. *[…wenn mein Deutschaufsatz ausgewählt wird, um ihn beispielhaft im Unterricht zu besprechen, habe ich Angst.]*	
	… while writing German compositions, I feel worried and uneasy if I know they will be evaluated. *[…wenn ich weiß, dass mein Deutschaufsatz von Lehrer/innen gelesen wird, bin ich nervös.]*	
Avoidance behavior (3)	… Unless I have no choice, I would not use German to write texts. *[…wenn ich die Wahl hätte, würde ich nicht auf Deutsch schreiben.]*	
	… I avoid writing longer texts in German *[…ich vermeide es, längere Texte auf Deutsch zu schreiben.]*	
	… I usually do my best to avoid writing texts in German *[…wenn es geht, vermeide ich es, auf Deutsch zu schreiben.]*	

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Efficacy for writing self-regulation, attitude toward writing, and quality of second grade students' writing

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Motivational beliefs, such as writing self-efficacy and attitude toward writing, are believed to foster or hinder writing by influencing if one chooses to write, how much effort is committed to writing, and what cognitive resources writers apply. In the current study, we examined self-efficacy for writing self-regulation and attitude toward writing of 2,124 Grade 2 Norwegian students (1,069 girls; 1,055 boys). We investigated if there were differences in each of these beliefs between girls and boys and students who differed in their language status (Norwegian first language, Norwegian and another language both first language, or language other than Norwegian first language). We further tested if each of these writing motivational beliefs made statistically unique contributions to predicting the quality of students' writing. In each of these analyses, we controlled for variance related to individual- and school factors. Girls were more positive about writing than boys, and they were confident about their abilities to self-regulate writing. Students with Norwegian and another language both as first language ("bilingual" students) had a more positive attitude toward writing than the other two language groups. Efficacy for writing self-regulation and attitude toward writing both made statistically significant unique contributions to predicting the quality of students writing, although these two writing beliefs collectively accounted for just 2% of the variance in writing quality scores once individual- and school-factors were controlled. Recommendations for future research and implications of the finding are discussed.

KEYWORDS

writing, self-efficacy, attitudes, self-regulation, gender, language, text quality

Introduction

During the last three decades, those who developed models and theories of writing placed increasing emphasis on the important role of motivational beliefs in writing. In his revision of the seminal Hayes and Flower (1980) model of writing, Hayes (1996) argued that "Motivation is manifest, not only in relatively short-term responses to immediate goals, but also in long-term predispositions to engage in certain kinds of activities" (p. 9). As a result, he revised the earlier model to indicate that writers' motivational beliefs and attitudes influence and are influenced by the long-term memory and cognitive processes writers' employ, and

the interaction between cognitive and affective aspects of writing were essential to a full understanding of how writing operates.

In Zimmerman and Risemberg's (1997) model of writing as a self-regulated process, writing was depicted as a complex cognitive task that is demanding, intentional, and self-sustaining, requiring a high-level of regulation on the part of the writer to manage covert writing processes, one's writing behavior, and the writing environment. Writers exert control over internal personal factors, behavioral patterns, and environmental attributes by employing a variety of self-regulation strategies (e.g., goal setting, planning, seeking information, evaluating). As these strategies are employed, writers monitor and react to self-feedback or feedback from others to determine which strategies were or were not successful. This feedback influences which self-regulation strategies are applied in the future. It also influences a writer's sense of efficacy, as beliefs about writing competence are presumably strengthened or weakened depending upon the perceived success of the deployed self-regulation strategies. In turn, self-efficacy beliefs are believed to influence motivation to write, use of self-regulatory strategies, and one's success when writing.

The more recent writer(s)-within-community model (WWC; Graham, 2018), also assigned a central role to writing motivational beliefs. A basic premise of this model was that motivation beliefs foster or hinder writing, influencing whether one writes, how much effort is committed, what cognitive resources and processes writers apply; which tools are used to create writing; how one monitors and regulates the composing process; and how one interacts with others while writing or learning to write. Accordingly, writers employ a variety of motivational beliefs about writing which interact to influence what a writer does. This includes beliefs about writing efficacy, attitudes toward writing, value and utility of writing, motives for writing, reasons for writing success or failure, goal orientation for writing, and writing identity. We provide two examples of how such beliefs can interact, using self-efficacy for writing and attitude toward writing to illustrate this principle. Students who are confident about their writing competence may develop a positive attitude about writing because their perceived efficacy leads them to view writing in an optimistic light, resulting in commitment and effort when writing. In contrast, students may have a neutral or negative attitude toward writing, but still evidence considerable commitment and effort when writing, because they are confident about their capabilities to complete writing tasks successfully.

To date, the two writing motivational beliefs that have received the most attention in the research literature are self-efficacy and attitude toward writing. In a systematic review of 84 writing motivational studies, Camacho et al. (2020) indicated that 44 and 27% of the studies reviewed included measures of efficacy and attitudes, respectively. While some studies have examined the writing attitudes of beginning writers (grades two and below; e.g., Graham et al., 2007, 2012; Skar et al., 2022, 2023), including the relationship between attitudes and writing performance (Knudson, 1992; Olinghouse and Graham, 2009), fewer studies have examined the self-efficacy of such young writers (e.g., Guay et al., 2016; Schrodt et al., 2019; Traga Philippakos and MacArthur, 2020). We were unable to locate any investigations that assessed relations between writing efficacy and writing performance with such young children.

The current study addressed the relative lack of knowledge about writing efficacy and attitude with beginning writers in four important ways. One, we examined the writing attitude and efficacy of a large sample of second grade students in Norway (N = 2,842). This is the first study to our knowledge to examine both of these writing beliefs concurrently with such young writers in Norway or in any other country. Two, we examined if student-level factors [gender, age, and language status (Norwegian as first language, Norwegian and another language both as first language, or Norwegian as second language)] as well as school-level factors (school size, national test scores, proportion of certified teachers, school hours per student, and students per special education teacher) were related to each of these motivational constructs. Such an analysis between writing motivational variables and multiple student- and school-factors has not previously been conducted. While previous studies examined relations between these motivational beliefs and gender and age (Ekholm et al., 2018; Camacho et al., 2020) as well as language status (Busse et al., 2023), no study has yet examined the collective contribution of these individual- and school-level factors to predicting self-efficacy for writing or attitude toward writing.

Three, we examined if writing efficacy and attitudes each made a unique contribution to predicting writing quality, after controlling for variance associated with the individual- and school-level factors describe above as well as students' scores on a handwriting fluency measure and the other motivational belief. This is the first time that an analysis where variance due to such an array of individual- and school-level variables were first controlled has been undertaken. Finally, we focused our examination of writing efficacy on second-grade students perceived competence to self-regulate their writing. No previous study has examined this aspect of writing self-efficacy with students this young. Zumbrunn et al. (2020) did examine if self-efficacy for writing self-regulation predicted the writing of students as early as Grade 3. However, they assessed writing performance using teacher grades for writing (we assessed students' actual writing products). Further, their analyses did not examine if self-efficacy for writing self-regulation predicted writing performance with Grade 3 students specifically. Rather, they evaluated this association between students in Grades 3 to 10 collectively. Across this broad range of students, they did not find a statistically significant relation between self-efficacy for writing self-regulation and the writing grades assigned by teachers.

It is especially important to learn more about beginning writers' efficacy for writing and their attitudes toward writing because it is possible that motivational beliefs formed early have long-lasting effects (Bandura, 1986). Students typically start school with a positive attitude about writing and a belief they can write (Calkins, 1983; Graham et al., 2007), but some studies show that developing writers become less positive and efficacious about writing over time (Knudson, 1991; Pajares, 2003). As a result, it is imperative that we document beginning writers' efficacy and attitudes toward writing as well as identify individual- and school-level factors that predict these beliefs. It is further important to determine if young children's attitudes and efficacy beliefs predict how well they write because it is not clear at this point when this occurs.

Before presenting our research questions and hypotheses, we first examine the constructs of self-efficacy for writing and attitude toward writing as operationalized in this investigation. At the same

time, we review prior research with older children examining if these two constructs predict students' writing.

Self-efficacy for writing self-regulation

Because writing is a complex task requiring the management and orchestration of writing skills, processes, knowledge, beliefs, and behaviors as well as the governance of the environment where writing takes place (Hayes, 1996; Zimmerman and Risemberg, 1997; Graham, 2018), self-regulation is essential to effective writing. Beginning writers commonly apply an approach to writing that minimizes some self-regulatory activity by converting the writing process into telling what one knows, with little attention directed at whole text organization, needs of the reader, or constraints imposed by the writing topic (e.g., Scardamalia and Bereiter, 1985). Nevertheless, these children must still identify the purpose for their writing, initiate and sustain the writing process, avoid distractions while writing, and continue to write even when it is difficult (Bruning et al., 2013). Writing cannot be accomplished if these self-regulatory skills are not applied and, as Pajares (2003) indicated, developing writers' efficacy for employing these skills influences their use and students' writing success.

To measure self-efficacy for writing self-regulation, we asked participating students in this study to complete the self-efficacy for writing self-regulation scale designed and tested by Bruning et al. (2013). This scale assesses students' perceived capabilities to manage the writing task (start and sustain writing), avoid disruptions and control frustrations while writing, and set writing goals (the same basic self-regulatory strategies described above). A number of studies have demonstrated that scores on this measure predict one or more aspects of upper-elementary and secondary students' writing. In a study with Grade 5 students in the US, Wijekumar et al. (2019) found that self-efficacy for writing self-regulation predicted the length and quality of students' writing. De Smedt et al. (2016) reported that this measure predicted Grade 5 and 6 Flemish students' reported use of self-regulation when writing. In a study conducted in Portugal, Limpo and Alves (2017) found this measure predicted the overall quality of essays produced by Grade 7 and 8 students. Further, Bruning et al. (2013) indicated self-efficacy for writing self-regulation predicted US high school students self-reported writing capabilities as well as their scores on a state wide writing assessment. Even so, this particular measure of self-efficacy was not statistically related to the writing of Grade 5 students or high school students in two studies conducted in the US (Yilmaz Soylu et al., 2017; Graham et al., 2019).

As noted earlier, there is currently no data on how beginning writers in second grade or below view their efficacy for writing self-regulation or if these views are related to their gender, primary language, or the quality of their text. It is important to examine such relationships with these young writers though. Berninger and Amtmann (2003) indicated that beginning writers, such as the second-grade students in this study, are "dependent on other-regulation in the form of guided assistance from parents, teachers, and peers" (p. 350). If this is the case, then there is likely to be little to no relationship between self-regulation and writing for these students, and by extension little to no relationship between efficacy for writing self-regulation and students' writing. The present study provides information that bears directly on Berninger and Amtmann's (2003) claim.

Attitude toward writing

Researchers have been inconsistent in how they define writing attitudes, even though the study of attitudes has played a prominent role in psychological research over time (Allport, 1954). According to Ekholm et al. (2018), attitudes can be defined as a generic or domain-specific disposition. Attitudes can also be viewed from a state or trait perspective (Camping et al., 2020). One can have a positive or negative disposition regarding a specific task (state) or a positive or negative disposition toward such tasks in general.

Ekholm et al. (2018) also indicated attitudes are characterized by affective and cognitive components. This was evident in the attitude toward writing measure applied in the current study. Students were asked to indicate their agreement with items assessing enjoyment to write (affective) and satisfaction with effort expended when writing and the resulting written product (cognitive).

All but one of the items used to assess writing attitudes (e.g., enjoyment of writing in general) were directly linked to the writing tasks students completed in this study. We felt that asking students about their attitude toward a specific task would make the task more concrete and understandable for the young children participating in this study, increasing the probability of obtaining a more valid test of the link between attitude toward writing and the writing students did in this study. In summary, the attitude toward writing measure in this investigation can be characterized as a disposition to respond favorably or unfavorably to a recent writing task as well as positive or negative judgments about effort expended and the resulting written product.

In their review of the research literature on students' attitude toward writing, Ekholm et al. (2018) noted relatively few studies examined the relationship between writing attitudes and students' writing performance. Of the studies that did examine this relationship, most found a positive relationship between attitudes and writing outcomes (Graham et al., 2007, 2012, 2017; Lee, 2013). With the exception of one study with middle school students, these investigations all involved students in the elementary grades, including students as young as 6 years of age (Graham et al., 2017). While attitude toward writing has typically predicted how well students write (see also Graham et al., 2019), this has not been the case in several investigations (e.g., Olinghouse and Graham, 2009; Wijekumar et al., 2019).

Research questions and predictions

The present study was designed to answer the following questions:

1. Is self-efficacy for writing self-regulation related to Grade 2 students' gender and language status after controlling for individual- and school-level factors? (RQ1)
2. Is attitude toward writing related to Grade 2 students' gender and language status after controlling for individual- and school-level factors? (RQ2)

3. Do self-efficacy for writing self-regulation and attitude toward writing each make unique statistical contributions to predicting the quality of Grade 2 students' writing after controlling for individual- and school-level factors as well as the other motivational belief? (RQ3)

For all three research questions, the school-level control variables were school size, national test scores, proportion of certified teachers, school hours per student, and number of students per special education teacher. We controlled for variance related to these factors because previous research demonstrated school-level factors predict students' writing performance (e.g., Walberg and Ethington, 1991), and theoretically students' writing beliefs and performance are shaped and constrained by the communities in which they write and learn to write (Graham, 2018).

Students' age was also treated as a control variable for each research question. While the contribution of this variable to predicting writing beliefs and performance is likely to be minimal because all students were in Grade 2, we felt it was still important to control for variance related to age because readiness factors and experience writing likely play a role in young students' development of writing beliefs and writing performance. When examining if gender or language status predicted self-efficacy for writing self-regulation (RQ1), we also treated attitudes toward writing as a control variable. Likewise, when determining if gender or language status predicted attitude toward writing (RQ2), self-efficacy for writing self-regulation was treated as a control variable. We did this because scores on self-efficacy and writing attitude measures are statistically related to each other (Pajares, 2003; Ekholm et al., 2018; Camacho et al., 2020).

For RQ3 which examined the predictive value of self-efficacy for writing self-regulation and attitude toward writing, we further controlled for students' gender, language status, and handwriting fluency. Gender and language status were statistically related to writing beliefs and writing quality in previous studies (e.g., Reilly et al., 2018; Camping et al., 2020). This was also the case for handwriting fluency (Graham et al., 1997; Kent and Wanzek, 2016; Skar et al., 2022). By controlling for variance related to these and the other variables described above, we added greater precision to all of our analyses because these variables can potentially confound the primary relationships we were investigating.

We hypothesized gender and language status would each make a unique and statistically significant contribution to predicting self-efficacy for writing self-regulation and attitude toward writing (RQ1 and RQ2). As Pajares (2003) concluded in his review of writing self-efficacy research, girls are more efficacious about their writing competence than boys. Likewise, in their review of research on writing attitudes, Ekholm et al. (2018) reported that girls have more positive attitudes than boys (Ekholm et al., 2018). While there is no current systematic review of relations between writing motivational beliefs and students' language status, individual studies such as those conducted by Camping et al. (2020, 2023) demonstrated that language status predicts students' beliefs about writing.

We further hypothesized that self-efficacy for writing self-regulation and attitude toward writing would each make a unique and statistically significant contribution to predicting the quality of Grade 2 students' writing (RQ3). Klassen (2002) and Pajares (2003) in their reviews of the writing self-efficacy literature reported that self-efficacy for writing consistently predicts writing performance, and this is evident in studies with older students by Bruning et al. (2013), De Smedt et al. (2016), Limpo and Alves (2017), and Wijekumar et al. (2019). Similarly, in their review of the literature, Ekholm et al. (2018) found that variation in writing performance was predicted by students' attitudes toward writing, as evidenced in studies by Graham et al. (2007), Graham et al. (2012, 2017, 2019), and Lee (2013). However, given Berninger and Amtmann's (2003) contention that beginning writers are dependent on other forms of regulation (e.g., guided assistance from parents, teachers, and peers), it is possible that self-efficacy for writing self-regulation will account for just a small amount of the variability in students' writing scores.

Materials and methods

Context of the study

This investigation was conducted in Norway, in which writing has been a "key competency" since an educational reform in 2006 (Skar and Aasen, 2021). In the Norwegian setting, "key competency" refers to skills and competencies that should be taught across the curriculum. The other key competencies are English, ICT skills, mathematics, and reading. Although writing is posited as a fundamental skill, previous research (Håland et al., 2019; Graham et al., 2021) have found indications of great variation in terms of time devoted to writing instruction and in terms of contents of writing instruction among elementary school teachers in Norway. The status of writing in Norwegian schools are also blurred by the fact that there are no explicit learning objectives tied to any of the key competencies in the obligatory national curriculum. However, there are national tests in English, mathematics, and reading providing indirect attainment goals in terms of proficiency levels and national norms. Such tests are not available for writing. Previous research has indicated that 17% of students in first grade may struggle to develop appropriate writing skills (Skar and Huebner, 2022), but these estimates stem from analysis of a small sample (N = 832) of students.

Participants

Participants were 2,124 Norwegian second grade students who completed all measures administered in this investigation. The sample represented 74.7% of students from a larger sample of students (N = 2,842), whose parents gave permission for their children to participate. The participants represented 143 classrooms in 57 public schools, and 3.5% of all second-grade students in Norway 2021. Students in the current sample attended schools that were involved in a writing instructional study in the academic years of 2019–2021, and data for this investigation was collected in May and June of 2021 (i.e., at the end of that study). There were 1,055 boys (49.7%) and 1,069 girls (50.3%) in the sample, 1,710 students (80.5%) who had Norwegian as their first language, and 246 students (11.6%) who had Norwegian and another language as their first languages ("Bilingual").

One hundred fifty-eight students (7.4%) had another language than Norwegian as their first language ("Other"). We had no information about language for ten participants (0.5%). Please refer to **Table 1** for a sample breakdown by gender and language status.

We believe the sample in our investigation was representative of second graders in Norway based on the following comparisons between sample and population characteristics. First, the proportion of boys in our sample (49.7%) was similar to that of the population (51%).[1] Second, our sample included 7.4% of students with another language than Norwegian as their mother tongue, which was similar to the national proportion (8.7%) of Norwegian second graders who in 2021 were entitled to mother tongue education for students with another language than Norwegian. Third, students in our sample were drawn from five municipalities, which reflected the diverse sizes of municipalities in Norway. These municipalities ranged from large (N = 709,037; 12.9% of Norway's population; 46 times larger than the average municipality) to medium-sized (N = 14,623; 2.6% of Norway's population; 95% the size of an average municipality) to small (N = 2,431; 0.04% of Norway's population; 15.8% the size of an average municipality). Fourth, our sample included municipalities from various regions of Norway, encompassing both urban and rural areas.[2] Fifth, the proportion of certified teachers in the schools from which students were drawn (M = 95.8%, SD = 5.4%) closely aligned with the percentage of certified teachers in all schools across Norway (M = 95%). Sixth, there were 84.8 students per special education teacher in our sample (SD = 33.1), while the national average was 82.4 (SD = 98.2).

It should also be noted that the average number of "school hours" per student (i.e., instructional hours divided by the number of students) in our sample was 54.5 (SD = 12.4), slightly lower than the national average of 61 h. Schools in our sample were larger in terms of student population (M = 482.5, SD = 174.3) when compared to the average schools in Norway (M = 225, SD = 166). Further, schools in our sample had similar, albeit slightly higher average score on the 5th grade national tests in reading, mathematics and English[3] (M = 51.5, SD = 2.82, score range: 45.8 to 56.6), than schools in Norway in general (M = 50, SD = 10, score range: 36 to 68), according to data from the Directorate for Education and Training.

Measures

Self-efficacy for writing self-regulation

Self-efficacy for writing self-regulation was measured using an already established self-efficacy scale (Bruning et al., 2013). The scale consists of six statements: (1) I can focus on my writing for at least 1 h; (2) I can avoid distractions while I write; (3) I can start writing assignments quickly; (4) I can control my frustration when I write; (5) I can think of my writing goals before I write; (6) I can keep writing even when it's difficult. For this investigation, the statements were translated into Norwegian. Participants in the validation study for this scale (Bruning et al., 2013) were asked to indicate their agreement on a scale that ranged from 0 to 100 (i.e., effectively 0–100%). Given the age of the students in this investigation, we opted for a shorter range, expressed in a more familiar way. In Norway, it is customary to express appraisals using dice. For instance, a movie may be awarded five dice, while a book may receive three dice. Consequently, we asked students to indicate their agreement with each item using a die with one dot (lowest agreement) to dice with six dots (highest agreement). To derive a score for this measure, we averaged a student's score across the six items. A higher number indicated greater self-efficacy for regulating writing. Reliability for the measure was acceptable (Cronbach's alpha = 0.78), although somewhat smaller than the one reported by Bruning et al. (2013) (Cronbach's alpha = 0.88). A confirmatory factor analysis with a one factor solution showed acceptable fit (standardized root mean square residual (SMRM) = 0.016; root mean square error of approximation (RMSEA) = 0.034; comparative fit index (CFI) = 0.992; Tucker Lewis index (TLI) = 0.986), albeit the chi-square statistic was significant (which is often the case in large sample studies; Brown, 2015).

Attitude toward writing

Attitude toward writing was assessed with a four-item scale, which was validated with students in Grades 1 to 3 in a previous investigation (Skar et al., 2022). The scale contained items which asked students to indicate: (1) how much they enjoyed their most-recent writing task, (2) how satisfied they were with their most-recent text they created, (3) how satisfied they were with their effort during their most-recent writing task, and (4) how much they enjoyed writing in general. Students were asked to indicate their answers using a three-point scale (designed as stars), with a higher number of stars indicating more enjoyment and satisfaction, respectively. The students took the attitude toward writing scale twice, once after each time they wrote a text. To derive a score for this measure, we averaged a student's score across all four items. The scale reliability was acceptable (Cronbach's alpha = 0.81), and somewhat higher than estimated in the validation study higher (Cronbach's alpha = 0.71; Skar et al., 2022).

Text quality

Text quality was measured by having students complete two "purposeful writing" tasks. The tasks, which were designed within the context of a Norwegian writing intervention program (Skar et al., 2023), asked students to describe to researchers what they enjoyed doing in recess time, and what happened on a day where they found a magical hat. In both instances, the students' teacher introduced the topic and conducted a brainstorming session focusing on the communicative purpose (i.e., to describe to someone external to the school context, and write a fictitious recount for entertainment purposes) and possible content. The teacher based the discussion about content on a picture supplied by the researcher. For the recess time task, a picture of young students in a playground was shown, and for the magical hat task, a picture

1 Data for gender, and language comparisons stem from Information System of the primary and lower secondary schools in Norway [i.e., Grunnskolens informasjonssystem (GSI); https://gsi.udir.no/].

2 There is no official data on proportions of schools in Norway located in rural areas.

3 Unfortunately, writing is not tested in Norway until 10th grade as (and then as a part of the language arts exam), and the general academic proficiency tests in reading, mathematics and English are taken by students in 5th grade.

TABLE 1 Means and standard deviations for handwriting fluency, text quality, attitude, and self-efficacy by gender and language status.

			HWF		TQ		Attitude		Self-efficacy	
Gender	Language	*N*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Boys	Bilingual	127	26.3	11.6	3.1	0.6	2.4	0.5	4.4	1.3
	Norw	847	22.5	9.9	3.1	0.5	2.3	0.5	4.3	1.2
	Non-Norw	78	25.2	11.9	3.1	0.6	2.6	0.5	4.5	1.2
Girls	Bilingual	119	26.8	11.9	3.3	0.5	2.6	0.4	4.8	1.0
	Norw	863	29.1	11.6	3.4	0.5	2.6	0.4	4.7	1.0
	Non-Norw	80	25.4	13.6	3.0	0.5	2.6	0.4	4.5	1.2

HWF, handwriting fluency; TQ, text quality; Bilingual, Norwegian and another first language; Norw, native Norwegian speaker; Non-Norw, non-native Norwegian speaker.

of a hat with stars above it laying on a gravel road was shown. When the teacher deemed that students were sure about why to write and what to write, the writing commenced, and students would—in keeping with standard Norwegian procedures—be granted 45 min to complete each task. The distribution of tasks was counterbalanced so that half of the students wrote about recess time first, and the other part about the magical hat.

Scoring

Students' texts were rated by 24 trained raters. Each text was rated by two independent raters, and raters marked an average of 488.5 texts (*SD* = 107.5) per person. There were 50 anchor texts, which had been used in previous rating sessions in the context of the intervention study, which served as "linking devises," so that all raters could be linked to all other raters.

The raters used an assessment rubric with eight five-point text quality rating scales which had been validated previously (Skar et al., 2020a,b). The eight rating scales tapped into different aspects of text quality, and common for all scales was that a higher number indicated higher quality. They were: audience awareness, organization, content relevance, vocabulary, sentence construction, spelling, legibility and punctuation. Audience awareness focused on textual indications that the writer was concerned about his/her reader (e.g., by adding a greeting phrase, or by explaining an uncommon concept). Organization concerned the macro and micro structure of the text. Content relevance concerned the proportion of the text that contained information relevant vis-a-vis the writing task (e.g., text about recess activities rather than text about other aspects of a person's life). Vocabulary concerned the repertoire of words in the text, and sentence construction, spelling legibility and punctuation tapped into texts' sentence construction (including grammar), spelling, legibility and punctuation (the criteria can be found in an online **Supplementary Appendix**).

We derived text quality scores for students by fitting the data to the many-facet Rasch measurement (MFRM) model (Linacre, 1994; Eckes, 2011). The following Rasch model was used:

$$log\left(\frac{P_{ijmkl}}{P_{nijmk(l-1)}}\right) = \beta_i - \tau_j - \delta_m - \gamma_k - \varphi_l$$

where $P_{ijmk(l)}$ represents the probability of student *i*, on task *j*, rating scale *m*, by rater *k*, receiving a score of *l*, and $P_{ijmk(l-1)}$ represents the probability of the same student under the same conditions receiving a score of *l*-1. β_i is the ability for person *i*, τ_j the difficulty of task j, δ_m is the difficulty of rating scale *m*, and γ_k is the severity of rater *k*. Finally, φ_l represents the point on the logit scale where category *l* and *l*–1 are equally probable.

The analysis yielded a single text quality score per student. This was the "fair average" output from the FACETS (Linacre, 2017) software, which was the average score across tasks, rating scales and raters while controlling for variations in difficulty and severity. Fair scores ranged from 1 to 5 and were not restricted to integers. The data fitted the MFRM model well. First, the reliability of separation (analogous to Cronbach's alpha) was *R* = 0.95, indicating that we were able to separate student proficiency with a high precision.[4] Second, there were 4.5% standardized residuals exceeding |3| and 0.5% residuals exceeding |2|, which was within the boundaries of what is generally excepted as good fit (Eckes, 2011).

Handwriting fluency

Teachers administrated a copying task designed to assess students' handwriting fluency. The task, which has been used in the US (Graham et al., 1997) and in Norway (Skar et al., 2022) with similar samples of students. The paragraph students are asked to copy was taken from Group Diagnostic Reading and Aptitude and Achievement Tests (Monroe and Sherman, 1996). Students were presented with a paragraph and were provided with 90 seconds copy the paragraph as quickly and correctly as they can. To assist students in completing this task correctly, students were shown a video that reviewed the steps for completing the task. Teachers were asked to show the video more than once if students did not appear to comprehend what they were to do. The teachers were further asked to start the test when all students sat with pencils in hand and paragraph in front of them. When starting the test, the teacher started a timer provided by researchers. The teachers were instructed to instruct students to stop copying the paragraph when the timer alarm rang.

To derive a measure of handwriting fluency, the number of correct letters copied were tallied and divided by 1.5, which yielded a measure of letters copied correctly per minute. Tallying was done by personnel who had vast experience of coding similar tasks at

4 The classical test theory reliability between raters, when considering the anchor texts (i.e., the same 50 texts across all 24 raters) was ICC = 0.98 [0.97–0.99] for audience awareness, ICC = 0.98 [0.97–0.99] for organization, ICC = 0.99 [0.99–0.99] for content relevance, ICC = 0.98 [0.96–0.98] for vocabulary, ICC = 0.98 [0.97–0.99] for sentence construction, ICC = 0.96 [0.95–0.98] for spelling, ICC = 0.98 [0.97–0.99] for legibility and ICC = 0.99 [0.98–0.99] for punctuation.

the first author's university. Ten per cent of student text samples were double coded to estimate reliability, which was acceptable (κ = 0.812, ICC = 0.99).

Language background

Information about students' language background was obtained from students' teachers. Teachers indicated whether Norwegian was a student's first language or second language or whether a student was bilingual, with Norwegian and another language both as native languages.

Procedures

Data was collected within the context of a large-scale writing research project,[5] and all data collection was performed by students' teachers. We opted for teacher-led data collection for two reasons. First, it is uncommon for young students to participate in standardized testing activities. Formal grades are not introduced until Grade 8, and students sit for their first high stake test in Grade 10 in Norway. We suspected that letting teachers administrate the tests in the frames of ordinary instruction would lower the risk of students feeling uncomfortable or pressured by the testing situation. Second, the scale of the project made it impossible for us to administrate all tests.

To reduce possible variations of how measures were administrated, we gave teachers detailed instructions on how to administer the tests. We supplied teachers with written instruction for each test (two "purposeful writing" tasks, one copy task, two attitude tasks, and one self-efficacy task). We also supplied teachers with video instructions on how to perform the "purposeful writing" tasks and the copying task. Students were also shown the video for the copying task. Further, all teachers were invited to online seminars in which the research team provided information on how tasks should be administrated. In these latter seminars we stressed that teachers should only proceed with test administration after they had assessed their students to understand the task at hand.

Test administration took place in a fifteen-day window in May and June of 2021, and task administration was counterbalanced. Once teachers had completed the administration of all tasks, student responses were sent by mail to the research team. All texts were anonymized and information about gender and language background was masked prior to coding.

Statistical analysis

Before conducting statistical analyses, the two scores for writing quality were averaged together to obtain a single score used in all analyses. The same procedure was applied with the two attitudes toward writing scores.

Various statistical models were fit to examine the effects of several independent variables on three dependent variables: (1) scores for self-efficacy for writing self-regulation; (2) scores for attitude toward writing; and (3) text quality scores. Since students were nested within classrooms which were nested within schools, linear multilevel regression models (MLMs) were used to account for this clustered structure of the data. Specifically, the cluster structure resulted in the use of linear models with three levels, where students, classrooms, and schools were denoted as levels 1, 2, and 3, respectively. For both dependent variables, a "null" model with no predictors was fit to assess the correlation structure of the data resulting from the clustering. This correlation was expressed using intraclass correlation coefficients (ICCs). For three-level MLMs, there are two possible ICCs, one expressing the correlation between two students randomly sampled from the same class (same school) and one expressing the correlation between two students randomly sampled from the same school (different classes).

Next, for each dependent variable, models were fit containing both student-level (level 1) predictors and school-level (level 3) predictors. For the model with self-efficacy for writing self-regulation as the dependent variable, the student-level predictors included gender, language, and age (a control variable expressed in months). The school-level control variables included school size, national test scores, proportion of certified teachers, school hours per student and students per special education teacher. The model with attitude toward writing as the dependent variable applied the same student- and school-level predictors and control variables. The model with text quality as the dependent variable had the same student- and school-level predictors and control variables described for the first model, as well as handwriting fluency mean, attitude toward writing mean, and self-efficacy for writing self-regulation as level-1 predictors. In the models for all three dependent variables, the gender predictor was binary, and the language predictor had three levels: (1) native Norwegian speaker, (2) bilingual, and (3) a language other than Norwegian as the primary language. The native Norwegian level of the language predictor was taken as the reference level, and this contributed to the model coefficients for the other two levels. All other predictors were numeric.

The numeric predictors, as well as the binary gender predictor, were centered according to the recommendations of Enders and Tofighi (2007) and Brincks et al. (2017). Specifically, the student level predictors were centered relative to the mean of classroom to which the student belonged. Enders and Tofighi (2007) state that this centering within cluster approach, as opposed to centering relative to the grand mean, results in a pure estimate of the student-level relation between the predictor and dependent variable. On the other hand, the school-level predictors were centered according to the grand mean, as that is the only option for the highest level of the hierarchy.

Results

ICCs

The estimated variance components and ICCs obtained from the null models for both dependent variables are displayed in **Table 2**. The correlation due to clustering was stronger for text quality than for self-efficacy for writing self-regulation and attitude for writing. Specifically, the estimated correlation of text quality for two randomly selected students in the same classroom (same school) was 0.211 versus 0.059 for self-regulation and 0.076 for

5 This was an intervention project targeting writing development. The intervention failed to produce differences in text quality, handwriting fluency and attitude toward writing between students in the control group and in the intervention group (Skar et al., 2023). Because of this we have opted to not to include any subgroup (i.e., control group, intervention group) analyses in this investigation.

TABLE 2 Variance components and ICCs for dependent variables.

Quantity	Self-efficacy	Attitude	Text quality
σ_e^2 (student variance)	1.246	0.196	0.238
σ_c^2 (class variance)	0.058	0.008	0.027
σ_s^2 (school variance)	0.020	0.008	0.037
ICC (class)	0.059	0.076	0.211
ICC (school)	0.015	0.040	0.122

Attitude, attitude toward writing.

attitude. Similarly, the estimated correlation of text quality for two students in the same school (different classroom) was 0.122, versus 0.015 for self-efficacy for writing self-regulation and 0.040 for attitude.

Self-efficacy as the dependent variable

Table 3 displays regression results for the linear MLM with self-efficacy for writing self-regulation as the dependent variable. The only predictor that was statistically significant was gender: on average, girls score about 0.341 points higher, on average, than boys. The model R^2 was computed using the method described by Snijders and Bosker (2012) for three-level MLMs. The estimated value of R^2 was 0.050, indicating that the predictors explained 5% of the variation in self-regulation scores.

Attitude toward writing as the dependent variable

Table 4 provides the regression results for the model with attitude as the dependent variable. The results are similar to the model with self-efficacy as the dependent variable, as gender was a statistically significant predictor in both models, the school-level variables were not significant in either model, and both models showed a relatively weak R^2 value (0.092 for the model predicting attitude). Interestingly, however, language turned out to be a statistically significant predictor of attitude but not self-efficacy. As seen in Table 4, on average, bilingual students scored 0.076 points higher on attitude than students with Norwegian as their first language, and students that had another language than Norwegian as their first language scored about 0.119 points higher on attitude than students with Norwegian as their first language.

Text quality as the dependent variable

Table 5 presents the regression results for the MLM with text quality as the dependent variable. Similar to the model above, gender was statistically significant: girls scored about 0.165 points higher than boys, on average. In addition, handwriting fluency, attitude, toward writing, self-efficacy for writing self-regulation, and language status were statistically significant level-one variables, and national test scores was a statistically significant level-three variable. For example, for every one-unit increase in attitude toward writing, we expect text quality to increase by 0.121. Also, the model R^2 was 0.311, signifying that the predictors and control variables collectively explained a bit over 30% of the variation in text quality.

While Table 5 displays the statistical significance of the predictors, it is also useful to assess their practical significance, i.e., their ability to explain the variation in the dependent variable text quality. To this end, Table 6 displays the variance in text quality explained (i.e., the amount of R^2 contributed) for self-efficacy, attitude toward writing, and self-efficacy and attitude toward writing taken together. For example, for the first row in Table 6, the model was refit with the self-efficacy of self-regulation for writing removed. This model had a R^2 of 0.305. Comparing to the full model with $R^2 = 0.311$, we conclude that the self-efficacy predictor contributed approximately 0.311–0.305 – 0.006 to the R^2 of the full model. Thus, while Table 5 shows that self-regulation had a statistically significance (i.e., a "real") effect, Table 6 shows that this effect was weak. Coincidentally, attitude toward writing contributed approximately the same amount of R^2 of the full model, so our conclusions about attitude toward writing were essentially the same as for self-efficacy of self-regulation for writing.

Discussion

In the current study, we examined if gender and language status of Grade 2 Norwegian students each made a separate and unique contribution to predicting the writing motivational beliefs of self-efficacy for writing self-regulation and attitude toward writing. Even more importantly, we examined if these two writing motivational beliefs each made separate contributions to predicting the quality of students' writing. To enhance the precision of our analyses, we controlled for variance related to the contribution of multiple individual- and school-level factors.

Efficacy, attitudes, gender, and language status

The Grade 2 Norwegian students in this study were confident in their capabilities to self-regulate their writing and they expressed a highly positive attitude toward writing. On a 6-point scale, with a score of 6 representing the highest level of confidence, the average score of participating Grade 2 students was 4.50. Young students have evidenced high-levels of efficacy in other studies (e.g., Pajares and Schunk, 2001: Traga Philippakos and MacArthur, 2020; Traga Philippakos and Voggt, 2021). There are multiple possible reasons for this including difficulty assessing efficacy at such a young age or over-estimating efficacy as a protective mechanism (e.g., to hide that writing can be difficult). In any event, research is needed to replicate our finding with such young children and better explore why efficacy is so elevated if our finding is replicated.

Likewise, on a 3-point scale, with a score of 3 representing the most positive attitude toward writing, students' average score was 2.50. It should be noted that variability was particularly pronounced for the self-efficacy scores for writing self-regulation, with the standard deviation exceeding 1 point of the 5-point scale. It was slightly less pronounced for attitude toward writing, with a standard deviation of about one-half of a point on the 3-point scale. Consequently, many students' scores on the self-efficacy and the

TABLE 3 Regression results for linear MLM with self-efficacy as the dependent variable.

Parameter	Estimate	Std. error	*t*-value	*P*-value
Intercept	4.562	0.044	102.866	<0.001
Gender: girls	0.341	0.051	6.708	<0.001
Language: bilingual	0.010	0.084	0.121	0.903
Language: other	−0.007	0.105	−0.070	0.944
Age	0.004	0.008	0.591	0.555
School size	0.000	0.000	0.784	0.437
Nation test	0.023	0.017	1.372	0.178
Proportion cert	−0.009	0.010	−0.919	0.364
Students/Sp. Ed	0.002	0.001	1.448	0.155
Hours	0.003	0.005	0.523	0.604

Model $R^2 = 0.050$.

TABLE 4 Regression results for linear MLM with attitude as the dependent variable.

Parameter	Estimate	Std. error	*t*-value	*P*-value
Intercept	2.448	0.020	123.334	< 0.001
Gender: girls	0.241	0.020	12.279	< 0.001
Language: bilingual	0.076	0.033	2.311	0.021
Language: other	0.119	0.042	2.867	0.004
Age	−0.003	0.003	−0.968	0.333
School size	0.000	0.000	0.893	0.377
Nation test	0.001	0.008	0.084	0.933
Proportion cert	0.007	0.004	1.670	0.103
Students/Sp. Ed	0.000	0.001	0.647	0.521
Hours	0.003	0.002	1.336	0.189

Model $R^2 = 0.092$.

TABLE 5 Regression results for linear MLM text quality as the dependent variable.

Parameter	Estimate	Std. error	*t*-value	*P*-value
Intercept	3.235	0.029	110.586	<0.000
HWF	0.018	0.001	19.443	<0.000
Attitude	0.121	0.024	5.015	<0.000
Self-efficacy	0.046	0.009	4.947	<0.000
Gender: girls	0.165	0.020	8.389	<0.000
Language: bilingual	−0.015	0.032	−0.476	0.634
Language: other	−0.176	0.042	−4.208	<0.000
Age	0.009	0.003	3.349	0.001
School size	0.000	0.000	0.146	0.884
Nation test	0.043	0.012	3.683	0.001
Proportion cert	0.007	0.007	1.002	0.322
Students/Sp. Ed	0.000	0.001	0.017	0.987
Hours	0.001	0.003	0.234	0.816

Model $R^2 = 0.311$.

attitude toward writing scales were very close to the ceiling score for each of these measures.

The overall positive ratings for self-efficacy in this study are consistent with the observation by Pajares (2003) in his review of the literature that students in the earliest grades believe they can write. The present study provides the first evidence that children as early as Grade 2 are confident about their capability to self-regulate writing, at least for the types of skills assessed by the measure used in this study. Further research is needed to replicate this positive sense of efficacy and to expand its exploration. For instance, it would be helpful to know how beginning writers' efficacy for writing self-regulation compares to their efficacy for generating and organizing ideas when writing; efficacy for applying foundational writing skills such as handwriting, spelling, grammar, and sentence construction; and efficacy for successfully completing writing tasks that vary in difficulties (e.g., writing a sentence, writing a paragraph, writing a story). It would also be fruitful to examine if providing students with a referent for judging their self-efficacy for writing self-regulation would influence judgments. For example, students could be asked to judge their capabilities in comparison to their classmates (see Graham et al., 1993). This may change young students' sense of efficacy for writing self-regulation because it provides a more concrete reference point for considering this capability.

The overall positive ratings for attitude toward writing in the current study are also consistent with the conclusions drawn by Ekholm et al. (2018) that beginning writers are positive about writing. Additional research is needed to replicate this finding, as well as our finding concerning self-efficacy for writing self-regulation, with students from different countries and cultures. Motivational beliefs such as these are not culturally or contextually neutral (see Klassen et al., 2009; Graham et al., 2022). Further, our measure of writing attitudes was directly tied to compositions that students wrote. It would be interesting to determine if similar outcomes are obtained with beginning writers when this is not the case or when students are asked to evaluate what they wrote before making an attitudinal judgment.

As predicted, girls were more confident than boys about their writing self-regulation capabilities. They also expressed a more positive attitude toward writing than boys. These findings are consistent with outcomes reported in previous investigations (Pajares, 2003; Ekholm et al., 2018). Additional research is needed to determine why such gender differences occur. It is possible that

TABLE 6 Contributed R^2 for self-efficacy, attitude toward writing, and both collectively.

Variable removed	R^2	Difference from full model (i.e.,R^2 contributed by variables)
Self-efficacy	0.305	0.006
Attitude	0.305	0.006
Self-efficacy + attitude	0.290	0.021

the observed differences in writing motivational beliefs between girls and boys was not a function of gender *per se*, but a consequence of gender stereotypical beliefs. For instance, Pajares and Valiante (2001) found that gender differences in middle school students' writing self-efficacy were no longer evident when their gender orientation beliefs were considered. It is possible that children believe that writing is more of a feminine-domain, fostering the belief that girls are more competent writers than boys. We think that is especially important for teachers and parents to address such stereotypes. One way of doing this is for adults to consistently express the opinion that writing is the domain of both boys and girls and both groups of children can each be effective and successful writers.

Our prediction concerning the relationship between students' language status (Norwegian as first language, Norwegian and another language both as first language, or Norwegian as second language) and self-efficacy for writing self-regulation and attitude toward writing was only partially supported. Language status was not statistically related to self-efficacy for writing self-regulation, but students who had both Norwegian and another language as a first language as well as students for whom Norwegian was a second language had a more positive attitude about writing than student with just Norwegian as a first language. It is possible that students who were native speakers of Norwegian and another language had more positive attitudes because learning two languages boosted their cognitive and/or language capabilities (e.g., Bialystok, 2001). Since writing is a cognitive activity that relies on language skills to express ideas and thoughts, this may have enhanced students' writing, resulting in a more positive valence toward writing. Unfortunately, this explanation is at odds with our findings that students learning Norwegian as a second language had higher a more positive attitude toward writing than native speaking Norwegians. It is possible that students learning Norwegian as a second language may have interpreted the items on the attitude scale differently than the other two groups of children. It is also possible that students who are still learning Norwegian are more positive than native speakers about the opportunity to write in this new language. In any event, assuming our findings concerning language status, writing attitudes, and self-efficacy are replicated, additional research will be needed to untangle these relationships.

Efficacy, attitude, and writing quality

As predicted, both self-efficacy for writing self-regulation and attitude toward writing each made a statistically significant and unique contribution to predicting the quality of Grade 2 students' writing after controlling for the other writing belief, age, handwriting fluency, and school-level factors of school size, national test scores, proportion of certified teachers, school hours per student, and number of students per special education teacher. These findings are generally consistent with outcomes in previous research conducted mostly with older students (Pajares, 2003; Ekholm et al., 2018). Our findings replicated the work of Graham et al. (2007, 2012) showing that attitudes toward writing can predict the writing performance of beginning writers but extends previous work involving writing self-efficacy by demonstrating that efficacy for writing self-regulation predicts the quality of beginning writers' text.

Any claims derived from these findings about the predictive value of self-efficacy for writing self-regulation and attitudes toward writing must be mitigated by fact that collectively these two writing motivational beliefs accounted for only 2% of the variability in the quality of students' text once variability associated with handwriting fluency, age, gender, language status, and the five school-related variables were controlled. This raises questions about the possible theorized effects on writing of these two writing motivational constructs for beginning writers (Hayes, 1996; Zimmerman and Risemberg, 1997; Graham, 2018). Further, the finding that self-efficacy for writing self-regulation only accounted for a unique 1% of the variance in writing quality was consistent with the claim by Berninger and Amtmann (2003) that self-regulation effects take time to be realized. It is possible that in second grade the hypothesized effects of writing efficacy and attitudes on students' writing are weaker than anticipated or that their effects are indirectly realized through their interaction and association with other individual and contextual variables. Assuming that our results are replicated, models can be derived and tested to more precisely determine the direct and indirect effects of our two writing motivational measures.

It is also important to realize that our study only assessed one aspect of self-efficacy (self-regulation) and our measure of writing attitude included items that assessed the affective and cognitive aspects of attitude, but not motivational ones (see Ekholm et al., 2018). Future research needs to expand the attributes of writing efficacy and attitudes assessed with children this young. It is possible the inclusion of other aspects of these two writing motivational beliefs will strengthen their predictive value. Further, the findings from this investigation may underestimate the predictive value of self-efficacy for writing self-regulation and attitude toward writing. The means for both measures were relatively high and the standard deviations large enough that ceiling effects were possible. Ceiling effects can attenuate relationships between predictors and outcome measures, resulting in smaller correlation (Nunnally and Bernstein, 1994). Thus, future research in this area with beginning writers will need to address this issue.

While gender, language status, handwriting fluency, and national test scores of participating students' schools were control variables, each made a unique and statistically significant contribution to predicting the quality of students' writing. These outcomes are consistent with prior research demonstrating that girls are better writers than boys (Reilly et al., 2018), writing outcomes differ by language status (Camping et al., 2020), handwriting fluency is related to quality of students' writing

(Graham et al., 1997; Kent and Wanzek, 2016; Skar et al., 2022), and school-level factors predict students' writing performance (Walberg and Ethington, 1991).

Limitations and implications

When interpreting the results of this investigation, it is important to keep three limitations in mind. One, while the study sample was large and representative of Grade 2 students in Norway, the findings do not necessarily generalize to countries with different social and cultural backgrounds. Likewise, such effects may vary depending upon the curricula and instructional approach to writing that is emphasized. We suspect that research conducted in countries with similar cultural, social, institutional, historical, and political backgrounds to Norway would be more likely to produce similar findings to ours than countries that differ significantly on one or more of these factors (Graham, 2018). Students exposed to similar instructional or curricular materials would also be more likely to yield similar patterns of relationships than writing programs that differ considerably. However, additional research is needed to substantiate these predictions.

Two, while students wrote two different texts as part of the study, these texts did not represent the full range of writing that young Norwegian students commonly complete at school (see Graham et al., 2021). Thus, the relations obtained in this study between text quality, efficacy for writing self-regulation, and attitude toward writing may differ when different kinds of writing are investigated. Three, we did not assess all aspects of writing efficacy and attitudes, and outcomes could differ depending on what is tested. Four, we did not administer a test of language proficiency in this investigation. This may have provided a better measure of language status versus whether students were classified as L1, L2, or bilingual. Finally, future investigations could include more measures, such as teachers' educational background to add even more precision in the model.

Despite these limitations, the current study demonstrated that the young beginning writers in this study were positive about their efficacy for writing self-regulation and had positive attitudes about what they wrote. Because some students' positive beliefs about writing can decline over time (Pajares, 2003; Graham, 2006), we encourage teachers to nourish students' writing confidence and views about writing as they progress through the grades. Moreover, girls in this study created texts that were judged to be of higher quality than text produced by boys. They also viewed writing more positively and were more efficacious about their capabilities to self-regulate writing. Like Pajares (2003), we think these differences were a result of gender stereotypic beliefs about writing and not gender *per se*. A challenge for teachers and parents, therefore, is to change children's view of writing so that it is perceived as valuable, relevant, and pertinent for both boys and girls.

The self-efficacy for writing self-regulation and attitude toward writing measure used in this study collectively accounted for only 2% of the variance in the quality of students' writing. It is possible that this was the case because the young children in this study had limited opportunities to form such judgements about such beliefs, attenuating their possible effects on students' writing. Teachers can potentially strengthen these linkages by increasing how much students' write; providing them with positive writing experiences, asking students to identify how the processes, strategies, and skills they apply strengthen their writing; and providing such feedback to students themselves.

Finally, while the findings of this study are descriptive and correlational, and great care must be taken in drawing educational implications from such data, we offer the following observations for educational practice. First, because attitude toward writing and self-efficacy for self-regulation each uniquely predicted the quality of young students' writing, teachers want to keep both of these motivational beliefs in mind when teaching writing. This includes putting into place procedures known to promote a positive sense of efficacy as well as attitude toward writing. For instance, teachers can potentially promote efficacy for self-regulation by engaging students in tasks where they successfully regulate the writing process (i.e., mastery experiences), observe other students or the teacher use writing self-regulation procedures successfully (i.e., vicarious experiences), and by telling students they are capable of regulating the writing process or providing them with feedback when they do so (i.e., persuasion). As Bandura (2006) noted, each of these sources of information can enhance efficacy. In terms of attitude toward writing, teachers can potentially promote a positive point of view by providing students with choice when selecting writing topics, having students work together when writing and supporting students as they write to ensure success, and teaching students needed and important writing skills and strategies (Ekholm et al., 2018). Second, the findings from this study suggest that primary grade teachers need to monitor the attitudes and efficacy of the all students in their class. For example, boys are likely to view writing more negatively than girls and believe they are less efficacious than girls with regards to their capabilities to regulate the writing process. This may well be due to stereotypical beliefs that girls are better writers than girls. Teachers and parents need to actively promote a different view—both boys and girls are capable writers. This belief needs to be stated frequently and reinforced. Likewise, based on the findings from this investigation, it is important to monitor the writing attitudes of young students whose language status differ and apply the types of instructional procedures identified above that promote more positive attitudes toward writing.

Author's note

This study was registered with the Norwegian center for research data (Identifier 848410).

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors.

Ethics statement

The studies involving humans were approved by the Norwegian Center for Research Data (Identifier 848410). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

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Supplementary material

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The role of writing motives in the interplay between implicit theories, achievement goals, self-efficacy, and writing performance

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It is well established that students' motivation for writing is a key predictor of their writing performance. The aim of the current study is to study and map the relations underlying different motivational constructs (i.e., implicit theories, achievement goals, self-efficacy, and writing motives) and to investigate how these contribute to students' writing performance. For that, 390 Flemish students in stage three of the academic track of secondary education (16–18 years old) completed questionnaires measuring their implicit theories of writing, achievement goals, self-efficacy for writing, and writing motives. Furthermore, they completed an argumentative writing test. Path analysis revealed statistically significant direct paths from (1) entity beliefs of writing to performance avoidance goals (β=0.23), (2) mastery goals to self-efficacy for writing ($\beta_{argumentation}$=0.14, $\beta_{regulation}$=0.25, $\beta_{conventions}$=0.18), performance-approach goals to self-efficacy for writing ($\beta_{argumentation}$=0.38, $\beta_{regulation}$=0.21, $\beta_{conventions}$=0.25), and performance-avoidance goals to self-efficacy for writing ($\beta_{argumentation}$=−0.30, $\beta_{regulation}$=−0.24, $\beta_{conventions}$=−0.28), (3) self-efficacy for regulation to both autonomous (β=0.20) and controlled motivation (β=−0.15), (4) mastery goals to autonomous motivation (β=0.58), (5) performance approach and avoidance goals to controlled motivation (β=0.18; β=0.35), and (6) autonomous motivation to writing performance (β=0.11). This study moves the field of writing motivation research forward by studying the contribution of implicit theories, achievement goals, and self-efficacy to students' writing performance, via writing motives.

KEYWORDS

writing performance, implicit theories, achievement goals, self-efficacy, writing motives

1. Introduction

To become proficient writers, students need to learn to skillfully manage production processes (e.g., idea generation and translating ideas into text), apply control mechanisms (e.g., monitoring the writing process), and rely on their long-term memory resources to retrieve, for instance, content and writing knowledge (Graham, 2018a,b). A great deal of effort and engagement is required in learning to manage such a complex skill as writing. To become a good writer and master this challenging skill, motivation is crucial for both initiating and sustaining persistence (Graham, 2018a,b; Camacho et al., 2021a). Writing motivation has been studied

from various theoretical frameworks, leading to different but interrelated motivational concepts (Camacho et al., 2021a). The current study derives from self-theories (ST; Dweck, 1999), achievement goal theory (AGV; Elliot and Harackiewicz, 1996; Elliot and Church, 1997), self-efficacy theory (SET; Bandura, 1997), and self-determination theory (SDT; Ryan and Deci, 2000b, 2020) to study students' implicit theories of writing, writing achievement goals, self-efficacy for writing, and writing motives, respectively. More particularly, we aim to disentangle how these different motivational concepts are related and how this complex interplay between motivational constructs contribute to students' writing performance. In what follows, we conceptualize the motivational concepts central in this study and present the hypothesized relational model linking these concepts with each other and with writing performance.

2. Theoretical and empirical background

2.1. Implicit theories of writing

Based on self-theories (ST; Dweck, 1999), implicit theories pertain to students' beliefs regarding a particular skill, such as reading, writing, or learning, and whether it is innate and unchangeable (i.e., entity theories or entity beliefs) or can be acquired or developed through dedication and hard work over time (i.e., growth theories or growth beliefs). Within the empirical writing research field, implicit theories of writing are considered an understudied motivational concept (Camacho et al., 2021a). Nevertheless, the few studies available provide evidence on the relation between implicit theories of writing and students' writing performance by revealing that students with incremental beliefs of writing perform better in writing (Limpo and Alves, 2017; Camacho et al., 2022). Interestingly, these studies showed that implicit theories were not only directly related to writing performance (Camacho et al., 2022), but also indirectly via achievement goals and self-efficacy for writing (Limpo and Alves, 2017). For instance, Limpo and Alves (2017) showed that entity theories of writing were negatively related to mastery goals, which, in turn, contributed positively to writing performance via self-efficacy for regulation.

2.2. Writing achievement goals

Writing is a goal-directed activity in which a (community of) writer(s) purposefully writes a text to a certain audience to achieve a certain goal (e.g., persuade, inform) (Graham, 2018a,b). According to achievement goals theorists (AGT), writers can have different reasons for pursuing specific writing goals. The trichotomous model of achievement goals, which is most widely applied in writing research, distinguishes mastery-oriented, performance-approach, and performance-avoidance goals (Elliot and Harackiewicz, 1996; Elliot and Church, 1997). Following this trichotomous model, mastery-oriented writers commit to writing for the sake of the act itself and to become skillful in mastering it. Performance-oriented writers are directed to maximize their perceived competence. Avoidance-oriented writers tend to avoid the appearance of incompetence in writing. Within the empirical writing research field, the relation between achievement goals and students' writing performance has been studied across text genres and across educational levels (Camacho et al., 2021a). In general, writing research studies are rather consistent on the direct positive association between mastery-oriented goals and students' writing performance on the one hand (Pajares and Cheong, 2003; Kaplan et al., 2009; Camacho et al., 2022), and the direct negative relation between performance-approach and avoidance goals and students' writing performance on the other hand (Pajares and Cheong, 2003; Hamilton et al., 2013; Troia et al., 2013; Camacho et al., 2022). However, prior studies also showed that the role of writing achievement goals to predict students' writing performance becomes more complex when other motivational variables are considered as well (e.g., self-efficacy for writing). For instance, Limpo and Alves (2017) and Soylu et al. (2017) showed that performance goals were indirectly related to writing performance via self-efficacy. However, the studies were not consistent in their findings. More particularly, Limpo and Alves (2017) found that mastery goals positively contributed to writing performance via self-efficacy for regulation. Contrarily, Soylu et al. (2017) did not find any direct or indirect relations between mastery goals and writing performance. However, they did find an indirect positive path between achievement-performance goals and writing performance and an indirect negative path of performance-avoidance goals and writing performance, both via self-efficacy for conventions. In sum, the indirect role of writing achievement goals in predicting students' writing performance via other motivational concepts, such as self-efficacy, remains unclear.

2.3. Self-efficacy for writing

According to self-efficacy theory (SET; Bandura, 1997), self-efficacy beliefs pertain to one's expectations of perceived capability. These self-efficacy beliefs impact how one will approach the task, the level of effort and persistence one brings to the task, and ultimately one's actual performance. In the writing research field, students' self-efficacy for writing is the most widely studied motivational construct and is considered as a key predictor of students' writing performance (Camacho et al., 2021a). In this respect, the conceptualization of Bruning et al. (2013) is often used to study students' self-efficacy for ideation (i.e., self-beliefs about the ability to generate ideas), conventions (i.e., self-beliefs about the ability to adhere to and apply writing rules), and regulation (i.e., self-beliefs about the ability to regulate behavior and emotions during writing). Prior writing research studies adopting this three-dimensional model to study the role of self-efficacy on students' writing performance, resulted in mixed findings. More particularly, both Soylu et al. (2017) and Zumbrunn et al. (2020) found positive associations between self-efficacy for conventions and students' scores on a statewide writing assessment and on students' writing grades, respectively. Limpo and Alves (2017) and Camacho et al. (2021b), in turn, reported on positive relations between self-efficacy for regulation and students' writing performance. Finally, De Smedt et al. (2016) did not find any evidence on the predictive role of self-efficacy for conventions or regulation on writing performance, but they did report a positive relation between self-efficacy for ideation and text quality. Furthermore, in a subsequent structural equation modeling study, De Smedt et al. (2018b) explored motivational and cognitive predictors of writing performance and results revealed no direct relation between self-efficacy for writing and

writing performance when writing motives (i.e., autonomous and controlled writing motivation) were taken into account. In sum, the predictive role of different self-efficacy beliefs for writing (i.e., ideation, conventions, and regulation) on students' writing performance remains unclear, especially when other motivational predictors, such as writing motives, are simultaneously studied.

2.4. Writing motives

Self-determination theory (SDT) is a theory of human motivation that has been developed through empirical research. It is particularly attractive to educational researchers due to its unique conceptualization of motivation, which redefines the traditional distinction between intrinsic and extrinsic motivation. More particularly, SDT conceptualizes subtypes of motivation with differing levels of regulation resulting in a continuum: amotivation (i.e., absence of motivation), external regulation (i.e., driven by external pressure), introjected regulation (i.e., driven by internal pressure), identified regulation (i.e., driven by values), and intrinsic regulation (i.e., driven by inherent fulfillment) (Ryan and Deci, 2000b, 2020). Based on SDT, writing researchers differentiated between autonomous and controlled motives for writing instead of intrinsic and extrinsic motives (De Smedt et al., 2020a,b, 2022). While autonomously motivated writers personally endorse the value of writing or inherently enjoy writing, controlled motivated writers are driven by externally or internally imposed rewards and punishments. In line with the core hypotheses of SDT, studies in the field of writing research showed that autonomously motivated students write texts of higher quality compared to texts produced by more controlled motivated students (De Smedt et al., 2016, 2018b; Rasteiro and Limpo, 2022). Despite this empirical evidence on the relations between writing motives and performance, research on writing motives and how these relate to other motivational writing constructs, is still scarce within the writing research field.

3. The relational model

As outlined in the theoretical background, writing motivation has been studied from various theoretical frameworks, leading to different but interrelated motivational concepts (i.e., implicit theories of writing deriving from ST, writing achievement goals deriving from AGT, self-efficacy for writing deriving from SET, and writing motives deriving from SDT). In the current study, we aim to disentangle how these different motivational concepts are related and how these contribute directly or indirectly to students' writing performance. This study builds on prior studies in which the relations between implicit theories of writing and achievement goals (e.g., Camacho et al., 2022) and the relations between achievement goals and self-efficacy for writing (Soylu et al., 2017) are studied in view of predicting students' writing performance. In this respect, the study of Limpo and Alves (2017) is particularly inspiring as they studied how implicit theories relate to achievement goals (see Figure 1, *H1*), which, in turn, are associated with self-efficacy for writing (see Figure 1, *H2*), which ultimately relates to writing performance (see Figure 1, *H3*). The hypothesized relational model that was studied by Limpo and Alves (2017) is visualized in black in Figure 1. The results of this model are presented in detail in sections 3.1, 3.2, and 3.3. The current study expands the relational model of Limpo and Alves (2017) by including students' writing motives in the hypothesized relational model (extensions in blue in Figure 1). There is increased attention in the writing research field to study writing motives as conceptualized by SDT (De Smedt et al., 2018a,b, 2020b, 2022). Despite the empirical evidence on the relations between writing motives and performance, research on writing motives and how these relate to other motivational writing constructs, is still limited. In the current study, we aim to understand the role of writing motives in the complex interplay of motivational predictors and students' writing performance. We therefore also study the relations between achievement goals and writing motives (*H4*), self-efficacy and writing motives (*H5*), and writing motives and writing performance (*H6*). In sections 3.4, 3.5, and 3.6 we will present the hypothesized relations between writing motives and achievement goals, self-efficacy, and writing performance. Finally, in section 3.7, we will present assumed indirect paths in the hypothesized relational model based on prior research.

3.1. Hypothesis 1 (*H1*): Implicit theories are related to achievement goals

According ST (Dweck, 1999) in general and based on the studies of Camacho et al. (2022) and Limpo and Alves (2017) in particular, we hypothesize that implicit theories reflecting a fixed mindset are positively associated with performance-avoidance goals and negatively related to mastery goals.

3.2. Hypothesis 2 (*H2*): Achievement goals are related to self-efficacy beliefs

We anticipate that (a) mastery goals are positively associated with the three types of self-efficacy (i.e., ideation, conventions, regulation; Limpo and Alves, 2017), (b) performance-approach goals are positively related to all three dimensions of self-efficacy for writing (Soylu et al., 2017), and (c) performance-avoidance goals are negatively related to all three dimensions of self-efficacy beliefs for writing (Soylu et al., 2017).

3.3. Hypothesis 3 (*H3*): Self-efficacy beliefs are related to writing performance

Although self-efficacy for writing is considered a key predictor of writing performance (Camacho et al., 2021a), studies revealed mixed results on the predictive role of self-efficacy when conceptualized as a three-dimensional construct (i.e., ideation, conventions, and regulation) and when simultaneously other motivational constructs are considered (Limpo and Alves, 2017; Soylu et al., 2017). Based on De Smedt et al. (2018b) who did not find a direct relation between self-efficacy for writing and writing performance when taking into account writing motives, we hypothesize no direct association between self-efficacy for writing and writing performance.

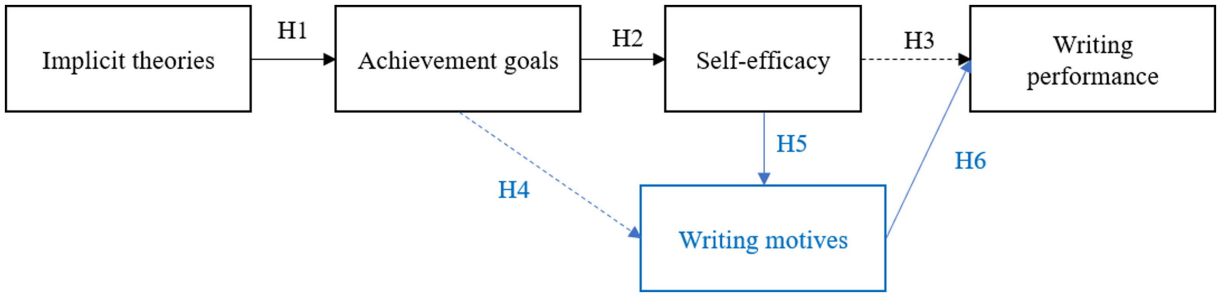

FIGURE 1
Hypothesized relational model. *H1*, *H2*, and *H3* were studied in Limpo and Alves (2017). The current study expands this by additionally including *H4*, *H5*, and *H6* in the relational model (in blue).

3.4. Hypothesis 4 (*H4*): Achievement goals are related to writing motives

Deci and Ryan (2000) claimed that to understand the effect of achievement goals on human behavior, it is crucial to understand why people pursue them and thus to consider people's motives. In this respect, Dweck (1985) theorized that when students are oriented toward mastery goals, the intrinsic motivation system is involved in initiating and sustaining the activity, while performance-approach or performance-avoidance goals can undermine intrinsic motivation. The alignment between achievement goals and extrinsic motivation is, however, not that straightforward given the full array of extrinsic motivations within SDT as presented in the theoretical background (Deci and Ryan, 2000). In line with prior writing research deriving from the SDT perspective (De Smedt et al., 2020b), we opted for including autonomous and controlled motivation (instead of intrinsic and various types of extrinsic motivation). We refrain from posing hypotheses on the relations between achievement goals and writing motives for two reasons. First, although motivational theorists have pointed out the alignment between AGT and SDT by studying the relations between achievement goals and extrinsic and intrinsic motives (Dweck, 1985; Elliot and Harackiewicz, 1996; Deci and Ryan, 2000), there is no empirical research to date relating the trichotomous model of achievement goals with autonomous and controlled motivation. Second, the current study is the first to introduce possible relations between achievement goals and writing motives within the writing research field.

3.5. Hypothesis 5 (*H5*): Self-efficacy beliefs are related to writing motives

In SDT, it is hypothesized that the fulfilled need for competence has a direct relation with motivation, indicating the association between self-efficacy beliefs and motives (Sweet et al., 2012; Kyndt et al., 2019). Based on prior research on students' learning, indicating the positive relation between self-efficacy and autonomous motivation (Katz et al., 2014), we anticipate that students' self-efficacy for writing is positively related to autonomous writing motives. We refrain from posing specific hypotheses on which types of self-efficacy (i.e., ideation, conventions, regulation) relate to which types of writing motives (i.e., autonomous, controlled) as no prior studies within the writing research field have studied the relation between self-efficacy beliefs and writing motives in such depth.

3.6. Hypothesis 6 (*H6*): Writing motives are related to writing performance

In line with the core hypotheses of SDT (Ryan and Deci, 2000b, 2020) and based on prior empirical writing research studies (De Smedt et al., 2016, 2018b; Rasteiro and Limpo, 2022), we expect autonomous writing motives to be positively related to writing performance, while controlled writing motives will be negatively associated with writing performance.

3.7. Hypothesized indirect paths

Next, to the abovementioned hypothesized direct paths, we also investigated possible indirect paths. Based on the model of Limpo and Alves (2017) we study the indirect paths between (1) implicit theories and self-efficacy, via achievement goals (*H1* + *H2*) and (2) achievement goals and writing performance, via self-efficacy (*H2* + *H3*). More particularly, we hypothesize that implicit theories reflecting a growth mindset will positively contribute to self-efficacy for conventions, argumentation, and regulation, via mastery goals (Limpo and Alves, 2017). Additionally, we anticipate that mastery goals will be related indirectly to writing performance, via self-efficacy for regulation (Limpo and Alves, 2017).

Given the novelty of including writing motives in the relational model, we refrain from posing specific hypotheses related to the indirect paths between (1) implicit theories and writing motives, via achievement goals (*H1* + *H4*), (2) achievement goals and writing motives, via self-efficacy (*H2* + *H5*), (3) achievement goals and writing performance, via writing motives (*H4* + *H6*), and (4) self-efficacy and writing performance, via writing motives (*H5* + *H6*).

4. Methodology

4.1. Participants

Secondary education in Flanders is aimed at students aged 12–18. The structure of secondary education comprises three stages (each consisting of 2 years). This study focusses on students who are enrolled in stage three of the academic track which prepares students to pass on to tertiary education. In total, 390 Flemish students in stage three of the academic track of secondary education participated (16–18 years

old). The majority of the students identified themselves as female (62.3%), while 37.7% identified themselves as male. 85.1% of the participants were Dutch (the language of instruction) speaking, 7.7% spoke a foreign language at home, and 7.7% were bilingual (i.e., speaking Dutch and another foreign language at home). According to the attainment targets in Flanders, students in stage three of the academic track are expected to be able to write argumentative texts. However, instruction on how writing is taught and the time spent on writing in Flemish classes varies considerably (De Smedt et al., 2016; De Smedt and Van Keer, 2017). To gain insight into students' experiences with argumentative texts, we explained the aim of an argumentative text and showed students a model text. Afterward, we asked students how many argumentative texts they have written during the past 6 months. Results showed large variation in students' writing experience with the argumentative genre (35.1% did not write an argumentative text, 33.6% wrote one argumentative text, and 31.3% wrote more than one argumentative text in the past 6 months).

4.2. Data collection procedure

Data collection took place in the spring of 2021 by the second author. Given the COVID-19 pandemic, some schools were closed while others were open. Also, some classes were organized face-to-face, while other classes were online. Therefore, we opted for collecting all data digitally. First, students completed an informed consent. Given that the participating students were minors older than 16, the parents of the participating students were provided with a passive informed consent form. After students' consent, they completed an online questionnaire measuring students' implicit beliefs, achievement goals, self-efficacy for writing, and writing motives. Furthermore, they also completed an argumentative writing test. The questionnaires and the writing test were in Dutch, which is the language of instruction in Flanders and the first language of the majority of the participating students (85.1%). The questionnaires were completed online by the students either during class hours or at home using LimeSurvey GmbH (2012). The writing test was administered digitally during class hours when students were in class to ensure that students were not consulting any other sources than the provided source texts. More information on the questionnaires and writing test is provided in section 4.3.

4.3. Measures

4.3.1. Implicit theories

The Implicit Theories of Writing Scale (ITW; Limpo and Alves, 2014, 2017) was administered to measure students' beliefs about the malleability of their writing skills. Students need to complete 3 items on a six-point Likert scale indicating their level of agreement (e.g., No matter how many texts I write, their quality will always be the same). Higher scores on the scale indicate entity beliefs about writing (i.e., fixed mindset), while lower scores on the scale indicate incremental beliefs about writing (i.e., growth mindset). The structure and the fit of the ITW has been tested in prior studies with Portuguese students (Limpo and Alves, 2014, 2017; Camacho et al., 2022) but not yet with Flemish students. In the current study, we confirmed the stability of the one-factor model which provided a good fit to the data according CFI (YB χ^2 (1) = 21.46, $p < 0.001$, CFI = 0.94, RMSEA = 0.26, SRMR = 0.24). High values of RMSEA and SRMR could be explained by the small number of degrees of freedom in the measurement model (Kenny et al., 2015). Finally, reliability analyses indicated a high internal consistency of the ITW scale (Bentler's $\rho = 0.87$).

4.3.2. Achievement goals

The Writing Achievement Goals Scale (WAGS; Soylu et al., 2017) was used to measure students' goals or intentions when writing. The WAGS contains 12 items on a five-point Likert scale probing students' mastery goals (i.e., the goal of the writer is to become a better writer), performance-approach goals (i.e., the goal of the writer is to maximize their perceived competence), and performance-avoidance goals (i.e., the goal of the writer is to avoid failure). The WAGS was tested in prior studies (Limpo and Alves, 2017; Soylu et al., 2017; Camacho et al., 2022), but has never been used with Flemish students. Therefore, we conducted confirmatory factor analyses to confirm the three-factor model. Results showed a good model fit (YB χ^2 (50) = 156.27, $p < 0.001$, CFI = 0.93, RMSEA = 0.08, SRMR = 0.05). Furthermore, reliability analyses revealed that the three subscales were internally consistent (mastery goals: Bentler's $\rho = 0.82$; performance-approach goals: Bentler's $\rho = 0.73$; and performance-avoidance goals: Bentler's $\rho = 0.81$).

4.3.3. Self-efficacy for writing

The Self-Efficacy for Writing Scale (SEWS; Bruning et al., 2013) was administered to assess students' self-efficacy for writing. The SEWS contains 16 statements which students have to complete by indicating their level of confidence ranging from 0 (no confidence) to 100 (complete confidence). The original SEWS consists of three subscales: self-efficacy for conventions (i.e., level of confidence to adhere to writing conventions such as correctly spelling words), self-efficacy for regulation (i.e., level of confidence to regulate the writing behavior and emotions, for instance by staying concentrated during the writing task), and self-efficacy for ideation (i.e., level of confidence to generate ideas for writing). In the current study, the subscale focused on ideation was slightly adapted to map students' self-efficacy for argumentation (De Smedt et al., 2022). For instance, the original item "I can put my ideas into writing" was rephrased as "I can write my arguments into a text." The structure and fit of the adjusted SEWS in the context of argumentative writing has previously been tested with Flemish students (De Smedt et al., 2022). In the current study, we confirmed this three-factor model (YB χ^2 (101) = 307.23, $p < 0.001$, CFI = 0.91, RMSEA = 0.09, SRMR = 0.06) and reliability analyses showed that the three subscales were reliable (self-efficacy for conventions: Bentler's $\rho = 0.87$, self-efficacy for regulation: Bentler's $\rho = 0.86$, and self-efficacy for argumentation: Bentler's $\rho = 0.91$).

4.3.4. Writing motives

Students' writing motives were measured using the SRQ-Writing Motivation (De Smedt et al., 2018b, 2020b). The SRQ-Writing Motivation consists of 18 items on a five-point Likert scale measuring students' autonomous and controlled writing motivation. Autonomous motives for writing originate from students' intrinsic interest in writing or from their appreciation for writing. Controlled motives for writing originate from external or internal feelings of pressure to write. The structure and fit of the SRQ-Writing Motivation was previously tested with Flemish secondary school students (De Smedt

et al., 2020b, 2022) and the two-factor structure was confirmed in the current study as well (YB χ^2 (136) = 3150.42, $p < 0.001$, CFI = 0.91, RMSEA = 0.09, SRMR = 0.09). Additionally, the internal consistencies of both subscales were acceptable to high (autonomous motivation: Bentler's $\rho = 0.92$ and controlled motivation: Bentler's $\rho = 0.76$).

4.3.5. Writing performance

Students completed a previously developed integrated argumentative writing test based on two informational source texts (Landrieu et al., 2022). Students were instructed to take a stance in the discussion on lowering voting rights from 16 years old and to convince the readers of their position. They had 45 min to finish their argumentative text by including information from the source texts and additionally discussing their own opinion. Four trained raters assessed all texts holistically using a benchmark scale with five prototypical texts ranging from low quality to high quality. The selection of the five benchmark texts was based on the reliable rank order of argumentative texts on voting rights written by Flemish students in stage three of the academic track (Separation Scale Reliability = 0.83) presented in Landrieu et al. (2022). More particularly, we selected the benchmark texts with a standardized *z*-score of-2, −1, 0, 1, and 2 and placed the texts on a continuous scale in which the score of the benchmark with an average text quality was 100, and the interval between benchmarks was 15 (For more information on the procedure of selecting benchmark texts based on a rank order, see De Smedt et al., 2020a). This scale with five benchmark texts representing different text quality scores (*cf.*, scores 70, 85, 100, 115, and 130) supported the raters in holistically assessing the quality of the texts. In view of interrater reliability, 9.2% of the texts were double-scored revealing an Intraclass Correlation Coefficient (ICC) of.72.

4.4. Data analysis

The hypothesized relational model was evaluated with path analyses in the lavaan package in R (Rosseel, 2012; R Core Team, 2019). Because the data were not normally distributed (skewness values ranging from-1.07 to 0.25 and kurtosis values ranging from −0.66 to 2.99), we applied the robust maximum likelihood as method of estimation. To evaluate the model fit we used the YB-scaled chi-square statistic, the confirmatory fit index (CFI), the root-mean-square error of approximation (RMSEA), and the standardized root mean residual (SRMR). CFI values greater than.90, RMSEA values less.10, and SRMR equal or lower than 0.8 are considered adequate fits (Hu and Bentler, 1999).

5. Results

5.1. Descriptive results

Table 1 displays descriptive results and correlations between all study variables. Based on the significant positive correlations within the achievement goals on the one hand and the different types of self-efficacy for writing on the other hand, it was decided to include these associations in the path model. As the correlation between the writing motives was not statistically significant, no association between autonomous and controlled motives was included in the path model.

5.2. Path analysis results

Results showed that the proposed model fitted the data well, χ^2 (10) = 29.86, $p < 0.001$, CFI = 0.974, RMSEA = 0.075, SRMR = 0.043.[1] Figure 2 presents the standardized betas for the statistically significant direct paths. The results for each of these paths will be presented in detail according the proposed hypotheses.

5.2.1. Hypothesis 1: Implicit theories are related to achievement goals

As hypothesized, entity beliefs reflecting a fixed mindset are positively related to performance-avoidance goals ($\beta = 0.23$, $p < 0.001$). No relation was found between students' entity beliefs and performance-approach goals ($\beta = 0.10$, $p = 0.11$). Contrary to our hypotheses, no relations were found between students' implicit theories on writing and their mastery goals ($\beta = -0.03$, $p = 0.65$).

5.2.2. Hypothesis 2: Achievement goals are related to self-efficacy beliefs

As predicted in the hypothesized relational model, students' achievement goals are related to students' self-efficacy beliefs for writing. More particularly, both mastery goals and performance-approach goals are positively associated with student's self-efficacy for argumentation ($\beta = 0.14$, $p < 0.001$ and $\beta = 0.38$, $p < 0.001$, respectively), regulation ($\beta = 0.25$, $p < 0.001$ and $\beta = 0.21$, $p < 0.001$, respectively), and conventions ($\beta = 0.18$, $p < 0.001$ and $\beta = 0.25$, $p < 0.001$, respectively). On the contrary, but also in line with the hypothesized relational model, performance-avoidance goals were negatively related to student's self-efficacy (argumentation: $\beta = -0.30$, $p < 0.001$; regulation: $\beta = -0.24$, $p < 0.001$; conventions: $\beta = -0.28$, $p < 0.001$).

5.2.3. Hypothesis 3: Self-efficacy beliefs are related to writing performance

As expected in the proposed hypothesized relational model, the results showed no significant relations between self-efficacy beliefs and students' writing performance (argumentation: $\beta = -0.06$, $p = 0.31$; regulation: $\beta = -0.08$, $p = 0.15$; and conventions $\beta = 0.07$, $p = 0.23$).

5.2.4. Hypothesis 4: Achievement goals are related to writing motives

Path analytical results showed that students' mastery goals were positively related to autonomous motives for writing ($\beta = 0.58$, $p < 0.001$), while both performance-approach goals ($\beta = 0.18$, $p < 0.001$)

1 We evaluated an alternative model which we compared with the current hypothesized model (see Figure 1). More particularly, in this alternative model we included a direct path between implicit theories and writing performance on the one hand, and between achievement goals and writing performance on the other hand. Although this alternative model fitted the data as well as the current hypothesized model (χ^2 (6)=23.49, p<0.001, CFI=0.977, RMSEA=0.087, SRMR=0.040), none of the added paths were statistically significant (implicit theories and writing performance: β=0.05, p=0.37; mastery goals and writing performance: β=0.09, p=0.17; performance-approach goals and writing performance: β=0.00, p=0.98; and performance-avoidance goals and writing performance: β=−0.13, p=0.06). These results suggest acceptance of the current hypothesized model as the most parsimonious.

TABLE 1 Descriptive statistics and correlations for all study variables.

	(1)[a]	(2)[b]	(3)[b]	(4)[b]	(5)[c]	(6)[c]	(7)[c]	(8)[b]	(9)[b]	(10)[d]
M (*SD*)	2.97 (0.92)	3.46 (0.82)	2.63 (0.90)	2.52 (0.92)	65.81 (13.69)	62.43 (17.71)	77.24 (12.81)	20.87 (0.93)	3.00 (0.70)	84.40 (15.81)
(1) Implicit theories[a]	1									
(2) Mastery goals[b]	−0.04	1								
(3) Performance-approach goals[b]	0.11*	0.34**	1							
(4) Performance-avoidance goals[b]	0.24**	0.20**	0.46**	1						
(5) Self-efficacy for argumentation[c]	−0.20**	0.21**	0.29**	−0.10	1					
(6) Self-efficacy for regulation[c]	−0.23**	0.27**	0.18**	−0.10*	0.48**	1				
(7) Self-efficacy for conventions[c]	−0.16**	0.21**	0.18**	−0.13**	0.46**	0.46**	1			
(8) Autonomous writing motives[b]	−0.05	0.64**	0.28**	0.10	0.22**	0.35**	0.21**	1		
(9) Controlled writing motives[b]	0.22**	0.17**	0.33**	0.47**	−0.12*	−0.15**	−0.05	0.04	1	
(10) Writing performance[d]	0.06	0.09	−0.00	−0.05	−0.05	−0.05	−0.03	0.08	0.07	1

*$p < 0.01$; **$p < 0.001$.

[a]6-Point Likert scale.

[b]5-Point Likert scale.

[c]100-Point scale.

[d]Benchmark text with score 100 represents an average text quality.

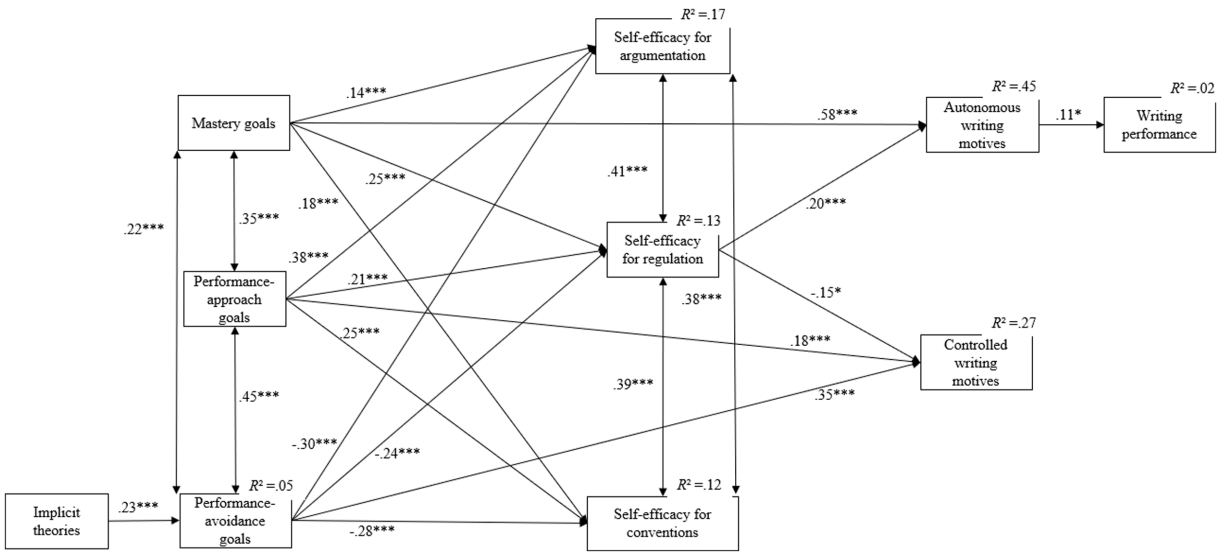

FIGURE 2
Significant standardized path coefficients of the path model (*p<0.05; **p<0.01; ***p<0.001).

and performance-avoidance goals ($\beta = 0.35$, $p < 0.001$) were positively correlated with controlled motives for writing.

5.2.5. Hypothesis 5: Self-efficacy beliefs are related to writing motives

Path analyses confirmed the hypothesis predicting the positive relation between self-efficacy beliefs and autonomous writing motives. More particularly, the results showed that self-efficacy for regulation was positively related to autonomous writing motivation ($\beta = 0.20$, $p < 0.001$). Although not hypothesized, the results also showed that self-efficacy for regulation was negatively associated with controlled writing motivation ($\beta = -0.15$, $p = 0.012$).

5.2.6. Hypothesis 6: Writing motives are related to writing performance

In line with the proposed hypotheses, path analyses indicated a positive association between autonomous writing motives and students' writing performance ($\beta = 0.11$, $p = 0.047$). Contrary to the predictions, no significant relationship was found between controlled writing motives and writing performance ($\beta = 0.04$, $p = 0.43$).

5.2.7. Hypothesis 7: Indirect paths

As for the statistically significant indirect paths, the results indicated that entity beliefs were negatively related to self-efficacy for

argumentation ($\beta = -0.07$, $p = 0.006$), regulation ($\beta = -0.06$, $p = 0.011$), and conventions ($\beta = -0.07$, $p = 0.005$), via performance-avoidance goals (*cf.*, *H1* + *H2*). Furthermore, the results showed that achievement goals contributed to writing motives via self-efficacy for regulation. More particularly, mastery goals ($\beta = 0.05$, $p = 0.001$), performance-approach goals ($\beta = 0.04$, $p = 0.004$), and performance-avoidance goals ($\beta = -0.05$, $p = 0.001$) contributed to autonomous writing motivation, via self-efficacy for regulation. Additionally, significant indirect paths were found between mastery goals ($\beta = -0.04$, $p = 0.020$), performance-approach goals ($\beta = -0.03$, $p = 0.039$), performance-avoidance goals ($\beta = 0.04$, $p = 0.020$), and controlled writing motivation, via self-efficacy for regulation (*cf.*, *H2* + *H5*). Finally, mastery goals were positively related to writing performance, via autonomous writing motives ($\beta = 0.06$, $p = 0.049$) (*cf.*, *H4* + *H6*).

6. Discussion

In what follows, we elaborate on the direct and indirect relations found in the current path model. More particularly, building further on prior studies revealing the relations between implicit theories, achievement goals, and self-efficacy, we discuss the results related to hypotheses 1 and 2. Furthermore, extending prior studies relating motivational constructs to writing performance, we will zoom in on the role of writing motives in understanding this complex interplay (*cf.*, hypotheses 3 to 6). Throughout the discussion, we address the limitations of the study and offer directions for future research and we present the educational implications of this study for writing instruction.

6.1. Relating implicit theories, achievement goals, and self-efficacy

In line with the theoretical assumptions of ST and AGT (Elliot and Harackiewicz, 1996; Elliot and Church, 1997; Dweck, 1999) and based on prior writing research (Limpo and Alves, 2017; Camacho et al., 2022), the present results showed that students who believe that writing is a fixed and innate ability, have the tendency to avoid the appearance of incompetence in writing. In turn, these performance-avoidance goals undermine students' self-efficacy for argumentation, regulation, and conventions (Soylu et al., 2017). Moreover, the current study also revealed an indirect negative relation between a fixed mindset regarding writing and students' self-efficacy beliefs for writing, via performance-avoidance goals. Contrary to the negative role of performance-avoidance goals in predicting students' self-efficacy, the results indicated that the more students are oriented to become better writers (i.e., mastery goals) or to maximize their perceived competence (i.e., performance-approach goals), the higher they perceive their ability to argument, to self-regulate during writing, and to adhere to writing conventions (Limpo and Alves, 2017; Soylu et al., 2017).

In sum, these findings highlight major educational implications, namely that it is key for students to be convinced that each and every student is able to learn to write provided that (1) they put in enough effort and time and (2) they are supported in this process. Herein lies a crucial role for today's writing instruction and for teachers responsible for that instruction. That is, if students are not explicitly supported in learning when, what, and how to write, the vast majority of students will evidently fail in becoming good and effective writers (Graham et al., 2016) and unintendedly, effective writing may be perceived as a fixed trait that only a happy few are blessed with. To break through this misconception, high-quality writing instruction and explicit guidance is essential for students not only to become skillful writers, but also to help them experience and understand the development of writing from a growth mindset instead of a fixed mindset. In this respect, more experimental research is needed to understand how instructional practices can foster (groups of) students' growth mindset or counter their fixed mindset regarding writing (e.g., Limpo and Alves, 2014; Camacho et al., 2023).

6.2. The role of writing motives

This study expands prior studies (Limpo and Alves, 2017; Soylu et al., 2017; Camacho et al., 2022) by including writing motives both as dependent variable (predicted by achievement goals and self-efficacy) and as independent variable (predicting students' writing performance) in the path model. In discussing the role of writing motives, three key results are highlighted and discussed.

First, the results showed that students reporting higher levels of mastery goals were more driven by values or by inherent fulfillment of writing (i.e., autonomous writing motives), while students reporting higher levels of performance-approach or performance-avoidance goals were more driven by external or internal pressure to write (i.e., controlled writing motives). In this respect, the current study is the first to substantiate the alignment between AGT (Elliot and Harackiewicz, 1996; Elliot and Church, 1997) and SDT (Ryan and Deci, 2000b, 2020) in writing research by relating the trichotomous model of achievement goals with autonomous and controlled writing motivation. Further empirical research is needed in view of replication as well as in view of further in-depth investigation. Concerning the latter, we call for more qualitative research to get more fine-grained insights into students' underlying goals and motives for writing (e.g., via interviews). In this way, we can learn (1) to understand how achievement goals and motives for writing are intertwined and (2) to uncover potential (instructional) factors hindering or facilitating students' achievement goals and motives for writing.

Second, in line with prior research on students' learning in general (Katz et al., 2014), the present results highlighted that the more students reported higher levels of self-efficacy for regulation, the more they were autonomously motivated to write and the less they were driven by controlled motives for writing. Moreover, the results also indicated that self-efficacy for regulation mediates the relation between achievement goals and writing motives. These results emphasize the key role of self-efficacy for regulation compared to the other two dimensions of self-efficacy for writing (i.e., self-efficacy for argumentation and for conventions). Although self-efficacy for regulation was not directly related to students' writing performance in the current study (*cf.*, contrary to Limpo and Alves, 2017), its central position in the path model relating the different motivational concepts, warrants attention for further research. Given the relatively low mean score on self-efficacy for regulation (compared to the mean scores of self-efficacy for argumentation and for conventions) and given the evidence that self-efficacy for regulation

is a key mechanism in understanding the relatedness of the motivational writing concepts, more experimental research is needed on how to foster students' self-efficacy for regulation in particular. In this respect, a recent experimental study showed that providing secondary school students with explicit instruction regarding writing knowledge (i.e., text structure knowledge, genre knowledge) and writing strategies (e.g., planning, revising strategies) and enabling students to write in collaboration, fostered students' self-efficacy for regulation (Landrieu et al., 2023). Next to replication studies on the effect of explicit writing instruction and collaborative writing on students' self-efficacy for regulation, we call for more in-depth research to uncover how exactly students benefit from these instructional practices in terms of their self-efficacy for regulation (e.g., exploring which key ingredients of explicit writing instruction and collaborative writing are essential in nurturing students' self-efficacy for regulation).

Finally, in line with theoretical SDT assumptions (Ryan and Deci, 2000b, 2020) and empirical evidence of prior studies (De Smedt et al., 2016, 2018b; Rasteiro and Limpo, 2022), students' autonomous writing motivation was positively related to students' argumentative writing performance. Furthermore, autonomous writing motivation mediated the positive relation between mastery goals and writing performance. These results highlight the importance of fostering students' autonomous writing motivation in view of optimizing their writing performance. Herein lies a crucial role for today's writing instruction: students do not only need to be taught writing skills, strategies, and knowledge to become skillful writers (Graham, 2018a,b). Being skillful in writing can help overcome the cognitive challenges writers face, but cannot overcome the motivational burdens of writing. To persevere in writing for different assignments with varying complexity, on different topics, using different genres, over longer periods of time with fluctuating levels of frustration, students need to be skillful *and* autonomously motivated writers. Being autonomously motivated refers to understanding the power and potential of writing for both authors and audience, recognizing the cognitive and motivational complexity involved, and being able to identify coping mechanisms to overcome these challenges. To support students in becoming autonomously motivated writers, today's education needs to enable students to experience the value of writing in their educational, professional, and personal life or even to experience joy and pleasure when writing. According SDT, nurturing students' inherent psychological need for autonomy, competence, and relatedness is key in fostering students' autonomous motivation (Ryan and Deci, 2000a). In the context of writing education, teachers can adopt autonomy-supportive, structured, and involved teaching behavior by for example (a) providing students with choice of writing subjects, tools, or partners (*cf.*, the need for autonomy); (b) providing explicit instruction and clear writing goals so students know how to approach the writing assignment (*cf.*, need for competence), and (c) create a writing community in class in which students can share their writing and confer with each other on their writing process and product (*cf.*, need for relatedness). Experimental research on the effect of autonomy-supportive, structured, and involved teacher behavior on students autonomous writing motivation remains, however, extremely scarce (see De Smedt et al., 2018a) and is therefore strongly needed.

6.3. Limitations and suggestions for future research

In addition to the research suggestions already raised, we conclude with additional suggestions and acknowledge the limitations of the current study. First, although the path model revealed interesting relations between students' implicit theories of writing, writing achievement goals, self-efficacy for writing, and writing motives, the proportion of variance in writing performance that can be explained by these motivational predictors remains small (2%). This potentially raises the question: if these motivational variables predict so little, what other factors should be considered to predict students' writing performance? Next to student-level predictors such as individual background (e.g., students' home language, socio-economic status) and cognitive factors (e.g., students' applied writing strategies, basic writing skills), we especially want to stress the importance of class-level predictors such as instructional factors (e.g., instructional writing practices, amount of writing instruction, teacher expectations, teacher behavior) to predict students' writing performance. In this respect, we call for future studies to include teacher or class-level variables in multilevel path models. Moreover, given the central role of instruction, we argue for more experimental research studying the effect of instructional writing practices on the interplay of the motivational predictors and students' writing performance (e.g., multiple group path analyses to study significant differences in the paths between experimental and control conditions).

Second, the current study focused on writing performance in one genre, namely argumentative writing. Follow-up research should consider studying the interplay between these motivational variables and writing performance in different genres given that students' motivation might differ depending the writing genre. More particularly, multiple-group path analyses can potentially reveal different paths between the motivational variables depending on the genre.

Finally, the present study used cross-sectional data to study the hypothesized relational model. We call for longitudinal research to study the mechanisms underlying the relations between the key motivational constructs and their role in predicting students' writing performance. Longitudinal designs could also study how students' writing performance, in turn, can affect students' implicit theories of writing, writing achievement goals, self-efficacy for writing, and writing motivation.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by The Faculty of Psychology and Educational Sciences of Ghent University (Specific Ethical Protocol for Scientific Research). Written informed consent for participation was not provided by the participants' legal guardians/next of kin because: There was an active

written informed consent from the participants and a passive written informed consent from participants' parents.

Author contributions

FDS was in charge of the design of the study, data analysis, and she wrote the manuscript. YL was in charge of data collection. All authors contributed to the manuscript and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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How students' writing motivation, teachers' personal and professional attributes, and writing instruction impact student writing achievement: a two-level hierarchical linear modeling study

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Student motivation to write is a pivotal factor influencing their writing achievement. However, individual motivation to write is not independent of the learning environment. It also is crucial for teachers to develop their own efficacy, knowledge, and ability in writing and writing instruction to help them utilize effective instructional methods that stimulate students' motivation to write and further promote their writing achievement. Given these considerations, we utilized a two-level hierarchical linear model to examine the relationships among student motivation, teacher personal and professional traits, teacher writing instruction, and writing achievement at student and teacher levels. Our analysis of the dataset, which included 346 fourth and fifth graders nested within 41 classrooms, found that motivation had a positive predictive effect on writing ability at both student and teacher levels. Moreover, female students, fifth graders, and typically achieving students demonstrated higher writing achievement than their counterparts. While there were no significant effects of teacher efficacy, knowledge, ability, or professional development on student writing achievement, we observed that higher frequency of classroom management practices during writing instruction had a significant negative effect on student writing achievement. Our full model revealed that the relationship between student motivation and achievement was negatively moderated by teachers' increased use of instructional practices related to process features and using writing instruction materials, but positively moderated by increased use of varied teaching tactics. Overall, our findings emphasize the importance of contextual factors in understanding the complexity of student writing achievement and draw attention to the need for effective instructional practices to support students' writing development.

KEYWORDS

writing achievement, teacher efficacy beliefs, instructional actions, writing motivation, hierarchical linear modeling

1. Introduction

The development of proficient writing skill is widely recognized as an indispensable component of K-12 education in the United States, as it empowers individuals to attain their academic, occupational, and personal aspirations (Graham, 2019; Sato and Thompson, 2020). However, the majority of young learners do not achieve mastery in the requisite writing behaviors and skills aligned with their grade-level expectations (Deane, 2011). This concerning trend is corroborated by the findings of the Nation Center for Education Statistics (NCES), which measures writing performance using the National Assessment of Educational Progress. The 2011 Nation's Report Card revealed that only 27% of twelfth-grade students demonstrated proficiency in writing, indicating a pervasive deficiency across the nation in constructing written responses that effectively accomplish the communicative purpose of writing, with proficient writing characterized by well-organized and coherent text with appropriate transitions and diverse sentence structure (NCES, 2011; Crossley and McNamara, 2016). In addition, half of learners encounter difficulties in even the most rudimentary aspects of writing, such as using detailed and factual descriptions, appropriate lexical choice, and varied sentence structures (NCES, 2011). The unprecedented decline in average scores across other core academic subjects (i.e., mathematics and reading) during the COVID-19 pandemic years, as reported in 2022 by the NCES, has further exacerbated concerns regarding writing deficiencies in the student population.

Examining the multitude of factors that influence writing performance represents a complex endeavor. Of these factors, student-level factors have garnered considerable research attention, given their direct and substantial influence on writing achievement (e.g., Maxwell et al., 2017; Coker et al., 2018). The existing writing models provide theoretical frameworks for understanding how the acquisition of writing skills and the production of written text can be influenced by individual factors. One such notable model is Hayes' (1996) cognitive model of writing, which underscores the central role of motivation and its enduring impact on student writing performance throughout the entire writing process. The model posits that motivation can facilitate both short-term responses to immediate writing goals and a long-term predisposition to engage in writing activities, even when they present challenging demands. Additionally, the model incorporates other individual factors, such as writing knowledge, working memory, and the ability to transcribe and translate ideas into conventional linguistic units, to account for the complexity of writing performance. Empirically, research has identified individual characteristics, such as motivational beliefs (e.g., Graham et al., 2018), writing knowledge (e.g., Saddler and Graham, 2007), working memory (e.g., Cordeiro et al., 2020), and writing-related behaviors and strategies (e.g., Graham et al., 2017b; Wijekumar et al., 2019), as significant contributors to writing achievement on the individual level.

Meanwhile, individual differences in writing-related factors are contingent upon the environment and are amenable to change through teachers' personal and professional qualities, as well as their instructional practices. Extensive research shows that teachers' beliefs in their ability to write and teach writing effectively (e.g., Tschannen-Moran and Barr, 2004; Corkett et al., 2011), writing knowledge and abilities (e.g., Huang and Shimizu, 2016), and participation in professional development programs (e.g., Roberts, 2002; Fearn and Farnan, 2007), have a positive and lasting impact on their students' writing performance and development. Moreover, establishing a supportive and inclusive learning environment by adopting effective writing instructional practices (e.g., Lam and Law, 2007; Graham and Harris, 2013; De Smedt and Van Keer, 2014), incorporating cultural and linguistic diversity elements when designing writing curricula and assessments (e.g., Datnow et al., 2003; Shapiro et al., 2016), and organizing school-wide celebratory events (e.g., Bradshaw et al., 2009) can also promote writing success. These findings also resonate with Graham's (2018) writers-within-community perspective, which emphasizes the significance of contextual factors and writing communities in shaping the meaning, motivation, and effectiveness of writing. Effective writing instruction should not only align with individual goals but also consider the intended audience, norms, and conventions of the genre to enhance the quality of writing. To accomplish this, teachers are expected to possess pedagogical knowledge and attitudes for teaching quality writing and a deep understanding of the social policy forces that influence writing instruction (Troia et al., 2011; Harris and Graham, 2016).

Despite a substantial body of research exploring the effects of various factors on student writing achievement, the majority of studies have investigated the associations between writing achievement and influential factors at the student and teacher level independently, without considering their interactional effects (e.g., Graham et al., 2017a; Bresina and McMaster, 2020; Wright et al., 2021). To address the complex nature and multilayered structure underlying writing achievement, it is essential for research to examine the nested relationships and consider the interplay of variables at higher levels through adopting multilevel analyses to mitigate aggregation bias and heterogeneity of regression (Anderson, 2012). Although some studies have investigated writing achievement from an integrated perspective by considering multilevel effects (e.g., Olinghouse, 2008; Mo and Troia, 2017), there is still much to explore regarding how these cross-level effects contribute to the effectiveness of writing instruction and ultimately lead to improved student writing achievement and what types of writing instructional actions can impact students' writing performance when considering their varying levels of writing motivation.

2. Student-level predictors of writing achievement

2.1. Writing motivation

Writing motivation has been a well-established area of research within the educational field, with recent conceptualizations highlighting the critical motivational and affective forces shaping students' perceived gains and losses in writing performance (e.g., Troia et al., 2013). Empirical evidence consistently suggests that motivated students demonstrate positive and strategic behaviors toward writing (e.g., Conroy et al., 2009; Wijekumar et al., 2019), expend extra effort on writing assignments (e.g., Hidi and Boscolo, 2006; Troia et al., 2012), persist in undertaking challenging writing tasks (e.g., Schrodt et al., 2019), actively seek feedback and

guidance from teachers and peers (e.g., Williams and Takaku, 2011), collaborate with others to share writing ideas (e.g., Turner and Paris, 1995; Graham et al., 2017b), self-regulate their learning to write (Zimmerman, 1990), and evaluate their drafts periodically (e.g., Boscolo and Hidi, 2006). These behaviors enable students to complete writing tasks successfully, resulting in longer and better texts and further reinforcing their enthusiasm for writing (e.g., Graham et al., 2018).

Research has provided compelling evidence of the significant and positive associations between writing motivation and outcomes. For instance, a meta-analysis conducted by Camacho et al. (2021) revealed that multiple motivational constructs, such as self-efficacy and attitudes toward writing, were moderately associated with writing performance. Conversely, the positive impact of performance on motivational levels has also been observed, as students who experience success in writing tasks tend to exhibit higher levels of motivation. A recent systematic review by Alves-Wold et al. (2023) investigated self-reported writing motivation, with a specific focus on K-5 students. The review found that motivational levels varied depending on students' ability level and that students' self-efficacy beliefs were positively related to their actual writing performance, with changes in performance affecting motivation levels. Additionally, the review examined the construct validity of student self-reported motivational scales and highlighted the importance of designing motivational measures that align with their intended purpose and design features.

2.2. Individual demographic characteristics

The impact of demographic factors such as gender, grade, and learning ability on student writing achievement has been extensively analyzed in the literature on writing motivation and achievement. Research has yielded a mixture of findings regarding gender differences in writing motivation. Girls tend to report higher levels of achievement-oriented goals and self-efficacy beliefs than boys, as they often attribute their successes to effort and hard work (Pajares et al., 2000). However, girls possess lower self-esteem than boys, and their expectations for success may be undermined as writing tasks becomes increasingly difficult (Hidi et al., 2002). Boys, on the other hand, tend to rate their confidence higher than girls, potentially due to their more positive beliefs about their own writing ability (Pajares and Johnson, 1996). There are a few studies that demonstrated no statistically significant differences between male and female students in certain motivational constructs, such as in self-efficacy beliefs. For example, other gender-related factors, such as gender orientation (i.e., stereotypical beliefs about gender and task performance that students usually hold; Pajares and Valiante, 2001), may confound the effects of gender on writing motivation and achievement. Hence, gender can be regarded as a proxy variable that is associated with motivational beliefs and can explain writing achievement.

Numerous studies have examined the relationship between grade level and writing motivation, with varying results. Generally, lower grade students exhibit higher levels of self-efficacy beliefs compared to their counterparts in higher grades. For example, Shell et al. (1995) discovered that fourth graders reported significantly higher levels of self-efficacy, effort, and intelligence than 7th and 10th graders. In contrast, 7th graders showed little difference compared with 10th graders, except for self-efficacy beliefs where there was a slight decrease among 10th graders. This tendency is consistent with other studies demonstrating that writing motivation may decrease as early as Grade 3 and remain stable through middle and high school (Koster et al., 2015; James et al., 2017). This decline in motivation could be attributed to the increasing difficulty of writing tasks (Boscolo and Gelati, 2019) and the attainment of more accurate self-perception (Stipek, 1993) as students' progress through school. Empirical investigations (e.g., Pajares, 2003; Pajares et al., 2007a) have consistently indicated a weakening trend in writing motivation among students as they advance in their academic careers. However, some studies have sought to identify the nuances of writing motives. For instance, Rasteiro and Limpo's (2023) research revealed that middle school students demonstrated greater confidence in their use of the conventions of writing than higher-level cognitive skills such as ideation and self-regulation. Furthermore, they observed that middle school students were motivated to engage in writing activities by a combination of intrinsic (e.g., curiosity) and extrinsic (e.g., assignment grade) factors. It is also noteworthy that the relationship between a writers' abilities and their level of motivation may shift as they gain more experience and proficiency in writing (Pajares et al., 2007b).

In addition, a student's learning ability can play a vital role in determining their level of motivation and achievement in writing. Individuals with higher learning ability often possess more advanced cognitive and metacognitive skills that allow them to comprehend and analyze complex texts, generate and organize ideas, and employ effective writing strategies (Karlen and Compagnoni, 2017). These skills can boost their confidence and motivation to engage in writing activities. Conversely, students with lower learning ability may struggle with these skills, leading to frustration and reduced motivation to write. They may also encounter difficulties in mastering basic writing techniques such as spelling, grammar, and punctuation, which can further impede their writing progress and diminish their confidence and motivational beliefs (Troia et al., 2009; Roitsch et al., 2021). Brouwer's (2012) study found that students experiencing language learning impairment had diminished perceptions of their writing competence and their autonomous writing motivation. Although language learning ability did not necessarily have a direct association with student writing motivation, it could function as a moderator that influences the connection between motivation and writing quality. This is because language learning ability influences the proficiency with which students can articulate their thoughts in written form and can further decrease their motivation and writing outcomes if impaired.

3. Teacher-level predictors of writing achievement

3.1. Teacher efficacy beliefs

Although the body of research on teacher-level factors influencing students' writing performance is not as extensive as that on student-level factors, it is equally important to

recognize their role in promoting students' writing proficiency, positive learning environment, and motivational beliefs (Graham et al., 2001). A teacher's self-efficacy beliefs is one of the most critical teacher-level factors that can lead to effective writing instruction. It can manifest in various aspects. Firstly, teachers with a strong sense of self-efficacy are more likely to adopt evidence-based teaching approaches that are multimodal and innovative (Posnanski, 2002) and demonstrate empathy and cater to the diverse needs of their students (Goroshit and Hen, 2016). Secondly, teachers with strong efficacy beliefs can enhance writing curriculum and assessment by dedicating more time to teaching grammar, mechanics, and content-level skills, such as developing ideas and text structures (Handtke and Bögeholz, 2019; Wyatt and Dikilitaş, 2021). Furthermore, they can enhance classroom management by implementing strategies to motivate students to write (Mojavezi and Tamiz, 2012), organizing in-class events and discussions on writing (Myhill et al., 2013), managing their classes efficiently to prevent disruptive behaviors (Poulou et al., 2019), and avoiding overly criticizing student errors (Shaukat and Iqbal, 2012). Collectively, these practices can help emphasize the importance of writing within the class, increase student engagement and enthusiasm, and achieve desired writing instruction outcomes.

A teacher's sense of efficacy is also influenced by contextual factors beyond their personal capabilities, such as professional development and teacher training programs (Posnanski, 2002), school resources and materials (Lee et al., 2011), and statewide assessment policies and high-stakes testing (Gonzalez et al., 2017). Troia and Graham's (2016) national survey found that teachers' beliefs and attitudes toward the Common Core State Standards for Writing and Language (CCSS-WL) and Common Core Aligned Assessments for Writing and Language (CCAA-WL) were associated with their sense of efficacy for teaching. Teachers who exhibited strong self-efficacy beliefs for teaching tended to hold favorable perceptions of the CCSS-WL and viewed them as feasible to implement with effort. This alignment with state standards was viewed as supportive of students in achieving satisfactory academic outcomes. The survey suggested that teachers who possess a positive self-perception of their efficacy as educators and are adequately prepared to teach writing are more likely to perceive state standards as a means to achieve improved student writing outcomes rather than a barrier hindering their ability to implement effective teaching practices.

Additional scholarly findings suggest that teachers' self-efficacy beliefs for their writing abilities and writing instruction skills are both important indicators of their effectiveness as writing educators. To become efficacious, it is crucial for teachers to develop a solid understanding of writing skills development and possess the capability to effectively implement writing instruction in their classrooms (Grossman et al., 2009). Teachers who lack confidence in their ability to lead student learning effectively may avoid emphasizing the importance of writing to their students and may not allocate sufficient time for writing instruction (Tschannen-Moran and Hoy, 2001), which can have negative effects on their students' writing skills and motivation. Consequently, it is essential for teachers to develop their own writing skills and have confidence in their capacity to teach writing to their students.

3.2. Teacher professional development and writing expertise

Efficient writing instruction necessitates competent teachers with a strong knowledge base, skills, and strategies in writing. Nevertheless, there is a scarcity of literature on teachers' writing knowledge, and one approach to evaluate their teaching writing knowledge is to examine their training programs (Lembke et al., 2021). According to a national report by Yoon et al. (2007), professional development can positively affect student achievement by first influencing teacher knowledge and skills, which subsequently serves as a mediator, leading to higher student achievement. The report also reveals a moderate-to-strong effect size of 0.53 on reading and writing performance, underlining that effective professional development training or workshops can significantly impact student achievement in these academic areas. Hence, it is essential to evaluate the extent to which teachers have received and internalized such trainings while assessing the impact of professional development efforts on student writing achievement.

Previous research has established that professional development programs that address both beliefs and practices enable teachers to shape their pedagogies and translate their beliefs into effective teaching behaviors (Doubet and Southall, 2017). In a randomized controlled trial conducted by Myhill et al. (2013), 32 teachers from different schools were assessed on their grammar knowledge and pedagogical content knowledge through an achievement test and interview. It was found that teachers with extensive knowledge of grammar were better equipped to enhance learning outcomes and assist their students in developing metalinguistic comprehension of written discourse. On the other hand, teachers with limited grammar knowledge may encounter challenges in handling grammatical discussions, especially when confronted with students' inquiries, and could potentially overlook opportunities to rectify misunderstandings related to grammar usage.

3.3. Writing instruction actions

The implementation of effective instructional practices is paramount to minimizing the discrepancies between anticipated and actual student achievement outcomes (Guskey, 1982). However, the quality and quantity of writing instruction provided to K-12 students often falls short (Cutler and Graham, 2008). Graham (2019) identified four major indicators of insufficient writing instruction, including inadequate time allocated for teaching writing, particularly for unfamiliar writing tasks, infrequent opportunities for students to engage in writing activities, limited utilization of evidence-based writing instruction, and insufficient access to digital tools to support students' writing needs. Addressing these shortcomings requires a concerted effort, including teachers' commitment to enhance their expertise and attitudes, as well as radical changes in curriculum standards and associated instructional materials within the educational system. Although mitigating these inadequacies can be daunting, analyzing

the interconnections between student- and instructional-level variables may yield meaningful implications for educational practitioners seeking to facilitate student writing outcomes.

Numerous experimental research and synthesis studies (e.g., Graham and Perin, 2007; Graham et al., 2012) have demonstrated that writing instruction can enhance text quality and quantity, and also spark students' creativity and interest in writing tasks, as long as specific components are incorporated. One key component is the process-oriented approach to teaching writing, which involves explicit instruction of various practices such as planning and revising writing components, peer conferencing for providing and receiving feedback on writing, sharing writing ideas with classmates, monitoring writing progress, selecting one's writing topics, working at one's own pace, and using invented spellings (Pritchard and Honeycutt, 2006; Cutler and Graham, 2008). According to a meta-analysis study by Graham and Sandmel (2011), process-focused writing instruction produced a statistically significant but modest increase in the overall quality of writing, as evidenced by an average weighted effect size of 0.34. Despite some studies reporting low effect sizes for certain writing processes and activities (e.g., traditional grammar instruction), the process approach to writing instruction remains a valuable albeit moderately influential strategy for teaching writing to students in general education classrooms.

Effective writing instruction can also be achieved through the use of appropriate teaching materials. Ciullo and Reutebuch (2013) found that interventions using technology-based graphic organizers or concept maps had a relatively high effect size of 0.80 in improving writing outcomes. By providing students with a structured method for planning and organizing their ideas, graphic organizers can enhance both the quantity and quality of their text output. Similarly, digital writing environments offer an immersive and interactive experience for students, leading to an increase in students' motivation, quantity and quality of writing, use of the writing process, and writing skills (Yamaç et al., 2020). Word processors are one such tool with digital environments, and they have been shown to be effective in improving writing length, quality, development and organization of text, mechanical correctness, and motivation to write (Morphy and Graham, 2012). These programs allow for easy revision and produce legible characters while providing additional learning supports such as speech recognition and spellcheck. Incorporating rubric-based feedback has also been observed to lead to higher levels of self-efficacy for elementary-aged students in writing class (Hier and Mahony, 2018).

Effective instruction in writing is also evident in both its teaching content and methods. An essential component involves incorporating instructional practices that encompass transcription, grammar, vocabulary, text structures, and general global features. These practices are crucial for improving students' overall writing quality and productivity. Specifically, in the early and middle elementary grades, it is imperative to prioritize the teaching of these basic composing writing skills as they establish a solid foundation for advancing writing abilities (Graham et al., 2012). Kim et al. (2021) meta-analysis study provides evidence that focusing on the basic mechanics and conventions of writing has a moderate and positive effect (ES = 0.31) on writing outcomes for primary-grade students (Kindergarten to Grade 3). This effect is particularly pronounced among students with weak writing skills compared to those with typical writing skills. Pedagogically, teachers can model the writing process and exemplify the desired products through the utilization of various material supports, such as writing notebooks, graphic organizers, checklists, and rubrics. Moreover, teachers can foster student engagement through questioning, offering suggestions, and facilitating summarization activities. These approaches contribute to enhancing students' writing proficiency and their understanding of effective strategies (Troia et al., 2011). In a study conducted by Graham and Perin (2007), explicit teaching interventions, such as summarization, were found to have a significant positive effect on writing outcomes, with an effect size of 0.82.

Effective writing instruction is also reliant upon successful classroom management and organizational skills. Elementary school teachers who possess these skills are more likely to have actively engaged students in their classrooms (Cluniess-Ross et al., 2008; Rimm-Kaufman et al., 2015), leading to increased participation, greater persistence, and fewer behavioral issues (Rimm-Kaufman et al., 2009). Additionally, classroom management methods that provide clarity and consistency in class regulations have been shown to enhance student interest and emotional engagement in writing (Kunter et al., 2007; Hochweber et al., 2014). By incorporating these strategies into writing instruction, teachers can optimize student learning and academic achievements.

4. Interplay between student- and teacher-level predictors

Several studies have investigated the variability of students' writing achievement at different levels, including the student, class, school, and broader state levels. Most of these investigations have utilized multilevel modeling to account for the variance within the nested structure of the educational data, allowing them to examine the effects of various factors and their interactions that contribute to explaining achievement disparities between classes. For example, Olinghouse (2008) investigated the impact of student- and instructional-level factors on the variability of narrative writing fluency and quality. The study revealed that students with low word reading ability could benefit from intensive spelling and grammar instruction to access acquired advanced planning skills, along with an increase in writing instructional time to enhance their genre and topical background knowledge. In a similar vein, Ritchey et al. (2015) explored the relationship between teachers' orientations and writing instructional practices, which varied by grade level, with older students producing superior texts and their teachers adjusting their instructional foci according to their students' developing competencies. Additionally, Coker et al. (2018) examined the connections between generative writing instruction and student achievement, which were found to vary based on two student factors (i.e., ethnicity and gender). Specifically, male and minority group students displayed higher writing quality than their counterparts when exposed to increasingly generative writing practices. Taken together, these studies provide critical implications

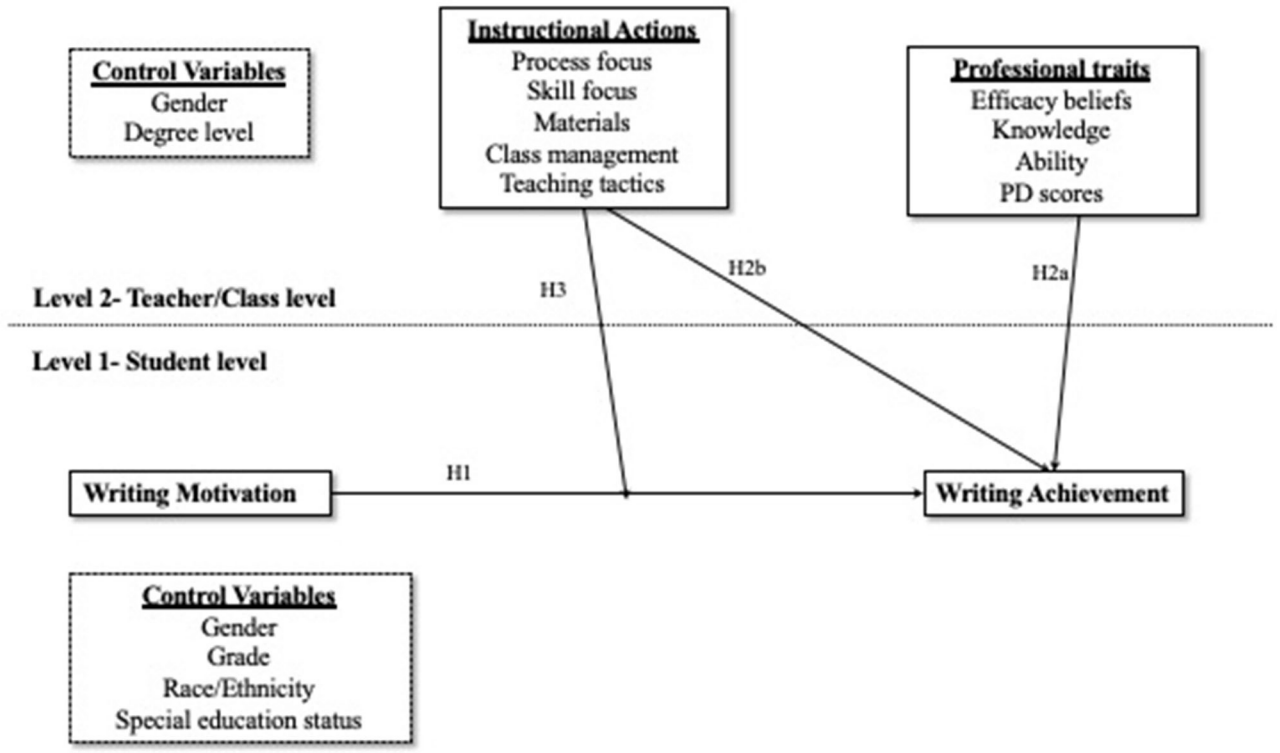

FIGURE 1
The proposed conceptual model among variables for the multilevel analysis.

for educators and researchers, emphasizing the need to address the ways in which student variables interact with influential teacher variables to facilitate student learning and construct classroom contexts.

5. Research objectives for this study

Although prior research has shed light on the factors that influence student writing achievement, there remain gaps in our understanding of how these factors interact and influence student writing outcomes. Specifically, exploring the interplay between student motivational beliefs, teacher professional traits, teacher instructional practices, and student writing achievement holds promise to inform the development of effective interventions that promote and sustain writing development. This study aims to expand on previous research by examining the relationships among these variables in upper elementary students using hierarchical linear modeling. The proposed conceptual model is presented in Figure 1. The study addresses the following research questions and corresponding hypotheses as follows:

Research Question 1: Does students' writing motivation predict their writing quality?
Hypothesis 1: Students' writing motivation relates to their writing quality. More specifically, we posited that the composite motivational scores of students, encompassing self-efficacy beliefs, task interest and value, and outcome and efficacy expectations, would exert a positive influence on their writing performance.
Research Question 2: Do teachers' professional traits and teaching effectiveness predict students' writing quality?
Hypothesis 2a: Teachers' self-efficacy beliefs, writing knowledge, writing ability, and professional development efforts relate to students' writing quality.
Hypothesis 2b: Teachers' instructional practices related to process, skills, materials, teaching tactics, and classroom management relate to students' writing quality.
Research Question 3: Does the relationship between students' writing motivation and their writing quality depend on teachers' instructional practices?
Hypothesis 3: Teachers' instructional practices related to process, skills, materials, teaching tactics, and classroom management moderate the relation between students' writing motivation and writing quality.

6. Method

6.1. Participants and setting

The present study is a subset of a larger research project that aimed to evaluate changes in students' writing motivation, knowledge, and performance over a school year, disaggregated by genres at multiple levels of analysis, including district, classroom, teacher, and student levels (see Troia et al., 2020). The sample

data analyzed in this study were obtained from 41 English language arts teachers from 18 suburban districts in the Midwestern United States. A total of 346 students were selected based on their writing ability levels, as determined by either their district writing assessment scores or their teacher's ratings of the quality of their beginning-of-year writing samples evaluated using a common rubric in the district. Students varied between low, average, and high writing performance based on this information. The dataset was organized using a two-level stratified cluster sampling design, with students as the first level and teacher/classroom as the second level. As such, the findings from this study can be generalized to similar populations, as the sample included a diverse range of writing ability levels.

6.2. Student instruments

6.2.1. Demographics

At the beginning of each school year, the participating teachers provided students' sociodemographic information, including their grade level, gender, race/ethnicity, and disability status through a survey. When data collection began, the students self-identified their gender and race/ethnicity on a participant information form. Of the 346 students, 46.5% ($n = 161$) were fourth graders, 55.5% ($n = 192$) were female, 72.0% ($n = 249$) were White, and 7.8% ($n = 27$) were students who received special education services.

6.2.2. Writing motivational scale

The Situated Writing Activity and Motivation Scale (SWAMS) is a self-report tool used to measure students' motivation levels across three writing genres: narrative, informative, and persuasive. Based on an earlier version developed by Troia et al. (2013), the SWAMS consists of 15 Likert-scale items rated on a 7-point scale (ranging from 0 representing *strongly disagree* to 6 representing *strongly agree*) for each genre that measure three common motivational constructs of writing: self-efficacy beliefs, task interest and value, and outcome and efficacy expectations. Confirmatory factor analyses were performed to determine the factorial structure of the motivational instrument. The results revealed that a single motivation factor using all 15 items was sufficient to represent writing motivation in each genre, with good internal consistency reliabilities (Cronbach's α ranged from 0.85 to 0.87). The model also exhibited good fitness, as evidenced by CFI = 0.97 and RMSEA = 0.073. Furthermore, significant correlations have been observed between the motivation for narrative, informative, and persuasive writing (see Troia et al., 2022; Table 2), indicating strong associations ranging from 0.89 to 0.90. Therefore, to represent students' overall level of writing motivational beliefs across three genres, a composite score was computed in this study by averaging the three genre-specific writing motivation scores.

6.2.3. Writing quality

Over the course of the academic year, students were required to complete four writing tasks for each of the three genres: narrative, opinion, and informative. These tasks were administered through an online writing assessment tool (see Truckenmiller et al., 2020), with each genre containing four distinct prompts that were presented in a counterbalanced order. To assess the quality of the students' typewritten responses, two trained research assistants utilized an analytic trait scoring rubric based on the Smarter Balanced Assessment Consortium writing rubrics (Troia et al., 2020). The raters evaluated the quality based on seven dimensions, including orienting the reader to the purpose of the text, grouping ideas to enhance text coherence, providing a concluding sentence or section, linking ideas using transition words and phrases, developing ideas with facts, examples, experiences, and descriptive details, using varied and appropriate language and vocabulary, and using correct grammar, usage, and mechanics. Each dimension was double scored on a scale of 0 to 5, resulting in a total score ranging between 0 and 35. To ensure interrater reliability, a two-way random effects intraclass correlation with absolute agreement was calculated, yielding coefficients of 0.80, 0.81, and 0.84 (Troia et al., 2022). Similar to the findings regarding writing motivation, our study revealed statistically significant correlations among the writing quality of three distinct genres (see Troia et al., 2022; Table 2), demonstrating correlation coefficients ranging from 0.81 to 0.85. These results indicate moderate to strong associations between three assessed writing qualities. In order to determine overall writing quality, a composite score was calculated by taking the average score of all essays completed by each student.

6.3. Teacher instruments

6.3.1. Demographics

The study involved 41 teachers who taught fourth and fifth grade English language arts classes. The majority of the participating teachers were female (95.1%) and White (92.7%), but the sample also comprised two African American teachers and one Asian American teacher. Of the 41 participating teachers, 10 (24.6%) held only a bachelor's degree, and 20 (48.8%) taught fourth grade classes. On average, the teachers were 41.59 years old (SD = 1.45, range = 26–61). They had an average of 15.01 years of teaching experience and reported an average of 6.64 years of teaching fourth or fifth grade writing classes, depending on the grade level they were currently teaching when data collection was conducted.

6.3.2. Self-efficacy beliefs

The Teacher Efficacy for Writing Scale (TEWS) is a self-report instrument originally developed by Graham et al. (2001). In the present study, the scale was modified by excluding eight items related to assessing teachers' general teaching efficacy factor, as these items exhibited low internal consistency reliability. The TEWS utilized in this study is composed of eight questionnaire items that assess teachers' perceived competence in teaching writing, using a six-point scale that ranges from strongly disagree to strongly agree (total scores ranging from 8 to 48; Cronbach's $\alpha = 0.84$, CFI = 0.92). A higher mean score across items indicates greater teacher efficacy. The TEWS questionnaire items pertain to asking teachers' abilities to implement effective strategies for teaching writing, enhance student retention of introduced concepts, teach writing concepts and skills for rapid mastery, assist

students with their most challenging writing problems, adjust the difficulty of writing assignments for struggling students, accurately assess the reasons for a student's writing difficulties, provide appropriate accommodations, and manage disruptive behaviors during writing time. Overall, the TEWS serves as a valuable means of gauging teachers' perceptions of their writing instruction efficacy. The average score of the eight items was used in this study to represent teachers' self-efficacy beliefs.

6.3.3. Writing knowledge

The Teaching Writing Knowledge Test (TWKT) is an assessment tool aimed to measure teachers' writing content knowledge and pedagogical content knowledge. TWKT encompasses a total of 32 questionnaire items with 116 unique multiple-choice or fill-in responses scored as correct or incorrect (total score ranging from 0 to 116). The test includes items from research-based spelling and grammar knowledge tests for teachers (e.g., Cajkler and Hislam, 2002; Myhill et al., 2013), as well as items from other available tests used to evaluate pedagogical content knowledge of teachers (e.g., Cambridge English Teaching Knowledge Test). The TWKT also incorporated original items developed by the researchers. The test evaluates teachers' knowledge of key writing concepts such as morphemes, phonemes, syllables, consonant and vowel digraphs, consonant blends, root words, derivational and inflectional suffixes, regular and irregular spelling patterns, parts of speech, sentence structure, writing mechanics (capitalization, punctuation, and spelling), genre traits, evidence-based writing instruction practices, and targeted instructional activities to address various aspects of writing. The instrument has an internal consistency reliability of 0.72.

6.3.4. Writing ability

The participating teachers were asked to undertake two subtests of the Wechsler Individual Achievement Test-Second edition (WIAT-II; Wechsler, 2005) at the beginning of the school year. These subtests, which evaluated the teachers' spelling and written expression skills, yielded standardized age-based scores as measures of writing proficiency. As one of our primary outcome variables at the teacher-level, a composite score was derived by tallying the standardized scores of the two subtests to represent teachers' overall proficiency in writing.

6.3.5. Professional development

A researcher-designed questionnaire of three items is used to assess the nature of teachers' pre-service and in-service professional development (PD) opportunities related to teaching writing. The first item asks about the number of pre-service courses that included information on writing instruction, with response options ranging from 0 (none) to 2 (two or more) or those that were fully devoted to writing instruction, with response options ranging from 3 (one) to 4 (two or more). The second item focuses on the number of in-service activities related to writing instruction that teachers had participated in over the prior 5 years, which included live or online workshops, as well as formal or informal coaching/mentoring activities, with options ranging from 0 (none) to 4 (more than 6). The third item aims to capture the extent of teachers' unique independent learning activities to improve their writing instruction skills, such as engaging in more writing, reading about effective writing instruction, observing other teachers' writing instruction, seeking feedback on their writing instruction, and participating in additional courses or workshops not part of preservice or in-service training. The response options for this item ranged from 0 to 5. The total score for the questionnaire ranged from 0 to 13.

6.3.6. Instructional practices observation

Over the course of the academic year, beginning in October/November and ending in April/May, the writing classes of the participating teachers were observed typically four times. It is worth noting that unforeseen disruptions, particularly during the COVID-19 pandemic, occasionally impeded the researchers' attempts to maintain a consistent interval between observation points. The observers received extensive training in project meetings before conducting the observations and employed a time-sampling procedure to document the occurrence of assigned instructional practices within each 10-min interval. To record the instructional practices, the two observers used iSeeNCode (Hofstetter, 2016), an iPad application with 131 binary codes (0 = absent, 1 = present) derived from the Observation Protocol for Writing Assessment and Instruction (OPWAI). The OPWAI was subdivided into eight major observation dimensions: (1) grouping, (2) process feature focus, (3) genre focus, (4) product feature focus, (5) materials, (6) instructional tactics, (7) management tactics, and (8) assessment. The present study places a particular emphasis on five dimensions of writing instruction, including process feature focus, product feature focus, materials, instructional tactics, and management tactics. To represent each dimensional code, the average proportion of relevant codes to the total number of observation codes (131) per observation segment was calculated across all observations. A higher value for each dimensional code indicates that teachers exhibited a greater frequency of taking actions related to that particular dimension during their observed classes. This approach allows for a quantitative assessment of the extent to which teachers implemented instructional practices related to the five dimensions of writing instruction examined. The components and subcomponents that were encompassed within the five dimensions, along with the interobserver agreement reliability statistics for each dimension, are displayed in the Supplemental material.

6.4. Data analysis strategy

Our study utilized a multilevel structure dataset comprised of 346 students nested within 41 classrooms. This hierarchical structure implies that a student's learning outcome is influenced by both their individual characteristics and the broader class environment. Since simple regression is not suited for analyzing nested data due to the assumption of independence among observations, we employed hierarchical linear modeling (HLM) as

our major statistical approach. HLM allows for the accommodation of the nested structure and parameter estimation of the effects of predictors at different levels simultaneously. Given the large sample size within clusters in our case, we also employed the maximum likelihood estimation (MLE) method for accurate parameter estimation on fixed and random effects (Maas and Hox, 2005). Due to the sensitivity of HLM to missing data at level 2 or above, we removed 2 instances of missing data at the teacher level, resulting in a final sample of 41 eligible teachers. All HLM analyses were conducted using lmer package in R Studio 2023.03.0.

During the exploratory phase of our study, we used descriptive and correlational analyses to determine potential covariates and gain preliminary insights into our data characteristics prior to model estimation. However, we acknowledge the limitations of solely relying on correlational analyses as they were indicative of interdependence rather than causality and did not account for correlations across multiple levels. Thus, in the subsequent stages of our study, we adopted HLM analyses to uncover the distinct main and interaction effects of the study measures across different levels.

The present study employed a linear two-level HLM model with MLE method to explore the complexity of the outcome variable of student writing quality. The analytical procedure involved four major steps. Firstly, a null model with no independent variables at both student and teacher levels was executed to assess the proportion of variance in student writing quality that can be attributed to differences between classrooms in addition to the magnitude of variance within classrooms. The intraclass correlation coefficient (ICC) was computed to summarize the proportion of total variance in student writing achievement that is attributable to differences between classrooms. If the ICC value is >0.058, the differences across groups cannot be neglected and should be explained using more complex models (Cohen, 1988).

Secondly, a level 1 model was employed by incorporating student-level variables, including writing motivation as the principal student-level predictor, along with four relevant covariates (i.e., gender, grade, race/ethnicity, special education status). The level 1 model was designed to examine the effects of student-level predictors on student writing quality.

Thirdly, a level 2 model incorporating teacher-level variables was fitted to test the effects of these variables on student writing quality while accounting for the effects of teacher covariates. The teacher-level variables were categorized into two dimensions. The first dimension consisted of personal and professional attributes of a given teacher, including self-efficacy, writing knowledge, writing ability, and professional development score. The second dimension pertained to teacher instructional effectiveness, focusing on process features, product features, materials, teaching tactics, and class management. By controlling for two demographic covariates, namely gender and educational attainment (i.e., degree), the level 2 model analysis aimed to unpack the unique contribution of teacher-level factors to student writing quality.

Finally, a full model was conducted to examine the cross-level moderator effect. Specifically, the interaction terms between instructional actions at the teacher level and writing motivation at the student level were of primary interest in this study, while six covariates at both student and teacher levels were also included in the full model to control for their potential influence. To ensure accurate and unbiased estimates of the relationship between variables in our HLM, we utilized a strategy of centering variables. Specifically, all student-level variables were centered on the grand mean, while all teacher-level variables were centered on the group mean. This adjustment allowed for easier interpretation of the fixed effect of the level 1 predictor, improved the convergence of the model, and helped to avoid issues of multicollinearity in models with interaction terms. This approach is supported by prior research (Raudenbush and Bryk, 2002; Hayes, 2006) and is a common practice in hierarchical linear modeling.

The full model can be mathematically presented as follows:

$$\begin{aligned}
&\textit{Writing achievement}\ \left(\textit{of individual}_i \in \textit{class}_j\right) = \gamma_{00} + \gamma_{10}\left(\textit{gender}\right) \\
&+\gamma_{20}\left(\textit{race or ethnicity}\right) + \gamma_{30}\left(\textit{grade}\right) + \gamma_{40}\left(\textit{special education status}\right) \\
&+\gamma_{50}\left(\textit{motivation}\right) + \gamma_{01}\left(\textit{gender}\right) + \gamma_{02}\left(\textit{degree}\right) + \gamma_{03}\left(\textit{Efficacy}\right) \\
&+\gamma_{04}\left(\textit{knowledge}\right) + \gamma_{05}\left(\textit{ability}\right) + \gamma_{06}\left(\textit{PD}\right) + \gamma_{07}\left(\textit{process focus}\right) \\
&+\gamma_{08}\left(\textit{material}\right) + \gamma_{09}\left(\textit{teaching tactics}\right) + \gamma_{010}\left(\textit{class management}\right) \\
&+\gamma_{011}\left(\textit{skill focus}\right) + \gamma_{11}\left(\textit{motivation} \times \textit{process focus}\right) \\
&+\gamma_{12}\left(\textit{motivation} \times \textit{material}\right) + \gamma_{13}\left(\textit{motivation} \times \textit{teaching tactics}\right) \\
&+\gamma_{14}\left(\textit{motivation} \times \textit{class management}\right) + \gamma_{15}\left(\textit{motivation} \times \textit{skill focus}\right) \\
&+r_{ij} + u_{oj}
\end{aligned}$$

where:

r_{ij} = random effect for student i in classroom j;

u_{oj} = random effect for classroom j.

HLM models can be evaluated using multiple criteria. The model fit comparison analyses were conducted using one-way ANOVA. The Akaike information criterion (AIC) and Bayesian information criterion (BIC) are commonly used fit indices, where lower values indicate superior model fit. The deviance statistic is another measure of fit for the covariance components of a model, which is calculated as −2 times the log likelihood function. Lower deviance values indicate a better model fit. Additionally, the difference in deviance statistics between two nested models can be used to test the hypothesis of whether additional predictors can improve model fit (Jayetileke, 2021). The difference in statistics follows a chi-square distribution, with degrees of freedom equaling the difference in the number of estimated parameters in the covariance component of the two models (Davison et al., 2002). These criteria are essential in evaluating the adequacy of HLM models and ensuring that the model accurately captures the relationship between variables.

7. Results

7.1. Exploratory data analysis

Table 1 presents the descriptive statistics of the student and teacher measures. Tables 2, 3 present unadjusted bivariate correlations for within-group (student) and for between-group (teacher) measures, respectively. At the student level, student demographic variables, including gender, grade, race/ethnicity, and disability status, were significantly correlated with their writing motivation and quality. Specifically, the positive and

TABLE 1 Descriptive statistics and coding for the student and teacher measures included in the model.

Variable	*n* (%)	*M* (SD)	Range
Student level			
Gender			
Female (coded as 0)	192 (55.5%)		
Male (coded as 1)	154 (44.5%)		
Grade			
Grade 4 (coded as 0)	161 (46.5%)		
Grade 5 (coded as 1)	185 (53.5%)		
Race/Ethnicity			
White (coded as 0)	249 (72.0%)		
Non-White (coded as 1)	97 (28.0%)		
Disability status			
Typically developing students (TD; coded as 0)	319 (92.2%)		
Students with disability (SWD; coded as 1)	27 (7.8%)		
Motivation		4.465 (0.821)	1.923–5.887
Writing quality score		13.659 (4.115)	3.833–23.833
Teacher level			
Gender			
Female (coded as 0)	39 (95.1%)		
Male (coded as 1)	2 (4.9%)		
Degree			
Bachelor (coded as 0)	10 (24.4%)		
Master (coded as 1)	31 (75.6%)		
Efficacy		4.182 (0.561)	2.75–5
Knowledge		89.561 (10.288)	62–107
Ability		230.926 (14.771)	194–256
Professional development (PD)		5.634 (2.904)	1–13
Instructional practices			
Process focus		1.211 (0.368)	0.44–3
Material		3.381 (0.783)	1–4.86
Teaching tactics		6.320 (0.832)	4.83–8.61
Class management (CM)		1.394 (0.857)	0–4.75
Skill focus		1.308 (0.276)	1–1.89

moderately strong correlation ($r = 0.362$, $p < 0.01$) between grade and paper quality suggested that moving from the grade 4 category to grade 5 category was moderately associated with an increase in quality, Gender was also found to have a positive but relatively low magnitude association ($r = 0.117$, $p < 0.05$) with paper quality, suggesting that moving from the male category to female category was associated with an increase in paper quality. Race/ethnicity showed a negative correlation ($r = -0.117$, $p < 0.05$) with writing motivation, indicating that moving from White category to non-White category was associated with a decrease in writing motivation. Disability status was found to be significantly associated with both motivation ($r = -0.177$, $p < 0.01$) and quality ($r = -0.291$, $p < 0.05$), suggesting that students with disabilities tended to demonstrate lower writing motivation and paper quality than typically achieving students. Therefore, these demographic variables were incorporated as covariates in subsequent HLM analyses.

At the teacher level, teachers' gender and degree information displayed significant associations with other teacher variables. For instance, the weakly positive correlation ($r = 0.121$, $p < 0.05$) between gender and teacher writing knowledge indicates that moving from the female category to male category weakly

TABLE 2 Bivariate correlations for within-group (student) measures.

Variable	1	2	3	4	5	6
1. Gender	1					
2. Grade	0.225**	1				
3. Race/Ethnicity	−0.094	−0.024	1			
4. Disability	0.024	0.012	0.010	1		
5. Motivation	−0.107	−0.014	−0.117*	−0.177**	1	
6. Quality	0.117*	0.362**	−0.100	−0.291**	0.421**	1

Spearman/point-biserial correlation coefficient for categorical variables 1–4 and Pearson correlation coefficient for continuous variables 5–6.
**$p < 0.01$.
*$p < 0.05$.

TABLE 3 Bivariate correlations for between-group (teacher) measures.

Variable	1	2	3	4	5	6	7	8	9
1. Gender	1								
2. Degree	−0.128*	1							
3. Efficacy	−0.050	0.109*	1						
4. Knowledge	0.121*	0.080	0.128*	1					
5. Process	−0.130*	−0.160**	−0.114*	−0.338**	1				
6. Material	−0.081	0.188**	0.003	0.113*	−0.367**	1			
7. Teaching	0.022	−0.111*	−0.010	0.021	0.380**	−0.222**	1		
8. CM	−0.188**	−0.023	−0.224**	−0.217**	−0.242**	−0.026	−0.102	1	
9. Skill	−0.137*	0.137*	0.260**	−0.240**	−0.051	0.123*	−0.052	0.254**	1

Spearman/point-biserial correlation coefficient for categorical variables 1–2 and Pearson correlation coefficient for continuous variables 3–9.
**$p < 0.01$.
*$p < 0.05$.

corresponds with an increase in their writing knowledge, or higher writing knowledge tends to co-occur with the male category. In addition, the weakly positive correlation ($r = 0.109$, $p < 0.05$) between degree and teacher efficacy implies that moving from teachers with bachelor's degrees to teachers with master's degrees was weakly associated with an increase in their teaching efficacy beliefs, or higher efficacy beliefs tend to co-occur with teachers with a master's degree. This finding is consistent with other studies (e.g., Yilmaz and Çokluk-Bökeoglu, 2008; Orakci and Karagöz, 2023) suggesting that as teachers' level of education progresses, they are likely to develop a more profound comprehension of writing, which may enhance their efficacy beliefs regarding their own writing skills and their effectiveness in teaching writing. Hence, the effects of teacher's gender and degree variables were controlled in the subsequent analyses.

7.2. Unconditional model

To estimate the extent to which writing achievement varied at the student and teacher levels, we initiated our HLM analysis by conducting a one-way random-effects ANOVA model, also referred to as an unconditional model, and included the dependent variable of writing quality as the sole factor. The intercept was found to be significant at 13.66, $t_{(38)} = 36.59$, $p < 0.001$, representing the overall average score of writing quality without any predictors in the model. The intraclass correlation coefficient (ICC) was 0.24, indicating that a considerable proportion (i.e., 24%) of the variance in student writing quality could be attributed to differences between classrooms, whereas most of the variance was due to differences between students. As our ICC was above the conventional threshold (i.e., 0.058; Cohen, 1988), further analyses were required to explain the variance related to differences between teachers and students. The ICC result also revealed the nested data structure of this study, making HLM an appropriate approach for examining our data. Furthermore, Figure 2 displays students' writing motivation and quality scores within each class, reinforcing the nested nature of the data and the necessity for multilevel modeling analysis. The varying slopes depicted in Figure 2 indicate that the factors contributing to the variability between classrooms needs to be explained in the subsequent models. The HLM results are given in Table 4.

7.3. Level 1 model: student-level

The level 1 model was employed to investigate the associations between students' writing motivational beliefs and writing quality while holding the four covariates constant. Results from the level 1 model supported our

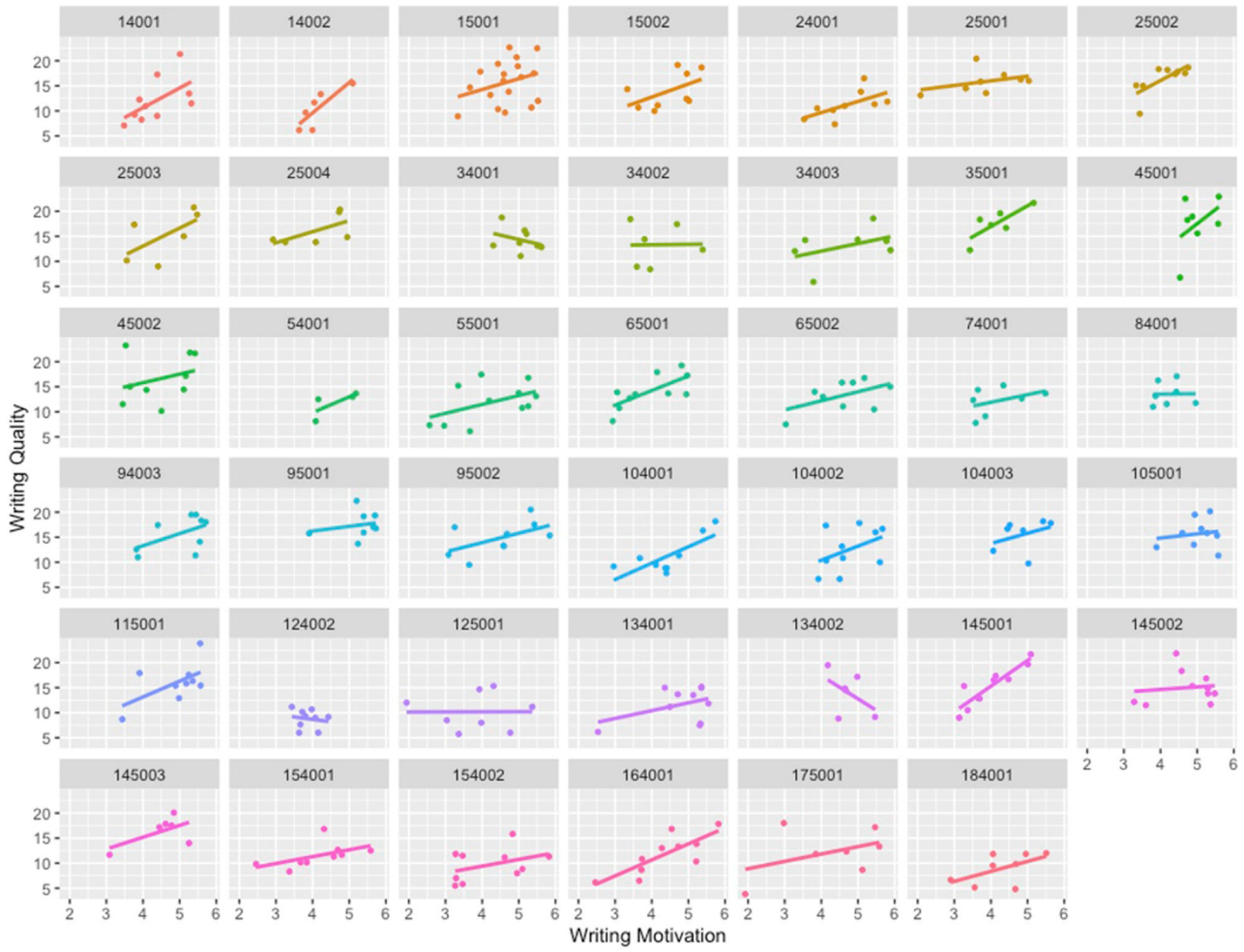

FIGURE 2
Student writing motivation, quality scores, and their relational slopes disaggregated by teacher/classroom. Each box in the figure represents a unique teacher ID ($n = 41$).

proposed Hypothesis 1 that student writing motivation had a positive effect on their writing quality, with a one-scale point increase in writing motivation resulting in a 1.61-point increase in writing quality. Moreover, the results revealed that students who were in fifth grade, female, and typically achieving had significantly better writing performance than their counterparts.

Incorporating student-level predictors into the model accounted for ~32% of the between-class variance in writing quality, while the estimated within-class variance decreased from 0.24 in the unconditional model to 0.14 in the student-level model. The reduction in within-class variance suggested that the addition of student-level predictors was not able to account for a significant portion of the within-group variability in writing achievement, and/or there may be other unmeasured factors that were influencing writing achievement at the student level. Furthermore, based on the model fit comparison (see Table 4), the resulting level 1 model demonstrated a significantly better goodness of fit [$\chi^2(5) = 121.96$, $p < 0.001$] than the unconditional model, indicating that the integration of student-level predictors significantly improved the model's ability to explain the variance in writing quality.

7.4. Level 2 model: teacher-level

The level 2 model was utilized to further explore the factors that influence student writing achievement by adding teacher-level predictors based on personal and professional attributes, as well as instructional actions. After controlling for two demographic covariates (namely gender and degree), our analysis revealed that, while teacher personal and professional characteristics did not significantly affect student writing quality, there were some notable effects observed between teacher instruction and student writing performance. Specifically, the use of effective teaching tactics, such as modeling, explanation, summarizing, and questioning, had a positive impact ($\gamma = 0.66$, $p < 0.10$) on student writing quality, while the frequent use of class management strategies

TABLE 4 Results from HLM predicting student writing quality scores.

Parameter	Unconditional		Student-level		Teacher-level		Full	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Fixed effects								
Intercept γ_{00}	13.66***	0.37	12.94***	1.14	11.77	0.89	8.99*	3.82
Level 1: student								
Gender γ_{10}			−1.02**	0.35	−1.02**	0.35	−1.04**	0.36
Race/Ethnicity γ_{20}			−0.25	0.42	−0.31	0.42	−0.22	0.44
Grade γ_{30}			2.98***	0.60	2.46***	0.63	2.46***	0.67
SPED γ_{40}			−3.81***	0.65	−3.91***	0.65	−4.03***	0.66
Writing motivation γ_{50}			1.54***	0.23	1.53***	0.23	0.82	2.59
Level 2: teacher								
Gender γ_{01}					0.77	1.17	0.76	1.44
Degree γ_{02}					0.59	0.63	0.59	0.77
Efficacy γ_{03}					−0.26	0.57	−0.27	0.69
Knowledge γ_{04}					−0.04	0.03	−0.04	0.04
Ability γ_{05}					−0.04	0.02	−0.04	0.03
PD γ_{06}					0.10	0.09	0.10	0.11
Process focus γ_{07}					−0.57	0.93	−0.59	1.15
Material γ_{08}					0.06	0.35	0.05	0.43
Teaching tactics γ_{09}					0.66*	0.33	0.67	0.40
Class management (CM) γ_{010}					−0.74*	0.35	−0.76*	0.43
Skill focus γ_{011}					0.40	1.03	0.43	1.25
Cross-level interactions								
Motivation × process γ_{11}							−1.27*	0.69
Motivation × material γ_{12}							−0.60*	0.33
Motivation × teaching γ_{13}							0.59*	0.30
Motivation × CM γ_{14}							−0.26	0.27
Motivation × skill γ_{15}							0.74	0.91
Random effects								
Level-1 effect r_{ij}	12.75		9.09		9.09		9.10	
Classroom mean u_{0j}	4.13		2.50		1.17		2.30	
ICC	0.24		0.21		0.11		0.20	
Between-classroom variance explained (%)	NA		32		40		38	
Within-classroom variance explained (%)	NA		14		6		12	
Goodness-of-fit								
AIC	1,922.1		1,810.2		1,813.4		1,815.3	
BIC	1,933.7		1,840.9		1,886.5		1,907.7	
Log Likelihood	−958.1		−897.08		−887.7		−883.7	
Deviance	1,916.1		1,794.2		1,775.4		1,767.3	
Chi-square (df)			121.9 (5)***		18.7 (11)*		8.1 (5)	

*$p < 0.10$.
**$p < 0.05$.
***$p < 0.01$.

had a negative effect ($\gamma = -0.74$, $p < 0.10$). Our findings highlighted the importance of effective teaching practices in shaping student writing quality. Effective teaching strategies, such as giving clear writing directions, facilitating discussions about writing-related issues, and using questioning techniques to gauge understanding, can enhance student writing performance. Conversely, instructional strategies that aim to monitor, support, alter, or control student writing behaviors may impede student writing achievement to some extent.

It is important to acknowledge that we applied a less stringent criterion for significance testing (i.e., $p < 0.10$) to interpret the results. The decision was made with the aim of increasing the likelihood of detecting interaction effects that hold theoretical importance while mitigating the risk of overfitting, which can arise when including too many variables in a model with a limited sample size (Scherbaum and Ferreter, 2009). Moreover, a significance level of 0.10 also was utilized to interpret the interaction results in the subsequent analyses. It is crucial to recognize that this approach introduces a limitation to the study.

By incorporating the main effects of teacher-level predictors, our level 2 model demonstrated an improved capability to account for 40% of the between-class variance in student writing achievement, resulting in a decrease in the estimated within-class variance by 0.08. Comparing the level 2 model to the level 1 model, level 2 model exhibited a better goodness of fit, as evidenced by its decreased deviation value of 1775.4 and a higher fit statistic [$\chi^2(11) = 18.754$, $p = 0.06$]. These findings suggest that the level 2 model is more effective in predicting data and provides a more accurate representation of the factors that impact student writing achievement.

7.5. Full model: moderating effect of teacher's instructional practices

Finally, a full model with multiple cross-level interaction terms was used to examine the joint effects of students' motivational beliefs and teachers' writing instructional practices on writing achievement. The findings showed that, at the student-level, gender, grade, and disability status remained significant predictors of writing quality, whereas the main effect of student motivational beliefs was no longer significant. However, we indeed found that student motivational beliefs had weak but significant interaction effects when combined with other writing instructional practices variables. This suggested that the effect of student writing motivation may be modified by other variables with which it interacted in a more complex model, such as teachers' implementation of certain writing instructional practices.

The findings indicated that the interaction term between student motivation and teacher instruction on process features was marginally significant and negative ($\gamma = -1.27, p < 0.1$), indicating that the relationship between student motivational beliefs and their writing achievement was moderated by the frequency of teacher instruction on process features. Specifically, the negative effect of student motivation on their writing achievement was found to be marginally significantly stronger when teacher instruction on process features was more frequent, compared to when it was less frequent. The observed decrease in the scale of the effect was weakened by a value of 1.27 units.

The interaction term of motivation × materials was also marginally significant and negative ($\gamma = -0.60$, $p < 0.1$), suggesting that the relationship between student motivational beliefs and their writing achievement was moderated by the more frequent use of materials in writing class. Specifically, the negative impact of student motivation on their writing achievement was found to be marginally significantly stronger when the frequency of utilizing materials in the writing class was higher compared to when it was lower. The observed decrease in the scale of the effect was weakened by a value of 0.60 units.

Conversely, the interaction term between student motivation and the frequency of utilizing teaching tactics in the writing class was marginally significant and positive ($\gamma = 0.59$, $p < 0.1$), indicating that the relationship between student motivational beliefs on writing and their writing achievement was moderated by the frequency of employing teaching tactics in the writing class. Specifically, the positive effect of student motivation on their writing achievement was found to be more evident when there was increased frequency of utilizing teaching tactics in the writing class compared to when it was lower. The observed increment in the scale of the effect was increased by a value of 0.59 units.

The full model, which included five pairs of interaction terms, did not significantly improve the fit of the model compared to the level 2 model, as indicated by the ANOVA chi-square test $\chi^2(5) = 8.066$, $p = 0.15$. In other words, the difference in fit between the level 2 model and full model is not statistically significant. While this non-significant result may suggest issues with statistical power or small sample size, it is important to note that the additional predictors in the full model may still be important and meaningful in explaining the outcome variable. It is noteworthy that the full model showed a slightly lower capability in explaining between-class variance in student writing achievement compared to the level 2 model, with a decrease of 2%. However, the full model demonstrated an increase of 6% in its predictive ability for explaining variance in writing achievement within classrooms.

7.6. Summary of results

The results of bivariate correlational analyses and level 1 model, as presented in Tables 2–4, revealed that all student-level variables, except race/ethnicity, were significantly related to student writing achievement. However, only two teacher variables, namely teaching tactics and class management, exhibited significant effects on writing achievement but with different directional impacts, as demonstrated by the level 2 model results. The HLM analysis revealed that writing motivation had a positive predictive effect on writing achievement, as evident from significant results in both student- and teacher-level models.

Despite student motivation being non-significant in the final HLM analysis, our study identified significant interaction effects between motivational beliefs and instructional practices on writing achievement. Specifically, our findings suggested that students with high motivation were more likely to demonstrate better writing outcomes in

TABLE 5 Summary of hypotheses.

	Hypotheses	Conclusion
H1	Students' writing motivation relates to their writing quality	Supported
H2a	Teachers' self-efficacy beliefs, writing knowledge, writing ability, and professional development efforts on writing relate to students' writing quality	Not supported
H2b	Teachers' instructional practices related to of process focus, skills focus, materials, teaching tactics, and classroom management relate to students' writing quality	Partially supported
H3	Teachers' instructional practices related to process, skills, materials, teaching tactics, and classroom management moderate the relation between students' writing motivation and writing quality	Partially supported

a classroom setting where writing instruction emphasized fewer process features and materials but utilized more teaching tactics, compared to classrooms with the opposite characteristics. Table 5 provides a summary of the results our proposed hypotheses.

8. Discussion and implications

Within the academic domain of writing, state content standards exert significant influence on guiding content and pedagogical approaches adopted by educators (Troia and Graham, 2016; Baez-Hernandez, 2019). Despite concerted efforts to incorporate a diverse array of writing task types and increase writing time across the curriculum, the impact of these standards on classroom instruction and subsequent writing outcomes may be curtailed due to the inadequate quantity and quality of writing practices provided throughout the United States (Graham et al., 2012). Additionally, the significant variability among teachers in terms of their experiences, values, beliefs, and attitudes toward writing proficiency and instruction poses a formidable challenge in implementing coordinated and effective writing instructional practices across diverse classrooms (Perry, 1998). This complexity necessitates a multifaceted approach when attempting to teach writing effectively and efficiently. Therefore, the aim of this study was to shed light on instructional practices and professional traits associated with writing that can promote students' motivation and performance. Our findings suggest an interrelated and integrated array of teachers' professional traits and instructional actions that can influence students' writing motivation and proficiency. Moreover, we observed that certain instructional practices targeting different aspects of developing students' writing performance can moderate the predictive power between students' writing motivation and their writing quality. Our findings not only validate students' writing strengths and weaknesses at the individual level, but also offer valuable insights for educators on implementing effective practices at the teacher level.

8.1. Student-level predictors of writing achievement

The outcomes of the student-level analysis indicated a significant association between students' motivational beliefs and their writing achievement, regardless of student demographics. Specifically, students who displayed a strong inclination toward writing, assigned value to producing multiple written products, and demonstrated confidence in their writing ability, tended to outperform in writing tasks compared to those who felt overwhelmed, frustrated, and lacked motivation toward writing. These findings were consistent with earlier research studies on writing motivation and achievement conducted by Pajares (2003), Graham et al. (2007), and Wilson and Trainin (2007), which also provided evidence of a significant positive correlation between writing motivation and achievement.

Furthermore, we explored the impact of students' sociodemographic characteristics on their writing achievement. Our analysis revealed that female students, fifth graders, and typically achieving students tended to produce higher quality writing than their male, fourth grade, and struggling counterparts. These findings aligned with prior research suggesting that gender (De Smedt et al., 2018), grade level (Shell et al., 1995), and learning ability (Troia and Graham, 2016) may have an impact on writing achievement, and should therefore be considered when designing writing instruction for elementary-aged children. Although the underlying reasons for these findings are not entirely evident, it is anticipated that girls, older students, and typically achieving students may have a more accurate understanding of their writing abilities, possess more advanced writing skills and strategies, set clearer goals for the writing process and product, and develop a theory of mind to understand their audience (Graham and Perin, 2007). Hence, students with these demographic characteristics are likely to develop into more advanced and sophisticated writers. Our results reinforce the notion that student motivational beliefs are malleable and can be influenced by various factors such as cultural background, personal interests, prior experience, and other individual traits (Pajares, 2003).

When examining the impact of student-level variables on writing achievement between classrooms, our study revealed that these factors accounted for a relatively lower proportion of the variance (i.e., 32%) compared to similar studies that employed multilevel analysis methods (e.g., Coker et al., 2018; Los and Schweinle, 2019) to explain writing outcomes. It is important to note that our study did not place primary emphasis on student-level factors, nor did we include other writing-related skills that have been found to significantly impact writing achievement, such as handwriting fluency, basic reading ability, and spelling, as was done in Coker et al.'s (2018) study. Future research could incorporate other student-related factors, such as writing knowledge and strategies, to capture a more comprehensive range of individual differences that may contribute to writing achievement.

The findings of our student-level analysis hold important implications for both preservice and in-service educators seeking to provide effective writing instruction for elementary-aged children. Firstly, along with considering the content and structure of the writing curriculum to benefit their students, it is also

essential to consider individual student-level factors and tailor their instruction to meet the specific needs of each student to boost their motivation and writing achievement. To achieve this, educators should adopt a student-centered approach that acknowledges the social and cultural diversity of students' backgrounds and their unique motivational beliefs (see Land et al., 2012). Professional development opportunities should also be provided to educators to enhance their understanding of student motivation and effective writing instruction, particularly for students who are struggling or disengaged. By leveraging students' individual strengths and interests, educators can create a respectful, supportive, and engaging writing environment that fosters motivation and facilitates writing achievement for all students (Tucker, 2012).

Additionally, educators should consider providing targeted writing instruction and support for struggling students, including those who lack motivation or confidence in their writing ability, to help them overcome writing challenges and achieve writing success. This finding was also consistent with a prior study (Troia et al., 2022) that classified the same sample of students used here into five distinct written profiles, where motivation was identified as a critical writing-related measure that distinguished their profiles and further affected their writing quality in narrative, persuasive, and informative essays. To address the needs of unmotivated writers, instructional scaffolds with motivational elements, including self-regulatory activities to maintain motivation and individualize treatment (Zimmerman and Bandura, 1994) may be beneficial to keep students motivated and prevent them from falling behind.

8.2. Teacher-level predictors of writing achievement

While individual differences among students are undoubtedly significant contributors to the complexity of their writing achievement, it is essential not to overlook the impact of teacher/classroom-level factors in explaining the variance in writing achievement between classrooms. Our analysis revealed that teacher-level predictors significantly accounted for an additional 8% of the variance in explaining writing achievement beyond student-level factors.

In our study, we examined two dimensions of teacher-level factors. The first dimension of teacher-level factors was investigated, specifically the quantity of teaching practices across varied aspects of instruction. Our analyses revealed that teaching tactics were positively associated with student writing achievement, whereas class management was adversely related to student writing achievement. However, we did not observe any statistically significant impact on student writing achievement for other aspects of teacher actions. These findings suggest that the positive effect of teaching tactics on student writing achievement may be attributed to their ability to create a supportive and engaging learning environment through modeling, questioning, suggestions, feedback, and so forth, which can enhance student motivation and confidence in writing (Kapka and Oberman, 2001; Tienken and Achilles, 2003). On the other hand, excessive class management practices can disrupt student learning and negatively impact their motivation to write (Franklin and Harrington, 2019). Regarding the non-significant effects, it is possible that these effects were confounded by other factors. To explore this possibility further, we conducted a moderating analysis and found that some of the other teaching aspects had a significant impact on student writing achievement when motivation served as a moderator. The interacting relationships are discussed in a subsequent section.

Another domain involved investigating the impact of teachers' personal and professional traits on student writing achievement. However, we did not find any statistically significant effects of teacher degree, gender, efficacy beliefs, writing knowledge, writing ability, or professional development on student writing achievement. There are various reasons that could explain these findings. Firstly, our result was consistent with prior research that proved no significant relationship between teacher qualifications and student academic achievement (Huang and Moon, 2009; Kosgei et al., 2013). Secondly, the measures used to assess teacher-level factors in this study may not have been sensitive or specific enough to capture the nuances of these constructs. For example, self-efficacy beliefs are multifaceted and intricate constructions, and a narrow or insufficient measure may not be able to capture the full range of nuances in this construct. Similarly, for writing knowledge, we only analyzed teachers' writing ability in spelling and written expression using a standardized test (the WIAT-II), thereby neglecting the complex nature of this construct. Thirdly, it is also possible that teacher-level factors interact with other contextual factors; therefore, the effect of teacher-level factors may be masked or moderated by other factors. Hence, future study should investigate these contextual factors to obtain a more comprehensive understanding of the complex interplay between teacher-level factors and student writing achievement.

Our analysis of teacher-level factors has important implications. While we did not observe significant associations between teachers' personal and professional characteristics and student writing achievement, this does not necessarily imply that teachers should not strive to develop their own expertise and ability for teaching writing. Instead, we propose integrating these factors into a school district's accountability system can provide valuable empirical insights into the multifaceted process of teacher evaluation (see Kupermintz, 2003). Although it may be challenging to define the hallmarks of effective teachers, effective instructional practices can be identified and honed. When data on teacher effectiveness are coupled with professional development opportunities that concentrate on improving instructional characteristics and teaching behaviors, the ultimate result can be improved educational success for the majority of students (Stronge, 2006).

8.3. Moderating role of teachers' instructional effectiveness between student motivation and achievement

Our study has revealed three interaction effects at a significance level of 0.10. First, the interaction term of motivation × process was found to have negative impact on student writing achievement. This finding implies that, in classes where writing

instruction on process features was infrequent, student motivation had a strong predictive effect on their writing achievement. It also can be interpreted that for students with lower writing motivation, providing writing instruction focused on process features was found to have a stronger predictive effect on their writing achievement; conversely, for students with higher writing motivation, such instruction may not provide as much benefit in facilitating their performance.[1] This finding is in line with the notion that process-oriented instruction involves providing direct strategy instruction and scaffolded practice that integrates a set of theories, procedures, and activities into multiple writing processes such as planning, drafting, and revising. Previous research has suggested that such guided instruction can be effective in boosting writing performance and can be particularly beneficial for demotivated students (e.g., Collins, 1998; Lamb, 2017). Additionally, the literature also indicates that more experienced and mature writers typically use writing processes to compose essays, implying that motivated writers may have the capability to leverage their own self-regulation and may not derive as much benefit from guided instruction (e.g., Graham and Harris, 1996; Cleary and Zimmerman, 2004).

The second significant interaction effect we observed was between motivation and the utilization of writing materials during classes, which had a negative impact on student writing achievement. This suggests that in classes where writing materials such as graphic organizers, revision checklists, and word walls were infrequently utilized, student motivation had a strong predictive power on their writing achievement. In other words, for students with lower writing motivation, utilizing materials was found to have a stronger predictive effect on their writing achievement, whereas such teaching practices may not greatly profit students with higher writing motivation. This aligns with prior research that providing optimal learning materials can be engaging for unmotivated students and can provide additional support for their writing development with an effect size of 0.82 (see Graham and Perin, 2007).

Third, the interaction term of motivation × teaching tactics was found to positively influence student writing achievement. The result indicates that in writing classes where teaching tactics such as modeling, explanation, questioning, and conferencing/discussion were frequently employed, student motivation had a strong predictive effect on their writing achievement. Specifically, for students with high writing motivation, these instructional tactics were found to have a stronger predictive effect on their writing achievement, while for students with lower writing motivation, providing such instruction may not be as beneficial for facilitating their achievement. Effective and adequate teaching tactics can contribute to a positive learning environment and promote student engagement, ultimately leading to better academic performance. Our findings are consistent with previous research suggesting that teachers can establish positive relationships with the students and enhance their writing performance by providing varied instructional assistance, including modeling, demonstration, and discussion, as well as offering positive feedback and reinforcement for the use of writing strategies, and granting students more autonomy in selecting their writing topics (Troia et al., 2012; Bruning and Kauffman, 2016; Philippakos, 2020). Additionally, the finding that low-motivated students may not gain as much from teaching tactics is likely due to their lack of intrinsic drive and interest, which can hinder their ability to remain attentive and receptive during teacher-led instruction. To address this issue, educators may opt for incorporating instructional models such as the self-regulated strategy development approach, which involves teacher modeling followed by independent student practice and hands-on activities that have been demonstrated to promote creativity and boost student engagement (Harris et al., 2008). This approach provides opportunities for students to take an active role in their learning and apply concepts and strategies in meaningful and interactive ways, because relying solely on modeling and explaining strategies may prove inadequate for many students (Harris and Graham, 1999). It is also noted that the frequency of class management has a negative impact on student writing achievement in the full model, although this was not an interaction effect. Excessive classroom management activities may impede the time allocated for writing activities and disrupt teachers' planned instruction, leading to a shift in focus away from writing instruction (Marzano et al., 2003). In addition, the frequent use of punitive management strategies during class may decrease students' motivation to learn (Rahimi and Karkami, 2015). Previous research has shown that effective writing classes typically encounter disruptive behavior incidents approximately once every 2 h, while ineffective classes may experience such incidents as frequently as every 12 min (Stronge et al., 2007). It is crucial to maintain a balanced approach to class management that does not detract from writing instruction and avoids frequent disruptions that can interfere with students' learning.

9. Conclusions

Different from prior studies that relied on bivariate correlations or simple regression analyses to explore relationships, the present study addresses a major gap in the literature on cross-level effects by utilizing multilevel analysis within our nested dataset. We aimed to investigate how students with varying levels of motivation may benefit from specific teaching strategies to enhance their writing achievement. Future studies could expand upon our work by incorporating additional student-level predictors, which would allow for targeted instruction based on individual student characteristics. It is also important to acknowledge that our study primarily relied on quantitative observation data to examine the presence or absence of specific writing instructional actions employed by teachers in their writing class, rather than delving into the intricates of their implementation. For instance, we found a negative moderating effect of teaching materials on students' writing achievement. However, it is essential to recognize that simply providing students with tools or resources without adequate guidance may not positively moderate the relationship

1 Interaction term indicates a bidirectional relationship. Therefore, we interpreted both directions of the interaction effects, whether motivation was the moderator or instructional practices were the moderator. The same approach for interpretation was taken for other interaction terms in this study. This allowed us to comprehensively explore the relationship between motivation, instructional practices, and writing outcomes.

between motivation and performance. Conversely, if students are provided with the same tools along with the knowledge and skills to effectively utilize these materials, it might yield a positive moderating effect on the relationship between motivation and performance. Future research utilizing qualitative methods can offer a more nuanced exploration of the utilization of these instructional actions, allowing for a richer understanding of their effects on students' writing performance.

Although we did not find any significant effects of teacher personal or professional characteristics on student writing achievement, it is arbitrary to suggest that these factors are not important. In fact, teacher efficacy beliefs and writing expertise can enhance their effectiveness as both writers and educators, and may ultimately influence their instructional efficiency and promote a positive learning environment. Furthermore, our study emphasizes the importance of caution when implementing teaching tactics, given that students with varying levels of motivation may exhibit different levels of response to these instructional approaches. This finding has significant implications for educational practitioners, as it suggests the need for differentiated instruction that caters to the unique needs and characteristics of each student, to ensure that all students are engaged and motivated to learn.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by Social Science Behavioral/Education Institutional Review Board, Michigan State University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

Conceptualization: HW and GT. Methodology, formal analysis, and writing—original draft preparation: HW. Writing—review and editing, project administration, and funding acquisition: GT. All authors have read and agreed to the submit the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1213929/full#supplementary-material

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Early childhood teachers' writing beliefs and practices

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This study examined the early writing beliefs, ideas, and practices of 54 early childhood teachers. Teachers completed a survey designed to examine their early writing beliefs and provided definitions about early writing development through a written response. Teachers were also observed in their classrooms and writing practices were coded for instructional strategy employed by the teacher (i.e., modeling and scaffolding approaches) and the instructional focus of these interactions with attention to early writing skill. Teachers' definitions of writing often emphasized specific writing skills, with most teachers emphasizing handwriting. Teachers were observed enacting a range of modeling and scaffolding practices to support early writing, but the majority of interactions focused on handwriting supports. Teachers' definitions of writing and their responses to the teacher belief survey were unrelated to each other, but differentially related to writing skills emphasized in interactions with children. Teachers who identified more than one writing component in their definition were more likely to enact practices to support children's writing concept knowledge, while teachers who espoused more developmentally appropriate early writing beliefs on the survey were more likely to engage children in spelling focused interactions. Findings have implications for the study of teachers' beliefs about writing as well as the need for professional learning supports for preschool teachers.

KEYWORDS

early writing practices, early writing, teacher beliefs, teacher knowledge, early childhood education

Introduction

Young children develop substantial early writing knowledge and skills during the preschool years (Diamond et al., 2008; Puranik and Lonigan, 2011; Campbell et al., 2019). This knowledge has led to professional recommendations regarding the types of environmental and instructional supports that early childhood teachers should provide preschool aged children to promote children's early writing development (Gerde et al., 2012, 2021). However, researchers document wide variability across early childhood settings in the (a) types of environmental writing materials and print resources teachers provide children on a daily basis (Gerde et al., 2015; Zhang et al., 2015) and (b) nature and quality of early writing interactions (Bingham et al., 2017). For example, interactions between teachers and children focused on supporting writing skills are relatively infrequent in comparison to other early literacy and language practices (Pelatti et al., 2015; Zhang et al., 2015). Encouragingly, even though infrequent, studies demonstrate that both environmental and instructional

opportunities uniquely contribute to children's writing development across preschool (Gerde et al., 2015).

Multiple factors have been posited for why early education teachers engage infrequently in early writing interactions and why most instructional interactions in preschool classrooms heavily favor transcription skills (i.e., handwriting and early spelling) rather than early composing (Bingham et al., 2017). For example, researchers have identified that writing practices are related to teacher knowledge about early writing (Bingham et al., 2022), early writing standards (Tortorelli et al., 2021), and pre-service teacher educational experiences (Hall and Grisham-Brown, 2011). Studies linking these constructs and teacher practice suggest that teachers' social cognitions (their beliefs and attitudes about writing) and their knowledge of how children develop early writing skills likely guide the frequency and types of experiences they provide children. Bingham et al. (2022) illustrate that teachers with more sophisticated early writing knowledge are more likely to provide high quality early writing instructional opportunities designed to support a wide range of early writing skills (i.e., composing, handwriting, and spelling). Because teacher beliefs and knowledge are malleable (i.e., they can be changed), understanding how preschool teachers think about early writing development and how it is promoted in early childhood classrooms is an important area of research.

The purpose of this study was to examine associations among preschool teachers' early writing beliefs, knowledge, and practices. Because understanding factors associated with teachers' early writing practices are essential to efforts to support the quality and frequency of early writing opportunities, we were particularly interested in examining how preschool teachers define early writing and their beliefs about developmentally appropriate and inappropriate writing practices. We were also interested in understanding the extent to which teachers' knowledge and beliefs were related to observed classroom practices. As limited research exists in this area, we explore both qualitative and quantitative approaches for capturing preschool teachers' beliefs and knowledge.

Early writing development

Writing is an incredibly complex act, particularly for young children. Even young writers must bring together cognitive, linguistic, motor, self-regulation, and literacy skills into the act of translating thoughts into symbols or marks on a page that have meaning to the child (Dyson, 2001; Berninger, 2009; Chandler et al., 2021). The preschool years, before children enter kindergarten, is a developmental period where considerable knowledge and skill related to writing develops (Puranik and Lonigan, 2011; Rowe and Wilson, 2015), although early marks take many forms that vary in complexity, conventionality, and intention (Rowe and Neitzel, 2010; Quinn and Bingham, 2019). The development of both print and meaning processes for writing emerge as children make connections between what they intend to communicate (i.e., oral language and intention) and the written symbols they generate to communicate these ideas with others (Tolchinsky, 2003; Rowe and Wilson, 2015). Cognitive conceptual models of early writing development typically organize early writing skills into meaning and print or code-based processes (see Kaderavek et al., 2009; Berninger and Chanquoy, 2012) or knowledge strands (see Puranik and Lonigan, 2014). For preschool aged children, these skills are typically broken down into two larger components, namely (a) transcription or procedural knowledge, which contains print awareness, handwriting, and early spelling skills and (b) composing or generative knowledge. The distinction among writing components is included in early learning development standards in preschool and reflects that young children must acquire a variety of skills in early childhood in order to become skilled writers (Tortorelli et al., 2021).

Transcription skills are print and code-based skills required in order to "translate" language into written text (Berninger and Chanquoy, 2012) and include subcomponent skills of (a) print or writing concepts, (b) handwriting, and (c) early spelling (Tortorelli et al., 2021). Writing concept knowledge represents a child's understanding of how print works (e.g., writing moves in language specific and logical ways from left to right and top to bottom in English and that spaces separate words) and how marks on paper have meaning and can be 'read' (Clay, 2000; Rowe, 2008; Puranik and Lonigan, 2014). Writing concepts knowledge, titled conceptual knowledge by Puranik and Lonigan (2014), is complementary to print concepts in that it examines children's understanding of print within the context of writing. Children's growing understanding of print is important to their awareness of writing form, which is key to a child's ability to write conventionally. In preschool, handwriting, or the ability to form letters, emerges as a key developmental indicator of children's early writing skill, as it represents a complex amalgamation of cognitive, motor, and neuromotor processes (Gerde et al., 2012; Dinehart, 2015). Children's handwriting reflects their ability to use their fine Dinehart motor skills to manipulate and move a writing utensil, their visual understanding of the letter form, and the knowledge of how English letters are made up of lines and curves (Schickedanz, 1999). Handwriting skills, in turn, support more complex writing skills like invented/estimated spelling as young children develop orthographic knowledge about letters and their formation (Puranik and Apel, 2010; Puranik and Lonigan, 2011).

Increasing sophistication in children's understanding about letters and letter sound associations support their ability to spell words phonetically (Adoniou, 2014; Sénéchal et al., 2023). Children's invented spelling abilities begin to develop in predictable ways in preschool and rely heavily on their phonemic awareness skills, particularly their knowledge of letter-sound associations (Puranik and Lonigan, 2014; Zhang et al., 2017). Early spelling development follows a predictable path for English speaking children, with children in preschool and kindergarten moving from pre-phonological to phonological writing (Kemp and Treiman, 2023). As they develop an initial ability to encode sounds in spoken language into text, children first are able to identify and then write the initial sounds in words before moving onto ending and then middle sounds (Ouellette and Sénéchal, 2008; Bear et al., 2012; Cabell et al., 2013). Although 3-year-old preschool aged children, who are mostly likely to be pre-phonological writers (i.e., they are producing some of the symbols of their alphabetic language but not yet using invented spelling; Kemp and Treiman, 2023) are unlikely to write salient sounds in words when asked to write consonant-vowel-consonant words, approximately 30% of 4-year-olds and 50% of 5-year-old-children demonstrated the ability to write either

initial or final letters (Puranik and Lonigan, 2011). This is likely one reason that some US states' preschool writing standards focus attention on letter-sound correspondence and invented spelling skills (Tortorelli et al., 2021). Because spelling reflects a child's ability to use letters and sounds to encode words (Ehri, 2000), even at the early stages, it taps into orthographic, phonological, and graphophonemic knowledge (Ouellette and Sénéchal, 2017; Kemp and Treiman, 2023).

Composing skills represent children's ability to generate ideas for what to write and the translation of those ideas into language that is captured in marks on a page (Berninger, 2000; Quinn et al., 2021). Although considerable variation exists in how researchers conceptualize composing skills in early childhood (Quinn and Bingham, 2019), preschool models of early writing and developmental standards designed to guide professional practice often emphasize meaning related skills and processes. Because young children demonstrate composing for varied communicative purposes (i.e., to make a list, label a picture, write a note to a family member, etc.), composing is situated within sociocultural contexts of why one might write and engages both oral language and written language as children attempt to capture their ideas using scribbles, drawings, or letter-like forms (Dyson, 2001; Quinn et al., 2021). Importantly, researchers emphasize that composing is not merely children's oral response to a writing task, but children's ability to intentionally connect their oral language to a written product regardless of the writing that is produced (i.e., through drawing, scribbling, or estimated spelling, Rowe and Wilson, 2015; Quinn and Bingham, 2019; Quinn et al., 2021). Approaches for assessing young children's composing examine the sophistication of children's ideas, how relevant they are to the writing prompt or context, and how oral responses match or align with written responses that the child shares with an examiner (Rowe and Wilson, 2015; Thomas et al., 2020; Quinn and Bingham, 2022). Consistent across these varied approaches is the importance of thought and communication to writing processes even for young children (Gerde and Bingham, 2023). Because the act of composing involves thought and language in addition to marks on paper, even young children compose before their writing reflects conventionality or properly formed letters (Rowe, 2009; Dyson, 2013).

Early literacy beliefs and practices

Although there are few studies examining preschool teachers' beliefs about early writing specifically, researchers have studied early childhood literacy focused beliefs, which sometimes contains attention to writing. Across studies, early childhood teacher beliefs have been conceptualized and measured in varied ways (Charlesworth et al., 1993; File and Gullo, 2002; Hindman and Wasik, 2008), but inherent across conceptualizations is that beliefs reflect ideas that are valued by an individual and perceived as factual or true (Evans et al., 2004). Conceptualizations of teachers' beliefs often emphasize teachers' thoughts and assumptions about (a) an area of development [e.g., knowledge or ideas about early literacy development, and/or (b) the importance of certain pedagogical approaches for supporting that development (i.e., the belief that there are best ways to support children's learning)]. Inherent in the study of beliefs is the importance of teacher knowledge, as research suggests associations among these constructs (Hindman and Wasik, 2008; Schachter et al., 2016). Because researchers have approached the study of beliefs with such varied conceptualizations, they have used a number of qualitative and quantitative approaches for understanding how teachers think about early literacy broadly (Cunningham et al., 2009; Campbell et al., 2019). In other words, because beliefs represent teachers' understanding about development and their perceptions about how certain practices support that development, it is important to attend to teachers' literacy beliefs within the context of instructional practices.

It is long known that teachers' beliefs inform their pedagogical decision-making and are a filter by which teachers perceive the importance of certain instructional approaches (Richardson et al., 1991; Fenstermacher, 1994). Cunningham et al. (2009) found that teachers' early literacy beliefs related to how they allocated time for literacy instruction.

Others document that teachers' beliefs relate to specific literacy practices they enact in the classroom (e.g., Stipek and Byler, 1997; Scull et al., 2012). For example, in their survey of Head Start teachers, Hindman and Wasik (2008) found that teachers' early literacy beliefs varied somewhat by the early literacy skill being assessed. Although teachers were much more likely to endorse the importance of certain instructional experiences for supporting language skills, they tended to not endorse active teaching of code-based skills, a finding replicated by Schachter et al. (2016). In their study of teachers and parents' beliefs about reading, Evans et al. (2004) found that teachers who endorsed graphophonemic views of reading were more likely to rate phonics and letter sound instructional activities as important, while teachers endorsing constructivist views of reading that emphasize language and meaning processes were more likely to endorse the importance of contextual approaches, such as using books with natural language, for supporting children's reading development. Similarly, in a study by Campbell et al. (2019), teachers' endorsing child-centered and play-based literacy beliefs reported engaging children in play-based literacy interactions and were more likely to resist commercially developed phonics programs.

However, others have found limited associations among early childhood teachers' beliefs and practices (Hamre et al., 2012; Sandvik et al., 2014) or even negative associations (Schachter et al., 2016). For example, in their study of Norwegian teachers, Sandvik et al. (2014) found that preschool teachers held early literacy beliefs that were generally aligned with current research on children's early literacy development, but that their self-reported literacy practices did not reflect such beliefs. Others have noted discrepancies among beliefs and practices when beliefs are self-reported and classroom practices are examined via observations (McMullen et al., 2006). Schachter et al. (2016) found limited relations between teachers' beliefs of some literacy skills and practices (e.g., beliefs about book reading and book reading instructional practices) and negative associations among beliefs and practices for other literacy skills. The negative associations were noted between (a) teachers' code-based beliefs and observed code focused instruction and (b) teachers' oral language and vocabulary beliefs and classroom instruction designed to support these skills. In their discussion of their findings, they raise concerns about the fact that many survey based measures designed to assess teachers' beliefs may be impacted by social desirability because teachers understand how to answer such questions. An additional explanation for weak or unexpected

associations between beliefs and practices may result from the fact that many preschool classrooms offer children' literacy focused interactions that are of low quality (Justice et al., 2008; Schachter et al., 2016). Adequate levels of both beliefs and instructional practice may be needed in order to find an association among constructs.

Early writing beliefs and practices

In contrast to early literacy beliefs, we know very little about how preschool teachers view writing, how they define it, and which practices they believe promote young children's writing development. Early educators' beliefs about writing may function differently from their beliefs about literacy broadly for various reasons. First, early childhood teachers receive limited, if any, pre-service teacher education coursework focused on early writing pedagogy (Zimmerman et al., 2014). Moreover, preschool teachers enter the profession from a range of backgrounds with varied educational training and experiences (Maxwell et al., 2006; Whitebook et al., 2009); only some of them from traditional teacher education programs. Limited educational experiences learning about writing development and pedagogy may be why teachers report relying on their own K-12 schooling experiences to inform their ideas about teaching writing (Ng et al., 2010). Unfortunately, these experience-informed beliefs are often negative or emphasize handwriting and spelling rather than composing and/or purposes for writing (Colby and Stapleton, 2006; Mackenzie, 2014). The negative writing experiences that teachers reported they had as students themselves (Colby and Stapleton, 2006; Hall and Grisham-Brown, 2011) may be why early educators, at least in the US, limit their writing time and opportunities in the classroom or focus on a narrow set of writing skills (Pelatti et al., 2015; Zhang et al., 2015; Bingham et al., 2017). A second reason relates to the fact that early childhood teachers may not consider certain writing experiences as developmentally appropriate for young children or that children may not benefit from writing instruction unless they are interested in writing. This may be one reason that some teachers endorse a "readiness perspective" for how and when they might provide writing instructional experiences to young learners (Gerde et al., 2019a).

In contrast to this perspective, research also identifies that teachers believe that young children find writing to be interesting (Gerde et al., 2019b) and that they identify young children as writers early on (Hall et al., 2019; Magnusson et al., 2022). For example, Hall et al. (2019) found that early educators had more positive beliefs about preschoolers' writing abilities than parents, demonstrating an understanding of writing development that was not typical of other adults. Survey research using researcher-generated items from the Preschool Teacher Literacy Belief Questionnaire (TBQ; Seefeldt, 2004) identifies that preschool teachers vary considerably in their writing development and instructional beliefs (Hindman and Wasik, 2008; Schachter et al., 2016). Whereas most teachers tended to espouse beliefs indicating their understanding that scribbling and drawing are important to young children's writing development and that children should write without worrying about spelling, other teachers disagreed with such statements and also the perspective that children learn writing skills through teachers' modeling how to write. Unfortunately, Schachter et al. (2016) were unable to link teachers' beliefs on the TBQ to observed instructional practices because so few teachers were observed engaging in writing interactions with children. Findings from these studies suggest the need to examine beliefs in a holistic fashion as preschool teachers may hold varying beliefs that may not be reflected adequately in researcher-generated categories. In addition, research that focuses on a wider range of early writing practices that have been shown to be predictive of children's early writing development (see Gerde et al., 2015) is needed.

Qualitative research coding open-ended responses about teachers' beliefs of early writing identified three teacher views on young children's writing (Gerde et al., 2019b). One group of teachers held an affirmative belief that young children enjoy writing. Other teachers held a conditional belief that some children do, and some children do not, enjoy writing depending on the child's characteristics. For example, teachers believed that (a) boys compared to girls, (c) younger children vs. older children, or (c) children with less developed fine motor skills tended to not enjoy writing. Finally, a third group of teachers held a belief that children enjoyed writing when teachers created learning experiences that made writing fun, primarily through varied and interesting materials (e.g., whiteboards, scented markers). Only six of the 32 teachers from their study discussed creating meaningful writing opportunities for children to compose; and, interestingly, these teachers represented all three belief categories. In other words, teachers can hold varied and somewhat conflicting beliefs about children's writing development. No pattern emerged identifying a relation between these belief categories and teachers' practices. Moreover, teachers' educational background, teaching experience, curriculum, and program type (e.g., Head Start, state funded) did not predict their beliefs.

There are likely multiple factors that influence teachers' ideas about writing, including limited and varied opportunities to learn about writing development and pedagogy (Zimmerman et al., 2014) and potentially negative experiences with writing as they learned this important communication skill (Colby and Stapleton, 2006). In addition, there is extensive complexity in early writing development, which may contribute to ideas that some children need particular skills (i.e., fine motor) before they are "ready" to write (Gerde et al., 2019a). This may be the case for teachers who are less knowledgeable about how children's marks on the page can provide important information into their writing concept, transcription, and composing skills (Bingham et al., 2022). The complexity of early writing development for young children may be taken for granted by adults who have long automated developmental systems that take years to fully develop, which may lead to developmentally inappropriate writing instruction (Puranik and Lonigan, 2014; Bingham et al., 2017). While initial work in the US examining early educators' beliefs and writing practices identified limited relation between beliefs and reported or observed practices (Gerde et al., 2019b), in a study of pre-service preschool educators from Norway, Sweden, and Finland, Magnusson et al. (2022) found that preschool teachers endorsed play based approaches for supporting children's writing, which was also reflected in their self-reported practices, particularly when discussing ways to make writing environments interesting and

engaging for children. However, they also found that teacher's self-reported writing mediation practices lacked details and concrete examples. Given such findings, it is clear that we need to continue to investigate teachers' beliefs about early writing in ways that appreciate the complexities that are influencing teachers' beliefs and the complex nature of writing development. The use of both theory-informed researcher-developed categories and qualitatively teacher-derived ideas may be essential for understanding teachers' complex beliefs and how they relate to the decisions they make about designing and supporting writing opportunities in early childhood classrooms.

Current study

The current study was designed to examine teachers' beliefs about children's writing development through both qualitative and quantitative means and to determine the extent to which these beliefs are related to their observed instructional practices. Because there are few measures designed to expressly examine early childhood teachers' early writing beliefs, we used a previously validated scale (i.e., the TBQ) along with an open-ended question designed to elicit teachers' ideas about children's writing development. Three research questions guided this study.

Research questions

1. How do teachers define early writing development? Given previous research studies examining teachers' early writing beliefs and knowledge (Gerde et al., 2019a; Bingham et al., 2022), we hypothesize that teachers will define early writing in various ways that describe transcription related skills (writing concepts, handwriting, early spelling) while focusing less on composing related skills.
2. How are these definitions related to self-reported writing beliefs as assessed through the TBQ? Because previous research suggesting that teachers' beliefs and knowledge are related (Hindman and Wasik, 2008), we hypothesize that teachers' beliefs as measured by the TBQ will be positively related to the number of components they articulate in their definitions.

To what extent are teachers' definitions of writing and writing beliefs as assessed by the TBQ related to their writing practices? As previous research documents some associations between teachers' literacy beliefs and their practices (Schachter et al., 2016), we anticipate that teachers' writing beliefs and definitions will be positively related to their early writing practices.

Materials and methods

Participants

A total of 54 lead Head Start teachers from two US states participated in this study. Teachers provided instruction to preschool aged children (ages 3 to 5 years old) in mixed aged classrooms. The majority of teachers in the sample reported their race as Black (57%) with the remaining participants identifying as White (43%). Teachers were relatively experienced, reporting that they had been teaching preschool children for an average of 8 years (*SD* = 7 years, Range = 6 months to 30 years). Consistent with Head Start requirements, the majority of teachers in this sample reported having a Bachelor's degree (61%), or Master's degree (28%), while the remaining 11% reporting having obtained an Associate's degree. The majority of teachers were teaching in programs using the Creative Curriculum (80%).

Procedures

Teachers in this study were participating in a professional development (iWRITE; Gerde and Bingham, 2023) project aimed at supporting their early writing practices. Data are taken from the first time point of the study, with information collected in the months of September and October, before any professional development was experienced. We recruited early childhood programs from two US states (one Southern and one Midwestern), with approval to engage in the study being granted by early childhood program directors. Once approval was obtained, researchers visited programs to discuss the study with teachers and invite participation in the study. Teachers were provided information about the study and an opportunity to ask questions from the researcher before they were asked to sign a consent form if they were interested in participating. Participants who agreed to participate in the project were asked to (a) complete a demographic survey about themselves and their educational and work experience, (b) complete a survey that contained both open-ended and Likert items designed to assess their early writing beliefs, and (3) participate in an observation of their classroom practices.

Classroom observations, which included videotaping of instructional practices, occurred during weeks six to tenth of instruction of the school year (i.e., months of September and October) during a typical day of instruction. Observations typically lasted approximately a full morning of instruction (approximately 2 h of indoor learning, excluding outside play) so that researchers could document the literacy practices that teachers typically enacted on a daily basis. At both the beginning and the end of the classroom visit, observers confirmed with the teacher that the observed instruction represented a typical instructional day. Video recording of preschool teachers' instructional practices focused on any instructional routines where writing might be present, including: breakfast or snack time, large group or morning meeting time, shared book reading, centers or free choice activities, and, if offered by the teacher, small group instruction. Videos were uploaded into a video editing program (INTERACT) and coded for a variety of modeling and scaffolding strategies (see section "Measures and coding").

Measures and coding

Early writing beliefs were assessed through a survey that teachers completed before they were observed in their classrooms.

Teachers responded to an open-ended prompt asking them to define early writing development and also responded to a series of statements about children's early literacy development. We briefly describe each approach.

Definition of early writing development

Given previous research suggesting the importance of teacher knowledge to their early writing beliefs and practices (Hindman and Wasik, 2008; Magnusson et al., 2022) teachers were asked to define early writing development. This open-ended response took up approximately a half-page of the survey at the beginning, allowing teachers ample space to write their responses. Teachers' open-ended responses were entered verbatim into an Excel spreadsheet and a second coder double checked them for accuracy. The spreadsheet was then uploaded into Dedoose, an online data management and coding platform,[1] for coding. We used a two-step process to analyze teacher's definitions. First, we used an *a priori* set of codes, derived from well-established theories of early writing (Kaderavek et al., 2009; Puranik and Lonigan, 2014; Kim, 2020), to identify language reflecting writing components: writing concepts, handwriting, spelling, and composing. Second, two coders independently reviewed definitions using a descriptive coding process (see Saldaña, 2015) in order to identify key writing beliefs identified by the participants that were not originally included in our *a priori* coding. This resulted in additional codes, such as "developmental progression of writing skills" (explained below), that were then included in the codebook. Once the code book was finalized through this two-step process, teachers' definitions were then evaluated by two PhD level graduate students with expertise in early literacy development and previous experience as early childhood educators. Responses were double coded by these research assistants revealing strong agreement across writing samples (0.91). Disagreements were discussed with the two authors of this study and final coding was agreed upon by all scorers.

Preschool teacher literacy beliefs questionnaire

Teachers completed the Preschool Teacher Literacy Beliefs Questionnaire (TBQ; Seefeldt, 2004; Hindman and Wasik, 2008), which contains 24 items designed to assess early childhood teachers' literacy beliefs. Items on the TBQ focus on 4 early literacy domains, namely (1) oral language/vocabulary, (2) book reading, (3) code-related skills, and (4) early writing. Items ask teachers to consider both skills that young children should be developing and specific instructional practices for how teachers should support these skills. Teachers are asked to rate their agreement with statements on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), with some items worded negatively and then reverse coded. Teachers with higher scores on the TBQ are considered to have beliefs that are more closely aligned with research-based notions of how children learn language, reading, and writing skills. We were primarily interested in writing subscale of this questionnaire, which is made up of six items designed to assess teachers' beliefs about early writing development (e.g., "Should write without worrying about spelling" and "Children learn to read before learning to write," reverse scored), how children learn to write (i.e., "Children learn to write by watching teachers write"), and classroom practices designed to support early writing (e.g., "Should not write until teachers show them how to form each letter," reverse coded). Survey responses evidenced acceptable levels of internal consistency for the total scale ($\alpha = 0.68$) and the writing subscale ($\alpha = 0.62$). These alphas are lower than reported by Hindman and Wasik (2008), but higher than those reported by Schachter et al. (2016). Scores on individual items were summed to obtain summative ratings of teachers' beliefs about children's writing.

Early literacy practices

Video coding of teachers' observational data examined early writing pedagogical supports available to children using the measure Writing Resources and Interactions in Teaching Environments (WRITE; Gerde et al., 2015). Using an expanded coding structure outlined in previous work (Bingham et al., 2017, 2022), we examined videos in order to identify (a) the instructional focus of interactions (i.e., handwriting, spelling, composing, writing concepts), and (b) the teaching strategy that teachers were using to support children's writing (e.g., modeling and scaffolding interactions). Modeling interactions included teachers' practices aimed at demonstrating purposes of writing ("I am going to number the things we need at the store as I make my list for our class party.") and explicit directions or demonstration of writing concepts ("I am going to draw a 'T' by making one line down and one line across"). Scaffolding interactions were focused on how teachers (a) broke down writing tasks to make the task easier for children (e.g., stretching sounds in words to support children's spelling or supporting children's idea generation to focus their thinking on something that they might write) and (b) expanded children's involvement or thinking about writing in a manner that pushed thinking or skill development (e.g., encouraging children to compare the ideas generated by multiple children to reach a consensus for a book title, encouraging children to analyze and compare various letter forms). Previous work with the original and expanded WRITE indicate that the measure has good internal consistency ($\alpha = 0.76$) and construct validity as evidenced by its correlation to the Early Language and Literacy Classroom Observation scale (ELLCO; Smith et al., 2008) ($r = 0.66$, Gerde et al., 2015). Scores from the Writing Interaction scale on the WRITE have been shown to relate to children's writing development, indicating that the measure has good predictive validity (Gerde et al., 2015; Bingham et al., 2017).

Coding of writing practices

Videos were coded by five early childhood literacy experts who were former early childhood teachers and who had received or were receiving a PhD in early childhood education. Two coders independently identified writing events in videos and time stamped them to ensure that we captured all instances of teacher-child writing. Coders were trained to examine each teacher-child writing interaction or utterance (i.e., what teachers said during interactions) for evidence of writing component focus (writing concepts, handwriting, spelling, and composing) and instructional strategy (modeling, scaffolding to make the task easier, scaffolding to expand child's involvement or understanding). As part training, coders familiarized themselves with the codes, definitions, and examples from previous research and coded several videos in

1 https://www.dedoose.com

order to establish baseline interrater agreement with the second author. Once all coders reached 90% interrater agreement with master codes, they were split into teams of two randomly and they coded all writing interactions for writing component and strategy. This ensured that all teacher practice data was double coded. When disagreements emerged between coders, these were resolved through conversations and the agreed upon codes were used in analyses. There was high agreement between coders before resolving disagreements for both writing component (93%) and writing strategy (86%).

Results

To answer research question 1, *how do teachers define early writing development,* we examined the qualitatively coded data to identify the frequency of each component teachers mentioned in their responses and other ideas teachers generated. Considerable variability existed in teachers' definitions of writing, as teachers emphasized different component processes (writing concepts, handwriting, spelling, and composing) as well as the developmental progression inherent in young children's early writing development. Representative statements of teachers' responses are displayed in Table 1 along with the total number of teachers representing each code. Because teachers could have discussed multiple component skills in their answers, categories in Table 1 are not mutually exclusive (i.e., responses total to more than the number of teachers in the sample). Although definitions generally aligned with research-based conceptualizations or US preschool early learning standards, teachers heavily emphasized some component processes, such as handwriting (85%) and writing concepts (31%) significantly more than others (i.e., spelling, 15%, composing, 20%). Patterns in teachers' responses are discussed below.

Forty-six teachers (85%) emphasized handwriting skills in their definitions of early writing. Teachers discussing handwriting in their answers often positioned writing as "Children learning how to form letters. . ." or "the form it takes" to generate writing. Overwhelming, teacher responses that discussed handwriting skills also emphasized fine motor skills. This is illustrated by one teacher who suggested "I define early writing development as any form of fine motor hand (using any form of writing utensil) movement expressed on paper, or any other surface." Similarly, another teacher suggested "Early writing development helps children with their small motor skills. It also helps children form some letters and shapes." In some responses emphasizing handwriting skills, teachers also discussed a developmental progression of skills as children's movements become more coordinated. Consider the following quote "Any marks children make to represent writing using drawing and writing tools. Eventually these marks will start to form shape like letters, and then they begin to form letters." In this last example, the teacher also emphasized conceptual knowledge or writing concepts, the second largest category emerging in teachers' definitions.

Seventeen teachers (31%) discussed children's conceptual knowledge or understanding of writing concepts. These responses primarily articulated the connection between oral and written language. As one teacher noted, "Early writing development is when children use symbols to make connections between spoken and written language." Another teacher emphasized writing concept knowledge by suggesting that writing was "Any purposeful marks or exploratory marks made by a child." A few teachers' responses that were categorized as emphasizing writing concepts articulated how children use different writing tools (i.e., "Any marks that children make to represent writing using drawing and writing tools"). Although no teachers emphasized writing concept knowledge related to linearity or directionality (e.g., writing from left to write), teachers including writing concepts in their definition did sometimes discuss print explicitly (i.e., "The exploration of print and its uses, the form it takes, and its meanings."). Only one teacher mentioned punctuation in their response, suggesting that it was too early to focus on in preschool, "Punctuation used improperly at first grade with a gradual proper use of!,.,?"

Only eleven teachers (20%) in this sample mentioned composing related concepts in their definitions of writing. Teachers who articulated composing in their definitions emphasized the importance of communicating thoughts or ideas, such as, "Early writing development is when children are beginning to understand that writing is how we communicate. In Head Start, students sometimes communicate by drawing and telling adults their story of their pictures." Teachers who tended to emphasize composing skills were also likely to mention other early writing skills in their responses, particularly writing concepts or the ability to link spoken and written language in intentional ways. As one teacher emphasized, writing is ". . .putting something down on paper and being able to articulate what it is." Rarely (4% of responses) did teachers who discussed composing skills specifically talk about how discussing ideas before or during writing or brainstorming. In one rare exception, a teacher suggested "Early writing development are also the pre writing like brainstorming letter and word formations children do even before being presented paper or pencil."

Teachers' definitions focused the least on children's early spelling development. Only eight teachers (15%) articulated how writing including children's ability to hear the sounds in spoken language. When teachers talked about early skills that support children's early spelling development, responses primarily emphasized symbol and sound relationships, particularly how letters make sounds that children must learn to be able to write. For example, one teacher suggested that writing involves ". . .understanding symbols, sounds, and language" while another suggested that writing is about "learning to form letters and sounding them out." Only one teacher used the term "invented spelling" and she did so when describing the developmental progression of writing skills (e.g., "writing will progress from letter strings to then invented spelling").

As briefly mentioned earlier when discussing handwriting skills, 31% of responses explicitly mentioned an early writing developmental progression, or stages, that children follow as they develop early writing skills. Teachers in this group tended to emphasize that children moved from less sophisticated to more conventional writing, noting that children's early writing contains scribbles or drawing before they learn to write letters. As one teacher noted, children ". . .scribble, make letter-like forms, trace letters, and write letters." Teachers' descriptions of early writing progressions overwhelmingly focused on the form of children's writing, and frequently made reference to handwriting skills. This is reflected in the following definition "children are beginning

TABLE 1 Preschool teachers definitions of early writing by writing component.

Writing concepts	Handwriting	Spelling	Composing
N = 17	*N* = 46	*N* = 8	*N* = 11
Early writing development is in children's scribbles, drawings and writings. When children are exposed to literacy and print, they begin to understand writing carries meaning.	Early writing development help children with their small motor skills. "It also helps children form some letters and shapes."	"Letter and letter sound recognition. Scribbles to mock letter forms."	I would define early writing development when a child begins to scribble and tries to draw objects and lines to communicate ideas.

Teachers could indicate more than one component in their written responses.

to learn pencil control and scribbling and mock like letters." Other developmental progressions noted that both writing progress and a developmental progression that included spelling skills. As one teacher articulated, "It starts the first time they pick up a tool they can make marks with. Eventually, the marks become meaningful to them. Then they go through stages of advancement as they learn letters and sounds." Teachers that discussed early writing as a developmental progression often positioned preschool children's writing as involving distinct phases and they provided examples of this progression (e.g., "They have different levels of early learning, some begin with lines, go onto forming some letters, then progress to making real letters."). A common thread through teacher definitions that noted the developmental nature of young children's writing skills was that early writing was the beginning of a process (e.g., "Early writing development is the beginning to these kids writing").

A sizable percentage of teachers (37%) also included how they would support early writing skills in their definition. For example, one teacher who emphasized handwriting skills suggested, "Early writing development would be the practice of introducing students to writing practice exposure to different tools: pencil, markers, crayons, paper. Also, it would be the practice of getting their hands and arms ahead (dexterity to write in the perfect manner)." As evident in this example, recommendations that teachers included in their definition overwhelmingly focused on handwriting skills in addition to exposure to various writing tools and opportunities to strengthen fine motor skills (e.g., "Experiences that allows children to practice fine motor skills that later help with writing."). A much smaller group of teachers who emphasized writing related activities in their definitions, discussed the importance of varied experiences with print and books (e.g., "Give as much exposure to all kinds of print – stories, modeled writing, environmental print, etc. Oral language development is also crucial before we can expect to see a lot of written literacy.").

Before we address research question 2, *How are these definitions related to self-reported writing beliefs as assessed through the TBQ?*, we first want to draw attention to the teachers' scores on this assessment. As displayed in the means of Table 2, teachers' scores on the writing subscale of the TBQ fell, on average, between "neither agreeing or disagreeing" (3) or agreeing (4). This suggests that teachers tended to positively endorse items on the scale, but did not hold the beliefs strongly. To examine research question 2, we generated a non-parametric test using the Wilcoxon signed rank sum test. We used this data analytic approach because teachers could have supplied 0, 1, 2, 3, or 4 writing components in their writing definitions. Given that few (n = 5) teachers emphasized three components (and none identified four writing components) in their definitions, we combined categories 2 and 3 to create a group where teachers emphasized multiple writing components. As a non-parametric test, the Wilcoxon signed rank test allowed us to determine whether teachers in these three groups differed in their writing beliefs as measured by the TBQ. Hence, our analyses compared the extent to which teachers in three groups (i.e., 0 writing components, 1 writing component, and 2 or more writing components) held similar beliefs about children's writing development and how it is promoted. Our findings revealed a non-significant test, suggesting that teachers' definitions of writing were independent from their self-ratings on the TBQ.

To examine research question 3, *To what extent are teachers' definitions of writing and writing beliefs as assessed by the TBQ related to their writing practices?*, we explored possible associations between the number of writing components teachers named in their writing definitions and their instructional practices coded as emphasizing writing concepts, handwriting, spelling, and composing. To analyze these relations, we generated a number of non-parametric tests using the Wilcoxon signed rank sum test. Similar to our approach in addressing research question 2, we used the combined categories of 2 and 3 to create a group where teachers emphasized multiple writing components. We then compared the extent to which teachers in these groups were enacting similar writing practices. Results demonstrate that teachers' writing definitions were generally unrelated to their observed instructional practices. The one exception to this pattern was that teachers emphasizing multiple writing components in their definitions were more likely to be observed enacting writing practices that emphasized writing concept knowledge (W = 22; $p < 0.05$). In other words, teachers who defined writing as involving multiple writing skills were more likely to be observed emphasizing the relation between oral and written language in their instructional practices and drawing attention to features of how English print works (left to right, with spaces, placement on a page) than teachers who did not emphasize separate writing components in their definitions.

We also examined the extent to which teachers' writing beliefs as measured by the TBQ were related to (a) the writing component (writing concepts, handwriting, spelling, and composing) they emphasized in observed interactions with children and (b) the instructional strategy (modeling, scaffolding by making the task easier, scaffolding by expanding). We display these associations in Table 2. As evident by this analysis, teachers' beliefs on the TBQ were largely unrelated to their observed writing practices. One exception to this pattern of null associations is a positive relationship between the TBQ and the number of spelling related writing interactions between teachers and children. This association is likely a function of the fact that

TABLE 2 Correlations, means, and standard deviations of study variables.

	1	2	3	4	5	6	7	8	9	10
1. Early writing beliefs (TBQ)	–									
2. Teacher education	0.18	–								
3. Teacher experience	−0.30*	0.09	–							
Writing interaction focus										
4. Writing concepts	0.06	0.17	0.01	–	–					
5. Handwriting	−0.05	−0.08	0.05	−0.05	–					
6. Spelling	0.34*	−0.03	−0.02	−0.10	0.28*	–				
7. Composing	−0.26	0.23	0.17	0.11	−0.26	−0.06	–			
Writing strategies										
Modeling Scaffolding-Making	0.10	0.07	0.01	0.33*	−0.06	0.07	0.36**	–		
9. Scaffolding-making writing easier	0.14	0.01	0.01	−0.05	0.36 **	0.52**	0.20	0.54**	–	
10. Scaffolding expansions	0.21	0.01	−0.02	0.04	0.15	0.57**	0.40**	0.63 **	0.70**	–
Mean	20.10	2.17	9.39	4.31	13.94	8.52	6.72	6.78	16.63	8.98
SD	2.87	0.61	7.14	6.53	20.69	12.04	10.98	7.80	18.40	12.85

**$p < 0.01$, *$p < 0.05$.

some TBQ items emphasize spelling related skills and their association with early writing skills. Interestingly, teachers' beliefs about writing were negatively related to their years teaching preschool aged children, but unrelated to their educational backgrounds.

Discussion

We designed this study to examine teachers' beliefs and ideas about early writing and their association with observed classroom practices. As one of the few studies to date that examines these constructs, the current study employed both quantitative and qualitative methods to describe preschool teachers' understanding of early writing development and explore how they were related to the instructional focus of teacher-child writing interactions. Because beliefs are argued to have a knowledge-based component (Hindman and Wasik, 2008), and recent research demonstrates how preschool teachers' writing knowledge facilitates early writing practices (Bingham et al., 2022), we were interested in examining associations between how teachers defined early writing and their beliefs about early writing development. Our findings point to limited concordance between teachers' beliefs as assessed by a previously validated measure of early writing and writing definitions, but each was associated in differential ways to the instructional focus of teacher-child writing interactions. We discuss main findings, recommendations for future research, and implications for professional practice below.

Variability of teachers' beliefs and ideas about writing

Consistent with our hypothesis, teachers participating in this study reported a wide variety of beliefs and ideas about early writing development in both their qualitative self-derived responses and their quantitative responses to researcher-generated items. Across both response options, teachers generally endorsed developmentally appropriate belief statements as measured by TBQ and also defined early writing skills to include a number of components that align with research-based notions of early writing that are articulated in US preschool writing standards (Tortorelli et al., 2021). It is noteworthy that teachers' definitions primarily focused on handwriting and print concept skills, with less attention to composing skills and early spelling skills, such as invented spelling. In many definitions that emphasized handwriting as a key writing component, teachers highlighted the importance of children's fine motor development and their ability to form letters for writing development. Consistent with both teacher belief (Gerde et al., 2019b) and early writing skill research (Chandler et al., 2021), it was clear that for many teachers writing was synonymous with handwriting and that developing strong fine motor skills was prerequisite for successful writing.

Teachers also showed some understanding about developmental progressions of writing, but many of these statements focused almost exclusively on form or development of fine motor skills as being the end point of writing in preschool rather than emphasizing early spelling skills, such as invented spelling. Rarely did teachers articulate ideas about making connections between letters and sounds or using letters to build words. Although it could be argued that focusing on spelling skills in preschool is inappropriate for young children, it is important to acknowledge that early, or pre-phonological, spelling development begins with children's understanding of, and ability to use, letters in their writing (Kemp and Treiman, 2023). As studies document that many children in US preschools are able to write letters and even engage in invented spelling (Puranik and Lonigan, 2011; Guo et al., 2018), it is important that teachers are engaging children with opportunities to use and connect early reading (decoding) and writing (encoding) skills (Cabell et al., 2013). Because phonemic

awareness is at the core of children's ability to segment the sounds within words to be spelled (Zhang et al., 2017; Sénéchal et al., 2023), teachers understanding of early spelling skills and their ability to engage students in a manner that supports their ability to hear the sounds in spoken language at the syllable, onsets and rimes, and phoneme level are key to supporting reading and writing development (Hall et al., 2015; Piasta, 2023).

In written responses, sophisticated or detailed descriptions of writing development that focused on composing processes or how children can connect oral language to written language was rare. It was uncommon for teachers to articulate that early writing included learning about the purposes for writing and developing skills for generating ideas, selecting words to use in their messages, or making connections between oral and written language. This finding may be a limitation of having participants write their responses or may reflect a more constrained understanding about children's writing, something noted in the literature (Bingham et al., 2022). In their study examining teachers' knowledge and practices, Bingham et al. (2022) found that teachers demonstrated a strong understanding of children's handwriting development and the importance of being able to write letters, but showed a more limited understanding about how drawing and writing involved communicative processes. However, as we will discuss in detail later, it is teachers who have a more complex and thus, more complete understanding of the multiple components of early writing who provided more practices supporting conceptual knowledge of early writing, practices we know support children's early writing development (Bingham et al., 2017).

A possible reason that preschool teachers appear less likely to discuss composing related skills when defining children's writing may be a result of the overwhelming focus on handwriting skills in US preschool early learning standards (Tortorelli et al., 2021). Standards have been known to inform teachers' practices for a range of skills (Scott-Little et al., 2012), but may unintentionally narrow teachers' beliefs about the importance of skills not contained in standards. Other explanations may be related to teachers' educational experiences and early childhood curriculum. Early childhood educators have multiple pathways to the profession that results in highly varied educational backgrounds (Maxwell et al., 2006; Whitebook et al., 2009). Even those teachers with an associate or bachelor's degree in education or child development may not have had courses or even course content in early writing development or practicum experiences to support early writing skills (Zimmerman et al., 2014). Teachers with minimal formal educational experiences about early writing may turn to curricula for guidance. However, even the most widely used early childhood curricula in the US provide uneven resources for early writing that do not reflect the full conceptual model of early writing to include composing, spelling, and handwriting or provide minimal guidance for supporting writing in ways that promote children's early development (Gerde et al., 2019a). Given that teachers' education was not related to teachers' beliefs and that years of experience was negatively related to beliefs, it appears that stronger pre-service and in-service teacher learning opportunities are needed that focus on supporting teachers' developmentally appropriate writing beliefs, knowledge, and skills.

Teachers primary focus on handwriting skills in their responses may provide insight into why writing opportunities are so rare in preschool classrooms (Gerde et al., 2015) or of so low quality (Bingham et al., 2017). For example, for literacy broadly we know teachers' beliefs inform their practices (Bingham and Kenyon-Hall, 2013; Schachter et al., 2016). For teachers who consider writing to be primarily handwriting, they may consider writing opportunities that go beyond writing one's name or tracing to be developmentally inappropriate for young children. Rather, as we see in this study, they may perceive developmentally appropriate writing opportunities to focus on the development of strong fine motor skills in preschool so that children will be "ready" for the writing expectations in kindergarten and later grades. Perhaps this is why we observe ample opportunities for children to write their name with a range of materials, opportunities for tracing and copying letters, and experiences for exercising fine motor skills available at writing centers (Gerde et al., 2015). This readiness perspective is not unusual among early childhood educators and may be how those beliefs and ideas are manifested for early writing through the provision of writing materials and activities (Gerde et al., 2019b; Magnusson et al., 2022).

Different approaches for eliciting beliefs and ideas offer unique insights

According to the responses teachers provided in this study their definitions of early writing and beliefs about early writing were unrelated, suggesting that they were tapping into different understandings about early writing development. This finding was opposite of our hypothesis that beliefs and writing definitions would be related. Results may reflect our elicitation approach of gathering teachers' definitions by having them write their own ideas, which some teachers may have found challenging. However, this approach also allowed teachers to share their understanding about early writing without limiting responses to preconceived categories. A primary focus in teachers' written definitions that resulted in a heavy emphasis on handwriting skills, while attending less to other writing skills, may have made it challenging to find an association with the TBQ. Alternatively, the fact that teachers' responses on the TBQ evidenced only acceptable reliability may have also contributed. In their original study, Hindman and Wasik (2008) noted that the TBQ has good reliability, a finding not replicated in Schachter et al. (2016) who found low reliability for this scale. It should also be noted that the TBQ does not contain items focused on children's composing skills (assessing primarily teachers' beliefs about transcription skills and how they should be supported), which may also have contributed to a lack of association. Challenges with both approaches for eliciting teachers' beliefs and ideas suggests the need to more closely examine how researchers conceptualize and elicit teachers' understanding of early writing. Given the complexity of early writing as a construct and the fact that teachers varied so much in their endorsement of the components within this construct, it is important that additional research be undertaken. This research should more carefully attend a full framework of early writing (e.g., Kaderavek et al., 2009; Puranik and Lonigan, 2014; Rowe and Wilson, 2015; Kim, 2020) and to teacher knowledge specifically because knowledge is an important source of teachers' beliefs as noted by Hindman and Wasik (2008) and others (e.g., Leatham, 2006). But also, beliefs are central to teachers' knowledge (Op 't Eynde et al., 2002).

Although the method used in this study, inviting teachers to generate responses to an open-ended question, may have provided space for teachers to share all of their ideas about writing, it may have also limited responses. While this approach permitted teachers to openly share writing definitions, it is possible that the format proved challenging for teachers or may have generated less complex responses given the open nature of the prompt. Recent research by Bingham et al. (2022) suggests that teachers demonstrate extensive knowledge of writing, writing development, and supports for writing when asked to respond to children's writing samples contextualized within a play experience, an approach that reflects typical practice of teachers. While this method elicited more details and depth of teachers' knowledge than the isolated definition question used in this study, teachers' responses to the contextualized writing samples were also narrow in focus, primarily targeting handwriting, motor skills, and print concepts, while their responses about composing and spelling were often inaccurate or vague (Bingham et al., 2022). This is an important finding with implications for the design of future elicitation materials for assessing beliefs and knowledge. Alternatively, there are benefits to belief measures that provide categories of responses for teachers like that of the TBQ. However, findings from this study suggest the need for an extended set of items that (a) reflect both the ideas of researchers and teachers and (b) comprehensively address research-based conceptualizations of early writing development.

Beliefs and knowledge are related to specific practices

We found partial support for our hypothesis that teachers' beliefs and definitions would be related to their classroom practices. One reason that we did not find additional associations may be related to the fact that previous research documents that preschool teachers enact few writing-related practices. In their study of teachers' literacy beliefs, knowledge, and practice, Schachter et al. (2016) did not pursue attempts to link writing beliefs and knowledge with practices because, so few teachers were observed engaging young children in writing interactions. It is important to also acknowledge that previous research also documents challenges with linking early childhood teachers' beliefs generally with their instructional practices (Hamre et al., 2012; Sandvik et al., 2014), particularly when examining reported beliefs and observed practices (McMullen et al., 2006; Schachter et al., 2016). Teachers may espouse to believe certain things, even strongly, but they may not engage daily in instructional practices to support these skills. This may be one reason that Schachter et al. (2016) found few or even negative associations between teachers' early literacy beliefs and practices. Despite limited research has examined preschool teachers' early writing beliefs and practices, others have noted limited concordance between teachers' beliefs, what they say they do in their classrooms, and observed practices (Gerde et al., 2019b).

Although we didn't find beliefs related to a wide range of early writing practices, early childhood teachers in this study who had less developmentally appropriate views of early writing or who demonstrated more limited understanding of writing development in their written responses were less likely to enact writing practices designed to support children's early writing skills. For example, teachers' beliefs as assessed by the TBQ were related to the number of teacher-child writing spelling interactions. That is, teachers who endorsed TBQ ideas were more likely to be observed supporting children's writing by drawing attention to letter-sound correspondence and encouraging children to listen to the sounds in spoken language when attempting to write words they wanted to communicate with others. This association may be the result of the TBQ asking teachers to respond explicitly to ideas related to the need to be sensitive to young children as they build their orthographic knowledge and accepting emergent spelling attempts as developmentally appropriate rather than requiring precision in early spelling attempts. Although children's invented or estimated spelling skills are just emerging in the preschool years (Puranik and Lonigan, 2011; Zhang et al., 2017), the ability to use letters and sounds to encode words is important to later writing and reading development (National Early Literacy Panel [NELP], 2008; Ouellette and Sénéchal, 2017). Hence, supporting teachers' beliefs and understanding about how children develop early spelling skills, and how these can be supported in preschool classrooms, is likely a productive area of focus for early writing professional learning approaches. Importantly, researchers have offered guidance in how this instruction can be carried out in preschool classrooms in a manner that is developmentally appropriate for preschool aged children (Quinn et al., 2016; Copp et al., 2023).

We also found that teachers who have a more complex and thus, more complete understanding of the multiple components of early writing also provided more writing supports for children's conceptual knowledge, a key feature of early writing. Previous research demonstrates that children in classrooms where teachers provide more supports for conceptual knowledge related to the purposes of writing, have higher invented spelling skills at the end of the year (Bingham et al., 2017). Teachers who understand that writing involves multiple writing components appear to be engaging in more practices to help children connect oral and written language as they engage in writing. Because writing concept or procedural knowledge is foundational to other early writing skills (Puranik and Lonigan, 2014), these types of instructional supports may be particularly helpful for young children in their development of both universal (how their ideas can be linked to written text) and language specific (how certain rules govern English writing) writing knowledge (Puranik and Lonigan, 2011; Treiman and Kessler, 2014). Notably, this finding expands previous work showing that teachers with a more complex knowledge of writing provide higher quality writing supports (Bingham et al., 2022) by pointing to a specific and meaningful component area–writing concept or conceptual knowledge–that is important for children's writing development (Bingham et al., 2017). Given that there was wide variability among teachers in their writing concept focused interactions with children, teachers may benefit from professional learning approaches designed to support their beliefs, knowledge, and practices of this important writing skill.

Limitations and future directions

A number of study limitations are important to acknowledge and have implications for areas of future research. First, we

note that data presented in this study are correlational in nature and were collected at one point in time within the first few months of the beginning of school. The correlational nature means we cannot draw causal conclusions but also that the unidirectional relation between writing beliefs and practices is not well established. As teachers' beliefs may develop or be influenced by their experiences across the school year, possibly in relation to the skill levels of children in their current classroom, future research is needed to examine how teachers' beliefs and practices are related across the preschool year. As our data were collected in the fall of the school year, it is possible that once children had more experiences with writing in preschool settings that teachers' beliefs and knowledge may have been slightly different. Additional assessment timespoints across the preschool year would answer critical questions related to how teachers' beliefs and practices relate across time. Second, although we used qualitative and quantitative approaches for eliciting teachers' beliefs and ideas about early writing development, we may have only partially captured these constructs. Because writing represents a number of distinct skills in early childhood, additional research is needed into approaches for holistically capturing teachers' beliefs. This additional research should use multiple approaches for eliciting beliefs and examine how beliefs, self-efficacy beliefs, and knowledge relate to each other and practices across time. Alternative elicitation approaches (such as an interview) should also be explored as teachers may not have shared all their ideas about children's writing development given the written format of the survey responses. Similarly, additional development is needed into survey-based approaches for eliciting writing beliefs with greater attention to writing components beyond handwriting and spelling. Of particular interest is how to support teachers' knowledge and beliefs of writing that are developmentally appropriate in nature.

Conclusion

We used quantitative and qualitative approaches to examine how teachers' beliefs and ideas relate to their instructional practices. Findings suggest some variability in early childhood teachers' writing beliefs; their definitions of writing heavily focused on handwriting skills. Results of this study have implications for the importance of teachers' beliefs in supporting instructional practice, but also raise questions around the measurement of beliefs and knowledge. Teachers' definitions of writing and their survey-based beliefs were unrelated to each other, but differentially related to the instructional focus of interactions with children. However, neither approach was related to the frequency of observed modeling or scaffolding behaviors. The heavy emphasis on handwriting skills in both teachers' writing definitions and observed instructional practices suggests that in-service teachers possess a good understanding of children's handwriting skills, but could use additional professional learning experiences designed to support their understanding of composing and early spelling skills, as well as how to support these in classroom practice. Because the knowledge base of early childhood teachers' beliefs is still evolving, additional research into approaches for eliciting beliefs in comprehensive ways that is tied to instructional practice are clearly needed.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the Georgia State University, Atlanta, Georgia, United States. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

GB took the lead on data analysis and writing. Both authors helped to co-conceptualize this manuscript that was undertaken with data gathered from a shared research project.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Exploring relationships between pre-service teachers' self-efficacy for writing and instruction provided in simulated elementary writing conferences

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Practice-based opportunities, like teaching simulations, are becoming more prevalent in teacher preparation programs. We sought to examine the instructional moves of 5 pre-service teachers during a simulated elementary writing conference using Mursion technology, a mixed-reality simulation (MRS) that emulates a classroom environment with student avatars. We examined both participants' self-efficacy and their instructional moves during MRS writing conferences. To better understand pre-service teachers' learning, we also examined reflections they wrote about their MRS experience. Results showed that pre-service teachers spent much of their time (31.7%) managing the environment (e.g., setting expectations, addressing student behavior) during MRS writing conferences, followed by nearly one-fourth of their time (24.2%) instructing students on their writing pieces (e.g., adding details, revising, editing), with high levels of teacher talk compared to student talk. Participants' self-efficacy for writing, for teaching writing elements, and for writing instruction were not clearly related to their instructional moves during the MRS experience. However, participants' reflections suggest that pre-service teachers felt the experience gave them the opportunity to practice making in-the-moment decisions and learn from their peers in a way that may allow them to have a more accurate understanding of their abilities to teach writing. Implications from these findings related to teacher self-efficacy, motivation, and teacher preparation programs are presented.

KEYWORDS

writing, elementary education, simulation, self-efficacy, motivation, teacher preparation

Introduction

An examination of literacy courses in U.S. teacher preparation programs shows an emphasis on reading over writing, even when courses include the word *writing* in their titles and descriptions (Myers et al., 2016; Brenner and McQuirk, 2019). Not surprisingly then, elementary and secondary teachers in the U.S. report receiving little preparation to teach writing or to help students use writing to support their learning (Kiuhara et al., 2009; Gilbert and Graham, 2010; Ray et al., 2016; Gillespie Rouse et al., 2021). K-12 students' writing performance reflects this lack of teacher preparation, as U.S. students continue to perform poorly on national assessments of writing and their scores have remained relatively unchanged for years (Salahu-Din et al., 2008; National Center for Education Statistics, 2012; White et al., 2015).

There is a clear need to address the lack of preparation to teach writing in the U.S., as teacher quality has a powerful influence on student achievement (Darling-Hammond, 2000; Myers et al., 2016). Opportunities for pre-service teachers to learn how to provide effective writing instruction in teacher preparation programs can help increase their writing instructional skills as well as their self-efficacy for teaching writing (Grisham and Wolsey, 2011). Additionally, when pre-service teachers can apply their learning in authentic contexts, they feel more prepared entering the classroom (Ronfeldt et al., 2014). However, research on best practices for teacher education on writing methods is limited (Myers et al., 2016; Sanders et al., 2020). Thus, we designed a practice-based rehearsal for pre-service teachers to apply writing instructional moves taught in our literacy methods course. We aimed to add to the literature on practice-based opportunities for pre-service teachers, specifically in writing, and to examine if participants' instructional moves during the rehearsals were related to their self-efficacy.

Review of literature

Practice-based teaching opportunities

Teacher preparation programs are becoming increasingly more practice-based (Cohen et al., 2020). Practice-based opportunities, sometimes referred to as approximations of practice (Grossman et al., 2009), encompass a variety of instructional techniques that can occur within coursework and field experiences. Forzani (2014) defines this approach to teacher education as involving training that focuses "novices' learning more directly on the work of teaching," (p. 357). Approximations provide pre-service teachers the opportunity to rehearse certain skills, such as in-the-moment decision-making and application of evidence-based teaching practices, before they enter the classroom (Grossman et al., 2009). By participating in approximations of teaching practices, pre-service teachers can rehearse, pause, get feedback from peers and instructors, and reflect on practice in ways that are not possible in actual classrooms (Grossman et al., 2009; Lampert et al., 2013; Benedict et al., 2016). During these opportunities, embedded coaching, feedback, and reflection support pre-service teachers' understanding and implementation of instruction, helping to bridge coursework with field experiences (Darling-Hammond, 2006).

One approximation of practice, the teaching simulation, has become more frequently integrated into teacher preparation courses (Ronfeldt, 2021). Teaching simulations allow pre-service teachers to rehearse providing instruction to "students" enacted through technology (i.e., student avatars) or with live actors (e.g., Kane, 2020). Mursion is one type of simulation technology that uses mixed-reality software to emulate a small group of students within a classroom setting (Landon-Hays et al., 2020). Mursion is deemed a "mixed reality" simulation (MRS) because it has both human and technological components that interact to provide authentic teaching experiences (Hartle and Kaczorowski, 2019). Users instruct in a virtual classroom environment, but student avatars respond in real-time because they are controlled through live actors (Cohen et al., 2020). With the ability to pause and restart instruction, peers and teacher educators can observe, provide feedback, and collaborate to work through obstacles that may arise during lessons implemented with Mursion (Dieker et al., 2014).

Researchers are still exploring ways simulations, like Mursion, are used within the context of teacher preparation. In a recent scoping review of physical simulation and MRS for pre-service teachers (Ade-Ojo et al., 2022), researchers found that although the research base was small, simulations were a promising tool for increasing pre-service teachers' confidence, communication, management skills, and self-efficacy. In terms of content area instruction, MRS research has been concentrated largely in math (e.g., Grant and Ferguson, 2021). We identified little research (Young and Gillespie Rouse, n.d.) using MRS for teacher preparation in literacy, with most of these studies focused on reading (e.g., Ely et al., 2018), and no research yet focused specifically on writing instruction for pre-service teachers using MRS.

Elementary writing conferences

In the context of our university literacy course, we designed a MRS with a focus on enacting elementary writing conferences. We felt this was an important opportunity for pre-service teachers because effective writing instruction is critical in the elementary grades (Graham et al., 2012). Beginning in elementary school, students typically learn to carry out the writing process (i.e., planning, drafting, revising, editing, and publishing) through iterative cycles of writing, sharing, and getting feedback on their work (Graves, 1983; Ray and Cleaveland, 2004). A critical component of this process is the writing conference, during which students get feedback from teachers (or peers) and leave with concrete next steps for their writing (Green and Steber, 2021). The writing conference provides a context for individualized support and instruction in writing skills, but perhaps more importantly, supports the development of a student's writing craft and their confidence in their writing abilities (Anderson, 2001; Hale, 2017; Myroup, 2020).

During a writing conference, teachers' instructional moves can affect not only the quality of students' writing but also students' self-regulation of the writing process and their beliefs that they can reach writing goals (Helsel et al., 2022). Anderson (2018) suggested that in successful writing conference teachers should seek to understand how a student feels about their writing process, assess their current strengths and needs within the writing piece, and focus on one writing skill to teach the student. Over time, writing conferences should support the development of the student as a writer, as opposed to making corrections to each of the student's writing pieces and they should always operate from a student-centered and individualized approach (Anderson, 2001, 2018; Helsel et al., 2022).

In this way, effective writing conferences require preparation as well as on-the-fly decision-making based on listening and responding to a student's needs and contributions during the conference. Accomplishing all of these tasks within a relatively short timeframe (conferences are typically brief and individualized for each student) is difficult to negotiate, even for experienced teachers (Lipson et al., 2000).

Theoretical framework

For this study, we chose to examine how pre-service teachers' self-efficacy for writing and writing instruction might guide their

instructional moves within a simulation experience. Stated simply, self-efficacy is related to an individual's judgments of how well they can carry out a course of action to accomplish a task (Bandura, 1982). We situated our work within Bandura's (1986) social cognitive theory, using the lens that self-perceptions, or self-efficacy beliefs, have strong influences on behavior.

In applying Bandura's theory within the context of writing instruction, Pajares (2003) posited that writing self-efficacy could be further parsed into self-efficacy of students' writing skills, their confidence in completing writing tasks, and their perceptions of their own proficiency in a language arts course. Hodges et al. (2021) applied this framework to understanding pre-service teachers' self-efficacy for writing, identifying four main sources contributing to writing self-efficacy development for pre-service teachers: past experiences with writing, instruction from teachers and peers, understanding different social perspectives of writing, and personal beliefs about writing.

Higher teacher self-efficacy can have positive impacts on both teachers and students (Zee and Koomen, 2016). Teachers with higher self-efficacy tend to have higher rates of persistence and resilience and are more likely to continue in the classroom (Yost, 2006; Pedota, 2015). In the area of writing specifically, studies showed that teachers with higher self-efficacy for writing provided better writing instruction to their students and had students with higher writing performance (De Smedt et al., 2016; Graham et al., 2022).

Self-efficacy and motivation

Self-efficacy is related to motivation because self-efficacy beliefs influence which challenges an individual undertakes, how much effort they exert, how long they persevere when encountering obstacles or failures, and whether they view failures as impetus to continue or as reason to stop their efforts (Bandura, 2001). Motivation and self-efficacy increase when individuals perceive they are performing well or becoming more competent (Schunk, 1995).

Research shows that a teachers' motivational beliefs, like their self-efficacy beliefs, are related to students' performance as well as to teachers' commitment to the profession (Watt and Richardson, 2012; Lauermann et al., 2017). Teachers' motivational beliefs have also been shown to influence students' own motivation (Richardson and Watt, 2010), engagement (Lauermann and Berger, 2021) and interest in what is being taught (Lazarides et al., 2023). Teachers with greater self-efficacy may also be more motivated to try new teaching strategies, introduce more challenging activities to their students, promote a more positive classroom environment, and address the needs of students who are struggling (Schunk, 1995).

Research questions

We chose to focus our MRS on writing conferences because they offer critical opportunities for providing writing instruction and individualized support but are difficult to enact. We wanted pre-service teachers to practice carrying out writing conferences using the knowledge gained from our early literacy course, using tools (e.g., checklists, student writing) they would later use in their own classrooms, and problem-solving within their community (i.e., peers in class) to provide effective instruction. We chose MRS, as the use of simulation in teacher preparation can provide novice teachers with a safe and controlled environment to try out new skills and strategies (Dieker et al., 2014). Beyond their instructional benefits, practice-based opportunities, like Mursion, may also be an avenue for supporting pre-service teachers' self-efficacy and motivation (e.g., Bautista and Boone, 2015; Gundel et al., 2019; Öner and Yaman, 2020; Bondie et al., 2023).

Three research questions guided our investigation:

1. What instructional moves do pre-service teachers make during MRS elementary writing conferences?
2. How do pre-service teachers' instructional moves during MRS elementary writing conferences vary based on their self-efficacy for writing and writing instruction? and
3. How do pre-service teachers reflect on their learning from the MRS?

We hypothesized that participants would apply their classroom learning but would still be impeded by management and behavior issues of avatars. We also anticipated that participants with higher self-efficacy would be motivated to provide more writing instruction, as teachers with greater self-efficacy for writing have been shown to provide more (and better) writing instruction to their students (e.g., De Smedt et al., 2016). We were less certain about participants' reflections on the MRS but hopeful that they would be able to recognize areas of strength during the writing conference and areas in which they needed additional learning or support.

Method

We employed a mixed methods approach in this study. After initial data analysis using quantitative methods to answer research questions 1 and 2, we added a third research question focused qualitative analysis of participants' written reflections on their MRS experiences to provide a more nuanced understanding of their instructional moves and learnings from the MRS experience.

Participants and setting

All students ($N = 18$) in an introductory literacy course for undergraduate education and Master's of Education majors seeking teacher certification participated in the MRS writing conferences during the last two meetings of the course. The MRS were enacted in a teaching lab with audio/visual equipment to deliver the MRS and to capture participants' responses.

For this study, we focus on three MRS writing conferences ($n = 5$ participants) enacted during the final course meeting (see Table 1 for participant information). We chose the final three MRS sessions for three reasons. First, they included each planned MRS scenario (MRS 1: a confident student who does not want to change their writing, MRS 2: a student distracted by off-task classmates and unable to respond to feedback, and MRS 3: a less-confident student who takes constructive feedback as criticism). Second, these sessions included both undergraduate and master's students, which we anticipated may provide a range of self-efficacy scores based on participants' previous classroom or teaching experiences. Third, we anticipated the final

TABLE 1 Participant and MRS information.

	Ethnicity	Gender	Program
MRS 1: Confident Student Scenario			
Kim	White	F	UG
Tanya	Multiple	F	UG
MRS 2: Distracted Student Scenario			
Jackie	White	F	UG
MRS 3: Less Confident Student Scenario			
Audrey	Multiple	F	M. Ed
Sophie	White	F	M. Ed

F, female; UG, Undergraduate elementary education major; M. Ed, Master's of Education.

three MRS groups would be the most comfortable with the MRS technology, as they had the opportunity to observe the previous groups' MRS sessions.

Pre-intervention planning

We provided all pre-service teacher participants with an authentic fourth-grade written response to the prompt: Pretend you have been granted three wishes. Make up a story about what you would do. We encouraged participants to plan for the MRS writing conference by completing a graphic organizer they had learned about during a previous course meeting. This graphic organizer included sections labeled: Plan, Discuss, Compliment, Teach, adapted from Anderson's (2001) guide to writing conferences. Participants planned out what to focus on during the writing conference by reviewing the student's writing prior to the conference, identifying strengths of the writing piece, and determining next steps for the student to take in their writing, considering grade-level writing standards. After planning individually, participants worked collaboratively with a randomly assigned small group of their classmates (groups of 2–3) to plan their instruction for the writing conference for 30 min prior to the MRS.

Pre-intervention measures

Because teachers' motivation, beliefs, and self-efficacy have been shown to impact their instruction (e.g., Graham et al., 2001; Tschannen-Moran and Johnson, 2011; Troia et al., 2012), we had participants complete the Preservice Teacher Self-Efficacy for Writing Inventory (PTSWI; Hodges et al., 2021) prior to completing the MRS writing conferences. In addition to questions about demographic and background information (e.g., gender, ethnicity, pre-service coursework focused on writing instruction), the PTSWI includes items to measure pre-service teachers' beliefs and self-efficacy for: writing ($n = 10$ items); teaching particular aspects, or elements, of writing ($n = 15$ items); and writing instruction more broadly ($n = 13$ items) (Hodges et al., 2021). A 5-point scale was used for each item (i.e., strongly disagree, disagree, neither disagree or agree, agree, strongly agree). For example, in section 1 (i.e., self-efficacy for writing), participants responded on a scale from strongly disagree to strongly agree to items such as, "I feel confident in my overall writing abilities" and "The majority of time I spend writing is for enjoyment." In Section 2 (i.e., self-efficacy for teaching writing elements), participants responded about their confidence in teaching particular writing elements and the writing process, rating (from strongly disagree to strongly agree) statements such as, "As a result of my teacher preparation program, I feel confident in my ability to teach paragraph structure" and "As a result of my teacher preparation program, I feel confident in my ability to teach grammatical conventions." In section 3 (i.e., self-efficacy for writing instruction), participants rated responses, from strongly disagree to strongly agree, such as "Writing is an important skill to teach students" and "Teachers who have more positive beliefs about writing can more effectively teach writing."

Intervention

We created three MRS experiences with elementary student avatars (see Figure 1). Each MRS represented a scenario teachers may encounter in their future classrooms during writing conferences. Participants had been introduced to Mursion software used for the MRS during an introductory activity on a different topic. We randomly assigned avatars to participants the day of the MRS, informing participants which avatar they would be working with immediately prior to the MRS beginning. These decisions ensured participants would have some familiarity with the student avatars prior to working with them but would develop a lesson plan that could be applied to any of the avatars.

Only a single participant could engage at a time with the avatars. Each small group chose a participant to begin the MRS. During the MRS, each participant sat at a table in front of a group of three avatars on a large screen. Participants engaged with all three avatars but only focused instruction on their previously assigned focal avatar. Thus, they had to instruct a focal avatar but provide some direction for the other two avatars at times. Avatars responded in real-time to participants' instruction, simulating the actions and responses of fourth-grade students.

Participants could pause, seek feedback or assistance from their small group, switch with a peer from their group, and restart the MRS as needed. Other class participants observed the MRS silently during the enactment. In MRS 1 and 3, participants switched who was instructing, so two participants' instructional moves and utterances were analyzed. In MRS 2, only one participant interacted with the avatars. MRS sessions lasted, on average, 6 min ($SD = 1.11$ min).

After the MRS experiences, participants completed written reflections answering the following: (1) In what ways did your team adapt plans for the writing conference while in the simulation?; (2) Explain how the following factors influenced any adaptations made to your plan during the simulation: student avatars, your peer group, anything else?; and (3) Explain how this experience might impact your planning and instruction for future writing conferences. Consider what you might do the same and/or differently.

Data segmenting and coding

MRS sessions

The embedded zoom transcription software used for recording MRS sessions segmented talk into timestamped utterances based on

FIGURE 1
Student avatars in MRS writing conferences (screen capture from study dataset, with participant image removed).

pauses in individual speakers' talk and speaker changes (i.e., between avatar and participants). Together, the first two authors read through the transcripts multiple times and met to confirm that the transcription software had correctly segmented utterances. There were some instances in which participants paused in the middle of a sentence or idea (we grouped these together even though the software segmented them) or when participants continued to discuss the same idea over several separated utterances (we grouped these together even though the software initially separated them). These data segmenting decisions were made so we did not overrepresent instructional codes in our analyses. Other times, participants discussed several different ideas in the same utterance, so we segmented these. Although we coded only participant talk, we left student avatar talk in each transcript to provide context when making coding decisions. Before coding, we also removed non-relevant talk. For example, participants had to initiate the MRS by saying "Begin classroom" and typically started with a greeting, such as "Hi! How are you doing today?" After segmenting all transcripts, the third author confirmed agreement at 100% for all three transcripts.

We developed a coding scheme grounded within our larger dataset ($N = 18$; Corbin and Strauss, 1990). Through iterative rounds of reviewing videos from three MRS sessions not included in the sample for this study, we conceptualized utterances pre-service teacher participants made during each MRS writing conference. We used participants' talk, or utterances, as a proxy for the instructional moves they made during the simulated writing conferences. Our coding scheme (see Supplementary files) went through seven iterations before we felt it adequately captured the themes and patterns in participants' utterances (Saladana, 2016), with five final codes and example utterances for each code in the final scheme: Describe, Expand, Affirm, Manage, and Instruct.

The code *Describe* captured how pre-service teacher participants described or asked questions prompting description of the student's writing piece (e.g., What is your writing piece about?, I like how you used _____, Can you read me ____ sentence?). The code *Expand* captured how participants expanded upon the student's writing, focusing more on the writing process and the student's development as a writer (e.g., How did you feel when writing this?). We used the third code, *Affirm*, to categorize more general utterances that encouraged students and supported their writing (e.g., Great idea!, I love your writing!). The code *Manage* captured utterances that involved behavior management, setting expectations for behaviors expected during the writing conferences, and clarifying directions (e.g., Please work together and read each other's writing while I work with [focal] student, Please work quietly and stop talking to your friends). The final code *Instruct* was subdivided into two categories: (1) utterances that involved instruction on the current writing piece (e.g., You could add details here, When you go back to your desk, I want you to try _____ [concrete next steps]) (2) instruction in how the student could develop as a writer (e.g., What message do you want to convey to your reader?).

The first and second author independently coded each transcript from MRS 1, 2, and 3. To determine interrater reliability (IRR), we counted the number of coding agreements and divided by the number of total coding opportunities (agreements plus disagreements). We multiplied this number by 100% to get percentage of exact coding agreement between raters. Across the three transcripts IRR was high at 99% (MRS 1: 98%, MRS 2: 100%, and MRS 3: 100%). We discussed all disagreements and resolved them by consensus, with the third author reviewing all coded transcripts for agreement prior to data analysis.

Reflections

Following Braun and Clarke's (2006) guidance for thematic analysis, the second author carefully analyzed and annotated participants' written reflections before conducting open and process coding (Saladana, 2016). See the Supplementary files for an example of this coding process. Then, the second author developed initial themes, refining and analyzing codes to ensure themes were representative of the data. To ensure trustworthiness of the findings

(Lincoln and Guba, 1985), all authors met to review the audit trail and memos made by the second author, as well as confirm that identified themes were supported by the data. Additionally, MRS transcripts for each participant group were reviewed during the coding process for triangulation purposes.

Data analysis

To answer research question 1, we tallied verbal counts (Chi, 1997) for each code in our coding scheme for each participant, along with means, standard deviations and total percentages for each code across all participants. We include examples from each participant's talk to provide further description of the utterances produced during each MRS. We also calculated ratios of participant and student (i.e., avatars) talk during MRS scenarios (i.e., total number of utterances and total number of words within those utterances produced by participants and avatars). For research question 2, we calculated average scores for participants' self-efficacy for: (1) writing, (2) writing elements, and (3) writing instruction on the PTSWI. We then examined variability in participants' instructional moves in relation to their beliefs and self-efficacy. For research question 3, we identified themes from participants' reflections to provide further information on participant learning from MRS experiences.

Results

In the sections that follow, we provide study results. For each research question, we first describe results across all three MRS scenarios, followed by results for each of the MRS and each of the five participants.

Research question 1: instructional moves during MRS elementary writing conferences

Overall trends

Table 2 provides the counts and percentages of utterances across all MRS. The most common type of utterances participants made were those coded as *Manage* (31.7%), with about 7.60 ($SD = 5.18$) *Manage* utterances, on average, per MRS. *Manage* utterances included participants' attempts to set expectations, clarify directions, and address avatar behavior. The next most frequent type of utterances were those used to instruct about the writing piece (*Instruct: Writing Piece,* 24.2%), with an average of 5.80 ($SD = 3.96$) of these responses per MRS. Instruction about the writing piece included utterances focused on editing, language, adding details, and actionable next steps for revising. Participants' utterances were relatively evenly split across two additional categories: *Describe* (17.5%) and *Affirm* (20.0%). Utterances coded as *Describe* ($M = 4.20$, $SD = 1.92$) focused on describing the avatar's writing piece, or questions to elicit description of the writing piece, while utterances coded as *Affirm* ($M = 4.80$, $SD = 1.48$) included encouragement and praise for the avatars and their writing. Participants rarely asked avatars to expand on the writing process or themselves as writers (i.e., *Expand*, 3.3%) and rarely instructed students about their development as writers (*Instruct: Writer*, 3.3%).

MRS 1

In MRS 1, Kim and Tanya encountered a confident avatar who thought nothing should be changed in their writing. Both participants tended to follow the overall trends described above.

Kim and Tanya mostly talked to manage the avatars (i.e., Kim: 9 [56%] and Tanya 8 [33%] *Manage* utterances). Examples included Kim setting expectations at the beginning of the writing conference with, "Okay, so we are going to start off with our writing conference. I think I'm gonna start with Ava. And Dev and Jasmine, remember, I asked you guys to email each other your drafts last night. And what you guys are going to do is go over the other person's draft and just see if you can add some comments or suggestions." Tanya also spent time managing behavior. When an avatar interrupted her writing conference, Tanya said, "Oh one second. Jasmine, what do you want girly?." The avatar responded by complimenting another avatar's writing. Tanya replied by redirecting the interrupting student: "Aww that's so nice, Jasmine. Thanks for letting Ava know… Can you save those comments for when you get a chance to give Ava comments on her paper?"

Kim and Tanya also described and elicited descriptions of the avatar's writing, with 4 (25%) and 5 (21%) *Describe* utterances, respectively. For example, Kim said, "I just want to start off by saying that I'm so impressed by the way that you used structure throughout your writing. I saw that there was a very clear beginning, middle, and end…" Tanya focused on describing the avatar's writing piece with, "I really like all the punctuation that you have used, I think that's awesome. I can tell you paid attention during our punctuation lesson," and later asked the avatar to read particular parts of their writing: "Can you read me the first sentence in your last paragraph?" Both participants had a similar number of utterances used to affirm avatars, such as when Kim said, "Ava, you are already off to an amazing start," and Tanya repeatedly told the avatar "Awesome!" throughout the conference. Like the overall trends, Kim and Tanya did not make any utterances to expand upon the avatar's writing process and neither participant instructed the avatar to focus on their development as a writer.

Kim and Tanya differed from the overall trends across MRS in that Tanya made 7 utterances related to instruction focused on the avatar's writing piece (*Instruct: Writing Piece*, 29%), while Kim made none of these utterances. Tanya prompted the avatar to edit their writing for mistakes with plurals and then spent the remainder of the conference instructing on how to add details and description with utterances like, "Ava is there anything you think that we could add to the sentence to maybe make it a little bit more interesting?" After the avatar came up with ideas to add to their writing, Tanya reminded them to "make a little bitty note under your writing for now, so you know to go back later and add it in when we are writing our second drafts."

MRS 2

Jackie encountered an avatar who was distracted by their classmates during the writing conference in MRS 2. Jackie followed overall trends for the types of utterances she produced during her MRS but was the only participant to talk about the avatar's development as a writer.

TABLE 2 Individual counts and overall percentages for participants' utterances during MRS writing conferences.

Codes for utterances/Instructional moves						
	Describe	Expand	Affirm	Manage	Instruct	
					WP	WR
MRS 1						
Kim	4	0	3	9	0	0
Tanya	5	0	4	8	7	0
MRS 2						
Jackie	5	1	5	15	6	4
MRS 3						
Audrey	6	2	7	5	5	0
Sophie	1	1	5	1	11	0
Total count	21	4	24	38	29	4
Total %	17.5%	3.3%	20.0%	31.7%	24.2%	3.3%

WP, instruction on the writing piece; WR, instruction on development as a writer; MRS, mixed reality simulation.

Jackie's most common utterances were those coded as *Manage* ($n = 15$, 42%). Like other participants, she spent time at the beginning of the conference setting expectations with statements like, "Okay, so today we are going to work on our writing. So Jasmine and Ava, I would like you two to please peer review each other's work." Later in the conference, she spent considerable time asking the other two avatars in the MRS to be quiet while she worked with the focal avatar: "Ava and Jasmine, would you guys mind, please reading each other's works in your head?" and "Um, can you please be a little bit more quiet? It's a little bit distracting."

Like the overall trends, Jackie's other utterances were split between *Describe* ($n = 5$, 14%) and *Affirm* ($n = 5$, 14%), with one utterance that expanded upon the writing process and the avatar as a writer ("Will you tell me how you are thinking about your writing today? How are you feeling about it?"). Jackie also focused instruction on the current writing piece ($n = 6$, 17%). After a discussion on adding detail to the avatar's writing she said, "Do you think we can maybe add that into our sentence? Maybe his first wish is that he would have a blue mansion, and then you can add another sentence about how it's on the beach and the mountains."

Unlike any other participant, Jackie focused on development of the avatar as a writer with four statements (*Instruct: Writer,* 11%) focused beyond the current writing piece to prompt the avatar to think about audience (e.g., "We want to express in our writing how we see detail…We want them [the reader] to be able to close their eyes and be able to see exactly what you what you see").

MRS 3

In MRS 3, Audrey and Sophie encountered a less-confident avatar who responded to teacher feedback as if it were criticism. Not only did Audrey and Sophie differ from each other in the utterances they made during the MRS, but they also differed from overall trends.

Unlike overall trends, Audrey's utterances were most commonly coded as *Affirm* ($n = 7$, 28%) and *Describe* ($n = 6$, 24%); she had the greatest number of each of these utterances of all participants. To affirm and support the avatar, Audrey began the writing conference with statements like, "I really loved your writing piece" and "I think what you have so far is a really good start." Later, when the avatar demonstrated they were not confident about their writing, Audrey said, "Oh, Jasmine, it was a lovely story" and "I happen to think you are very smart." When describing the current writing piece, Audrey made statements about its structure, much like Kim had in an earlier MRS: "I really liked how you had a clear beginning, middle, and end." Later, Audrey continued to describe the avatar's writing with "I really liked that you gave Fred unlimited wishes…he got to wish for everything he wanted."

Audrey had 5 each (20%) of *Manage* and *Instruct: Writing Piece* utterances. Like other participants, Audrey set expectations at the beginning of the writing conference with statements like "I'm going to start with Jasmine today, but Ava and Dev, I want you to pull out your writing rubrics that we have used in our class before, and I want you to go over each other's writing and just give some comments." Later, she checked for understanding with "Does that sound like a good idea?" When providing instruction focused on the current writing piece, Audrey made statements such as "We're just going to add a little bit of detail to make it even better." When the avatar came up with a detail to add, Audrey said, "That's a great wish that we could add." Like most participants, Audrey made no utterances focused on development of the avatar as a writer.

Although relatively small, Audrey had the most utterances of any participant coded as *Expand* ($n = 2$, 8%). Like Jackie, she checked in with the avatar, focusing on how they felt during the writing process with, "I was wondering, how did you feel when you are writing this piece? Did you feel good about it? Did you feel confident?" and later asked, "Did you enjoy writing that part of the story?"

Unlike Audrey and the rest of the participants, most of Sophie's utterances were used to provide instruction related to the writing piece ($n = 11$, 58%). Sophie focused on supporting the avatar to add descriptive words to the text. She made comments focused on the writing piece such as, "So let us start with the first sentence, it says, Once upon a time there was a boy named Fred. Fred could be anyone. What did he look like to you?" When the avatar provided some description of their main character, Sophie continued instructing on the writing piece with, "A boring guy? Okay that's a

good descriptive word…Can you think of one more descriptive word?" She then had the avatar read the text, line-by-line, to add descriptive words. Sophie wrapped up instruction with reminders of next steps: "Why do not you write 'add detail' at the top of your paper and then you can go back and work on that for next time?" Like most participants, however, Sophie made no utterances focused on the avatar's development as a writer.

Similar to Audrey, slightly more than one-quarter of Sophie's utterances were coded as *Affirm* ($n = 5$, 26%). Sophie provided affirmation throughout the MRS with repeated use of "good" (e.g., "Boring is good" and "That's a good detail"). She ended the conference with affirmation for all three avatars, "Great job today, Jasmine. I'm so proud of your work," and "Thanks Ava and Dev for being so quiet."

Sophie's remaining utterances were evenly split ($n = 1$ each), between *Describe*, *Expand*, and *Manage*. Like other participants, Sophie described the use of details in the avatar's writing and expanded upon the process by asking about how the avatar felt while writing. Her utterance coded as *Manage,* "Maybe we'll save that idea for later," was used to maintain focus and pacing in response to the avatar's repeated answers of "ummmmmm" and "I do not know."

Ratios of participant (teacher) to avatar (student) talk

Across all MRS, there was a total of 121 participant (i.e., teacher) utterances and 58 avatar (i.e., student) utterances; this equaled 2,427 participant words and 574 avatar words. Participants made more than twice as many utterances and said four times as many words as the avatars during the MRS writing conferences.

In MRS 1, Kim and Tanya made 40 utterances, while the avatars in their MRS contributed a total of 21 utterances; these utterances consisted of 953 participant and 251 avatar words. Thus, there were nearly twice as many participant utterances as avatar utterances, and Kim and Tanya spoke more than 3.5 times as many words as the avatars in their MRS.

In MRS 2, Jackie made 36 utterances and the avatars made 21 utterances. Jackie's utterances equaled 611 words, while avatars produced 179 words. Although Jackie's utterances were not double those of the avatars in her MRS, they did take up a majority (63%) of the talk during the writing conference. When examining words produced, Jackie produced more than three times as many words as the avatars in her MRS.

In MRS 3, Audrey and Sophie made 45 utterances while the avatars made 16 utterances; this equaled 863 participant words and 144 student words. Like the overall trend, Audrey and Sophie made more than two times as many utterances as the avatars in their MRS. Their word count was nearly six times that of the avatars in MRS 3.

Research question 2: self-efficacy and variance with instructional moves during MRS elementary writing conferences

Table 3 shows each participant's average score for self-efficacy for writing, self-efficacy for teaching writing elements, and self-efficacy for writing instruction (from the PTSWI), along with the type of utterances they most and least commonly made during the MRS. As shown, scores on the PTSWI were relatively similar across participants, with scores at or near 4, indicating strong, or high, self-efficacy in each area (Hodges et al., 2019).

Kim had the highest self-efficacy average overall ($M = 4.18$), and the highest averages in self-efficacy for writing ($M = 4.00$) and self-efficacy for writing instruction ($M = 4.54$). Kim also had most of her utterances (56%) coded as *Manage* (i.e., setting expectations, addressing behavior, clarifying directions) during her MRS; hers was the highest percentage of utterances coded as *Manage* across all participants. Kim was also the only participant with 0% for three categories: expanding on the writing process and the writer, instruction on the writing piece, and instruction in developing the student as a writer.

Tanya had the highest reported self-efficacy for teaching writing elements ($M = 4.13$). Tanya's highest category of utterances were those used to manage behavior and expectations (33%) during the MRS. Twenty-nine percent of her utterances during the MRS focused on instruction on the writing piece (e.g., adding details, editing). However, 0% of Tanya's utterances involved expansion on the writing process or the writer and 0% involved instruction designed to develop the avatar as a writer. Additionally, Tanya's average self-efficacy for writing ($M = 3.60$) tied with Audrey and Sophie for the lowest of the participants.

Jackie had the lowest average self-efficacy for teaching writing elements ($M = 3.40$) of all participants. Although she mostly talked to manage the avatar's behavior and expectations (42%), like Kim and Tanya, Jackie was also the only participant to focus on developing the avatar as a writer (11%), and her second most common type of utterance involved instruction focused on the writing piece (17%).

Audrey scored the lowest for self-efficacy for writing ($M = 3.60$, tied with Tanya and Sophie) and the lowest for self-efficacy for writing instruction ($M = 3.85$). Her most common type of utterance was used to affirm the avatar (*Affirm,* 28%; e.g., Great job!) and she focused 0% of her MRS on instruction on the writing piece.

As mentioned previously, Sophie tied for lowest self-efficacy for writing ($M = 3.60$), yet her MRS was predominated by utterances focused on instruction on the writing piece (58%), the most of any participant. Like Kim, Tanya, and Audrey, Sophie focused 0% of her MRS on developing the avatar as a writer.

TABLE 3 Averages for PTSWI with most and least common type of utterance in MRS.

	PTSWI			MRS	
	Writing	Elements	Instruction	Most	Least
Kim	4.00	4.00	4.54	Manage 56%	Expand, WP, WR 0%
Tanya	3.60	4.13	4.23	Manage 33%	Expand, WR 0%
Jackie	3.70	3.4	3.92	Manage 42%	Expand 3%
Audrey	3.60	3.87	3.85	Affirm 28%	WR 0%
Sophie	3.60	3.67	4.08	WP 58%	WR 0%

PTSWI, Pre-service Teachers' Self-Efficacy for Writing Inventory; MRS, mixed-reality simulation; WP, instruction on the writing piece; WR, instruction on development as a writer.

Research question 3: reflections on learning from the MRS

Through thematic analysis (Braun and Clarke, 2006), the researchers identified two overarching themes throughout participants' reflections on their learning during the MRS. These themes are representative of how participants made sense of their experiences during their own interactions with the student avatars, as well as what they observed while watching their peers' MRS experiences. We present each of these themes in more depth below.

Participants began to shift their thinking away from trying to plan "the perfect lesson" and recognize that adapting plans is an integral part of classroom teaching

Across their reflections, participants described a change in the way they conceptualized effective lesson planning. Some participants referenced the idea of trying to "plan a perfect lesson," but their time in the MRS highlighted that a teacher cannot plan for every possible situation that may occur during instruction. For example, Jackie reflected, "Over the years we have learned how to make lesson plans and have taught them to our peers. We make them perfect and we meet time requirements…but we teach them to adults…No matter how perfect our lesson plan is on paper, it may not go that way in the classroom." Although the participants were well-prepared and had included all parts of their lessons, once lessons were enacted with student avatars, they realized changes had to be made in response to students' actions and needs.

One common reason for the changes was the constraint of time. Participants described pressure around attempting to complete a full writing conference in about 5 min and often found they had to cut parts of their lessons to complete the task in the time allotted. For example, Tanya described planning to go through a whole paragraph with her avatar but was only able to get through a single sentence. Similarly, Sophie acknowledged that although she and her team were able to complete what they had planned, it took much longer than they had anticipated: "While we were eventually able to get to this point and clarify this objective for the student to work on when they went back to their desk, it took a while to get there." Participants found that completing their plans, once enacted with "real" students, took more time than they realized, and they had to make adjustments during conferences to achieve their intended outcomes.

Another common reason for adjustments made during the MRS related to the social and emotional needs of student avatars. Participants Kim and Tanya both highlighted the needs of the avatars, and that these needs should be accounted for when planning for future writing conferences. However, sometimes participants realized that student needs could not be planned for, and adjustments had to be made during the lesson to support students. For example, during Audrey and Sophie's MRS, their avatar lacked confidence. They felt they could not move to the instruction portion of their lesson until they had sufficiently supported the avatar. In reflection, Audrey noted, "Since she was lacking confidence in her writing, we felt that it was necessary to spend more time encouraging her in her ideas and identity as a writer rather than making numerous edits to her composition." These participants felt that to conduct a successful writing conference, the needs of the students must be addressed in the moment.

Across reflections, participants began to change their thinking around planning; recognizing that making changes during a lesson does not indicate lack of planning but is rather an important part of teaching. This idea was summarized by Sophie: "This experience was very enlightening because it showed me that while planning for a writing conference is a crucial element so that you are prepared to lead it as the teacher, things will more than likely turn out differently than you initially imagined." Additionally, Kim stated, "I designed my plan according to a perfect classroom and perfect students. However, I now realize that this is not a logical way to create a plan after this experience." These statements highlight participants' recognition of the need for both detailed plans as well as the ability to adapt those plans to be able to conduct a successful conference.

Participants grappled with making in-the-moment decisions during their MRS experience but felt supported by their peers and were able to learn from observing one another

Although participants recognized the need for adjusting their lesson plans while in the MRS, they also highlighted the difficulties they faced in making in-the-moment decisions. Tanya described how she made an instructional move (i.e., allowing Ava to choose which paragraph to work on) that did not seem to engage the avatar. She stated, "This kinda threw me off because I expected her to pick, so then I had to quickly pick a paragraph to focus on." This experience is also clear in Jackie's reflection on an instructional move she made regarding student behavior:

> One thing that I wish I handled better or differently was when Ava snapped at me. When I asked her to be quiet when she was distracting Dev, she responded with "whatever". I was so shocked that she said that! I froze in the moment and didn't know what to say, so I said nothing at all…Was this the wrong thing to do? How would someone with more knowledge have handled this situation? This was something I wasn't prepared for.

Jackie's experience demonstrates how participants weighed possible options for instructional moves. In Jackie's case, she felt she needed more knowledge or experience to make those decisions. Some participants also noted how they reflected on decision making after the fact, such as Kim who stated, "I was thinking of so many different ways that I could have approached the situation and how I could have corrected my mistakes in the moment. These quotations underscore how participants felt compelled during the MRS to make quick decisions in response to the avatars and reflected on the effectiveness of those decisions.

As participants reflected on their MRS, they highlighted the benefits of working with their peers, through both observing and supporting one another during instruction. Jackie noted she knew her peers were prepared to take over the simulation if she had to "tap out" (e.g., decide she no longer wanted to participate in the MRS). Similarly, Sophie mentioned how, during a pause, her peer group was integral in helping to decide which instructional move to make once the simulation resumed: "My peer group helped me decide to tell her that

since we loved her writing so much, we wanted to hear more of it in order to get her motivated to add more descriptive detail to her writing." In Kim's reflection, she acknowledged that she struggled to get her avatar back on track and was grateful to step away from the MRS and allow her partner, Tanya, to try a new tactic. She stated, "Tanya taught me some ways that I can use to adapt my plan for difficult students." Having peers available for support and problem-solving helped participants work through obstacles that arose during their MRS experiences.

Participants also acknowledged the influence of observing their peers' MRS before their own and how those observations influenced their decision making. Audrey noted this was particularly helpful when it came to expectation setting, stating, "Especially in seeing how to set explicit behavior expectations for Dev and Ava, being able to watch other groups first helped us create a clear, explicit opening statement." Several participants expressed this sentiment, particularly in reference to anticipating student behaviors. Jackie noted, "After seeing some of the student's reactions, I knew we had to give them explicit instructions." Moving forward, Sophie mentioned that learning from watching her peers may influence her future instructional moves during a writing conference: "It was so helpful having Audrey set the expectations at the beginning of the conference before I went it because I saw how explicit she was when giving directions to both Jasmine and the other two students, and I recognized how I wanted to be intentional about implementing that skill myself."

Discussion

In this study, we examined pre-service teachers' talk during simulated writing conferences with elementary student avatars. We were interested in participants' instructional moves (talk was used as a proxy for coding instructional moves) during each of three MRS writing conferences. We also examined if participants' instructional moves varied in relation to their reported self-efficacy for: writing, teaching writing elements, and writing instruction. In response to our initial findings, we performed an additional analysis of participants' reflections on learning from the MRS experience to provide further insight into the impact of this experience on pre-service teachers.

Based on our findings, we discuss implications for pre-service teacher preparation, including the need to provide opportunities for pre-service teachers to: (1) learn about and practice conducting effective writing instruction; (2) learn about important pedagogical choices (e.g., wait time, open-ended questioning); and (3) develop positive beliefs, self-efficacy, and motivation for writing.

Instructional moves during MRS writing conferences

In line with our hypotheses for research question 1, pre-service teacher participants applied course-related learning during MRS writing conferences with an average of just under one-quarter of utterances focused on instruction related to developing the writing piece (24.2%; e.g., adding details, focusing on language used, steps for editing and revising) across all MRS and all participants. As we anticipated, however, management of avatars and the writing conference predominated MRS experiences (31.7%; e.g., setting expectations, behavior management). Furthermore, teacher talk predominated MRS writing experiences, with nearly twice as many utterances and four times as many words spoken by pre-service teacher participants as avatars across the three MRS.

Our findings support the need for continued focus on writing instruction for pre-service teachers. Although our participants indicated some grasp of how to design and implement targeted writing instruction during writing conferences, only one participant spent most of her instructional time focused on the writing piece and only one participant focused any instructional time on developing the student as a writer. These findings align with nationwide surveys of in-service teachers who report feeling unprepared to deliver writing instruction and spend little instructional time doing so (e.g., Kiuhara et al., 2009; Gilbert and Graham, 2010; Ray et al., 2016).

Pre-service teacher preparation programs have a responsibility for expanding literacy courses to include methods for providing effective writing instruction. Such efforts could capitalize on reading-writing connections, as reading predominates educator preparation coursework in the U.S. (Brenner and McQuirk, 2019), but writing, both learning to provide instruction on the component skills needed for writing *and* the composition process deserve a space in teacher preparation courses and applied experiences (Myers et al., 2016; Hawkins et al., 2022). Admittedly, our own pre-service preparation program has only one master's level course devoted to K-12 writing instruction and our undergraduate courses mainly focus on how to provide reading instruction.

Changes to pre-service preparation may require shifts in state standards and federal policies (e.g., Reading First). Both tend to emphasize reading over writing and pre-service coursework may be reflective of these priorities which drive what is emphasized in our nation's classrooms (Brenner and McQuirk, 2019). We strongly believe that with adequate pre-service preparation to teach writing and continued supports to provide effective writing instruction in the classroom (Wijekumar et al., 2019), U.S. teachers can reverse decades-long trends of students who do not have the writing skills needed for success in K-12 classrooms (e.g., Salahu-Din et al., 2008; National Center for Education Statistics, 2012; White et al., 2015) and beyond.

Because management and teacher talk predominated MRS writing conferences, pre-service preparation programs should also provide targeted instruction and practice opportunities around pedagogy and classroom management. For example, our pre-service participants appeared to need more preparation for how to quickly set expectations and use most of their time for instruction. Additionally, they frequently failed to provide wait time for students or to ask open-ended questions that allowed students to contribute ideas, with only 3.3% of overall utterances focused on prompts or questions for student avatars to expand on the writing process or their approach as a writer. The predominance of teacher talk may also indicate teachers' use of talk as an attempt to control or manage the students and the MRS, or as Edwards and Furlong (1978) described, a way of "maintaining order" (p. 149). This further supports the need for pre-service teacher preparation programs to provide instruction on how to support and manage student engagement and behavior in the classroom so teachers can focus less on these aspects and spend more time providing high-quality academic-focused instruction.

Self-efficacy and variance with instructional moves during MRS writing conferences

Our findings for research question 2 did not align with our hypotheses. Although we expected participants with higher self-efficacy would provide more writing instruction, this was not the case. In fact, Kim, the pre-service teacher participant with the highest self-efficacy average score and the highest self-efficacy average for writing and writing instruction, spent none of her MRS writing conference focused on writing instruction (*Instruct: Writing Piece,* 0%; *Instruct: Writer,* 0%). Conversely, Jackie, the participant with the lowest average self-efficacy score, was the only participant to implement instruction focused on developing the student as a writer (*Instruct: Writer,* 11%). Furthermore, Sophie, who tied Jackie and Audrey for the lowest average self-efficacy for writing score, was the only participant to spend a majority of her time focused on instruction on the writing piece (*Instruct: Writing Piece,* 58%).

These findings indicate a mismatch between pre-service teachers' self-efficacy for writing and the writing instruction they enacted in the MRS. This supports the need for pre-service teacher preparation not only on how to provide effective writing instruction, but also preparation that facilitates self-efficacy and motivation for writing among pre-service teachers. Like Hodges et al. (2019), we believe pre-service preparation is the appropriate time to address self-efficacy, as changes in self-efficacy "take time and practice" and "reaching teachers who are still developing their beliefs about writing and writing instruction has the potential to proactively prepare teachers to more successfully integrate writing into their future classrooms rather than to reactively try to change entrenched behaviors" (p. 3–4).

Reflections on learning from the MRS

Participants were asked to reflect on how they adapted their plans during the simulation, what factors may have influenced those adaptations, and what they would do the same or differently in a future writing conference. Although we were unsure of specific areas they would focus on in their reflections, we hoped participants would reflect on both their strengths and areas of need related to writing instruction and lesson planning. However, reflections revealed important learnings beyond just how participants chose to adapt and deliver their lesson plans. The first overarching theme from participants' responses showed reflections on adapting lesson plans in response to the realities of implementing a writing lesson plan with student avatars. The second theme involved reflections on the difficulty of in-the-moment decision making during instruction and what was learned from peers during the MRS experience.

Participants' reflections supported the use of teaching simulations in pre-service teacher preparation programs. Through the MRS writing conferences, our participants were able to better understand and practice adapting to the realities of an actual classroom, which they could not do through lesson planning alone or through teaching to peers. Participants had valuable take-aways from the MRS experience related to time and behavior management and making in-the-moment decisions to adjust plans. This type of learning would not have been possible without the simulated teaching environment that promoted growth in understanding of lesson planning, but perhaps more importantly, provided the opportunity to actually experience how to make on-the-fly adjustments to lesson plans based on some of the demands and needs one would have in an actual classroom.

We believe that applied experiences focused on writing will allow pre-service teachers to better understand their own writing instruction abilities, so they enter the classroom with a more precise understanding of the challenges they may encounter with writing instruction and management of the learning environment. Pajares (1996) described this revision, or better understanding of one's self-efficacy with children and adolescents, as a "recalibration" that helps students "better understand what they know and do not know so that they may more effectively deploy appropriate cognitive strategies as they perform a task," (p. 355). In the same way, we believe teachers who enter the classroom with a better understanding of their own skills and a better understanding of instruction, pedagogy, and classroom management, will be more successful, and teachers who are more successful are more likely to be motivated to remain in the profession (Schunk, 1995; Lauermann et al., 2017).

Learning from peers in the MRS writing conferences was also powerful and showed in our results and reflections. Sophie, the final participant in the MRS writing conferences, had the fewest (only 1) utterances related to management of the avatar and writing conference, while the first three participants' MRS writing conferences had *Manage* as their most common type of utterance. Furthermore, Sophie's conference predominantly involved instruction on the writing piece (58%) and she noted in her reflection that her partner (who taught in the conference directly before her) had already spent time setting expectations and providing directions for what the avatars should do; thus, she could focus on instruction. Although our participants only completed one MRS experience, we hope that providing multiple opportunities for approximations of teaching practice through simulation, pre-service teachers will increase their own self-efficacy as they became more and more successful and as they learn from peers who are successful (Schunk, 1995; Usher and Pajares, 2008). From this, teachers with higher self-efficacy and greater motivation to teach writing will likely provide more and better writing instruction as well as have students who demonstrate higher writing performance (e.g., De Smedt et al., 2016; Graham et al., 2022).

Participants' reflections on learning from each other during the MRS experience support continued use of simulations in pre-service teacher preparation. Participants reflected on what they learned from observing others and what they learned from having a group of peers with whom they could confer and strategize with to address events they had not initially planned for. This type of learning would not be possible without the opportunity to implement instruction with student avatars, who behaved in ways similar to actual students, and without the option to pause, confer with peers and the professor, and restart instruction that Mursion afforded (Dieker et al., 2014). We feel strongly that teaching simulations, via Mursion and other related technologies, should be an integral part of pre-service teacher preparation, as they provide a link between coursework and applied practice in field placements, a sort of interim space to experiment with ideas and instruction with lower stakes than an actual classroom full of students (Bradley and Kendall, 2014).

Limitations and future research

We recognize that our work is both exploratory and descriptive. Thus, we can describe participants' utterances, self-efficacy, and reflections but do not draw causal connections between the MRS writing conference and participants' behaviors or performance. This work is new, and we are designing next iterations of MRS writing conferences moving forward. We hope other researchers will begin examining the impact of MRS in pre-service preparation to teach writing, as explorations of the impact of MRS have predominantly been conducted in other subjects (e.g., Grant and Ferguson, 2021). Because this work is emergent, future studies should continue to employ mixed methods to better understand what works and under which conditions, and researchers should aim to draw causal connections between MRS and pre-service teacher outcomes, both in their preparation programs and in their future classrooms.

We also acknowledge that our design and assessment choices impacted our findings. We chose to develop three MRS scenarios to avoid participants being overly influenced by the instructional moves of the groups before them. However, it is possible that each of our three scenarios may have encouraged different types of instructional moves from our participants. We further allowed for collaborative planning among group members prior to MRS; this, along with group composition, could have impacted participants' instructional moves. We also recognize the limitations of using a single instrument to measure participants' self-efficacy for writing instruction through self-report. Future research should explore how MRS scenario contexts, collaborative planning, and group composition could impact instructional moves during MRS writing conferences. Our findings from participants' reflections also provide reasons to further explore how participants benefit from observing peers in MRS scenarios before them and the types of learning that occurs between peers and between MRS sessions. Future research using multiple measures of self-efficacy for writing is important as well and research to examine if self-efficacy changes because of participating in the MRS.

We further understand that MRS alone, conducted once in a pre-service preparation program, is insufficient to cause lasting change in participants' teaching practices. Coaching during teaching simulations has been shown to be an important addition to MRS experiences (e.g., Cohen et al., 2020). In addition to further studies on coaching and feedback that is most beneficial for pre-service teachers in MRS experiences, we hope future research will assess the impact of multiple opportunities for pre-service teachers to participate in MRS experiences throughout their preparation programs. We believe that through multiple opportunities to approximate teaching practices in simulated environments, pre-service teachers will be more likely to develop instructional and pedagogical skills that could have lasting impacts on their future teaching and their future students (Darling-Hammond, 2006).

Conclusion

We advocate for changes to teacher preparation programs that increase emphasis on the teaching of writing and support teachers' self-efficacy and motivation for teaching writing. Such changes can have powerful impacts on the readiness of teachers as they first enter the field, their determination and persistence in the face of difficulties, their desire to remain in the profession, and their impact on students' learning (Schunk, 1995; Yost, 2006; Graham et al., 2022). Our findings support the use of practice-based teaching opportunities, like MRS, that allow pre-service teachers to hone their instructional and pedagogical skills, and perhaps their self-efficacy too, in a space where they can take chances, get feedback, and learn from their peers and professors, without the multiple demands they will juggle in an actual classroom. Such opportunities present an invaluable avenue for future research and for the future of teacher preparation.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by SMU Institutional Research Board (IRB). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

AGR, MY, and DG contributed to study design and data analysis. AGR took primary responsibility for writing the manuscript, with writing support from MY and editing support from DG. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1214086/full#supplementary-material

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Writing knowledge, practices, efficacy, interests, attitudes, and beliefs of deaf education teachers: a randomized controlled trial

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Writing teachers play an extraordinarily important role in their students' writing development. Teachers' motivational beliefs, such as attitudes toward writing, perceptions of their efficacy to teach writing, or preparation to use evidence-based instructional practices, impact their writing instruction, which directly affects the advancement of students' writing skills. Deaf writers are a subpopulation of writers who may face discriminatory beliefs toward their writing development stemming from ableism, audism, or linguicism. Deaf education teachers may doubt their abilities to teach bilingual/multilingual students or teach deaf students experiencing language deprivation. The current study investigates whether deaf education teachers' beliefs can be fostered through an intensive one-year professional development (PD) program designed specifically for deaf education teachers. In this randomized controlled trial, we examine the extent to which the participation of deaf education teachers in specialized PD and subsequent writing instruction implementation (n=26) impacts their pedagogical content *knowledge*, use of evidence-based *practices* for teaching writing, *interest*, *attitudes*, *efficacy* in teaching writing, and *epistemological beliefs* about writing compared to teachers in a business as usual condition (n=24). Pre-post regression analyses indicate statistically significant group differences (with the treatment group scoring higher) on all variables except attitude and some epistemological beliefs. We speculate that specialized, sustained PD paired with supported implementation of writing instruction and ongoing teacher reflection are contributing factors to changes in teachers' motivational beliefs.

KEYWORDS

professional development, writing instruction, deaf education, teacher beliefs, efficacy, instructional practices

Literature review

Writing is an integral component of people's daily lives across the globe. It is used for practical purposes, such as creating grocery lists, initiating a petition, or chronicling life experiences. Writing development does not occur innately; rather, it necessitates continuous effort and practice over time. Teachers play a pivotal role in fostering students' writing development, with instruction often commencing in preschool and extending beyond the twelfth grade. Effective teacher preparation is critical to enhancing the quality of instruction,

which subsequently influences student achievement. This study is an investigation into an intensive, sustained professional development (PD) program tailored for teachers of deaf students.

Theoretical framework

Inclusive of social and cognitive perspectives, the Writer(s)-within-Community model (Graham, 2018, 2023) provides a broad lens for examining influencing factors on how writing is taught. Writing instruction occurs in context-specific environments involving writers, readers, teachers, and collaborators, and each member carries with them unique experiences, abilities, and motivations. Relevant to this study, the Writer(s)-within-Community model can be used to predict and explain the cognitive capabilities and resources that teachers bring to the act of teaching, with a focus on their knowledge and beliefs, as they are retrieved from memory and acted upon in the teaching of writing (see Graham, 2023). In addition, one's actions are moderated by emotions and personality traits. For example, teachers who hold considerable knowledge about how to teach writing likely hold greater confidence and positivity about their instructional competencies. While no writing community is exactly the same because writing instruction is influenced differently by teachers, a common experience such as a PD program has the potential to impact teachers' knowledge and beliefs. In the experimental study that follows, we examine the impact that a PD program has on teacher-level variables including knowledge, self-efficacy, and implementation of evidence-based instructional practices. In addition, as teachers make gains in these ways, we inquire into the simultaneous impact a PD program may have on other potentially relevant variables such as teachers' interest in teaching writing, attitude about writing, and epistemological beliefs.

Teacher as a factor in writing instruction and learning

Teachers are one of the most influential factors in students' academic success. Their knowledge and educational preparedness are directly associated with student achievement (Burroughs et al., 2019). With respect to the teaching of writing, a teacher's cognitive capabilities and resources – such as one's knowledge of writing instruction, application of evidence-based practices, and efficacy – play a significant role in how writing is taught in the classroom, and these may impact or be impacted by other factors such as interest, attitudes, beliefs, or state/school policies, to name a few. There are a number of cognitive and social factors influencing writing instruction, and one's preparation to teach writing has potential to positively impact them. A study by Graham et al. (2023) of 143 general and special education teachers of elementary students receiving special education services found that when a teacher holds positive beliefs about their preparation to teach writing, they are likely to provide more favorable reports of their knowledge, attitude toward writing, attitude toward teaching writing, and belief that writing can be developed through effort and process.

Another relevant finding of the Graham et al. (2023) study was that general education teachers held more favorable beliefs than special education teachers. Teachers of deaf students must possess both generalized and specialized knowledge to provide writing instruction that responds to students' unique and diverse language needs (Dostal et al., 2019). Thus, it is even more critical that PD programs are able to affect deaf education teachers' outcomes positively. Understanding the influence that a PD program has on teacher variables is crucial, as one's capacities, resources, and beliefs can either enhance or hinder instructional effectiveness and student outcomes. Researchers and educators can design PD programs that lead to change in teacher factors and foster more effective student learning experiences.

Knowledge of writing instruction and use of evidence-based practices

Knowledge of writing instruction refers to teachers' understanding of the principles, strategies, and techniques required to effectively teach writing to students with varying abilities. Teachers must possess a deep understanding of the writing processes, writing genres, and strategies that support writing development across diverse learners. Research demonstrates that low teacher knowledge is correlated to low student knowledge (Piasta et al., 2009; Binks-Cantrell et al., 2012). In the context of writing instruction, Wijekumar et al. (2019) found that teachers with low knowledge of text structures had difficulties with teaching strategies for engaging with text structures. Alternatively, teachers with solid knowledge of writing instruction are able to describe teaching practices that are grounded in research and have been shown to improve student writing outcomes. In a study by Wolbers et al. (2016) of elementary deaf students, teachers' knowledge of writing instruction significantly increased after engaging in PD that embedded information about and the application of evidence-based practices. If a teacher has knowledge of evidence-based practices, it increases the likelihood that these practices will be implemented in the classroom.

Evidence-based practices in writing instruction are identified through rigorous or statistical reviews of writing research conducted with diverse subpopulations of students (Graham and Perin, 2007; Graham et al., 2012), and also specifically with deaf and hard of hearing writers (Strassman and Schirmer, 2013). Explicitly teaching strategies for writing processes (e.g., planning, organizing, revising) is one of the most evidenced approaches, producing large, positive effects for low- and high-achieving writers (e.g., De Silva and Graham, 2015), and deaf writers (e.g., Wolbers et al., 2022). Specific to the teaching of elementary students, evidence-based methods include teaching students to engage in the writing process for diverse purposes (Ferretti et al., 2009; Tracy et al., 2009; Wolbers et al., 2015; Dostal and Wolbers, 2016), to become comfortable with handwriting, spelling, sentence construction, typing, and word processing (Graham et al., 2001; Saddler and Graham, 2005; Wolbers et al., 2020), and to participate in a community of writers (Yarrow and Topping, 2001; Troia and Graham, 2002; Wolbers et al., 2022). The amount of time students spend writing each week also plays a crucial role in their writing development. However, a review of the literature that investigated the current state of writing instruction revealed that the majority of teachers were not adequately employing evidence-based practices (Graham, 2019). Many teachers did not spend enough time teaching writing, did not provide adequate opportunities for students to engage in writing, and did not teach writing strategies. Although deaf education teachers report adequate time for teaching writing, they express an underpreparedness with specialized language

approaches (Wolbers et al., 2023) known to be effective in writing instruction with bi–/multi-lingual deaf students and those experiencing language deprivation (Wolbers et al., 2018).

Efficacy in writing instruction

Teacher efficacy is important in education because it influences instructional practices and student achievement. Bandura (1978) describes efficacy as teachers' belief in their ability to impact student outcomes with their instruction. Highly efficacious teachers believe they can positively affect student learning, even when students face challenges such as low socioeconomic status or lack of interest and motivation in school (Salgado et al., 2018). Teachers with high efficacy exert more effort, maintain higher expectations, adapt to new methods, persist through obstacles, and are not as critical of students' struggles (Zee and Koomen, 2016). High teacher efficacy leads to greater job satisfaction and reduced stress (Caprara et al., 2006). A survey of 296 deaf education teachers revealed that they had a high self-efficacy, which was significantly correlated with their years of teaching experience (Garberoglio et al., 2012). Teachers felt more efficacious in the areas of instructional strategies and classroom management than student engagement. The most impactful predictor of teacher self-efficacy was their perception of the efficacy of the educational program.

Specific to writing instruction, teacher efficacy relates to confidence in one's ability to teach writing and to improve students' writing outcomes (Brindle et al., 2016). Research indicates that teachers with high efficacy exhibit positive attitudes toward teaching writing and spend more time supporting students' writing development (De Smedt et al., 2016; Rietdijk et al., 2018). A survey involving 44 elementary deaf education teachers who taught writing found that they had high self-efficacy and somewhat positive attitudes toward writing, along with partial beliefs that writing skills necessitated effort and practice (Graham et al., 2021). This research found that teacher self-efficacy played a significant role in predicting the reported use of efficacious writing instruction practices. As a result of efficacious teachers, students who face challenges in writing respond positively to instruction (Graham and Harris, 2002) with their writing showing growth (Zee and Koomen, 2016; Ekholm et al., 2018). In contrast, a study by Brindle et al. (2016) revealed that many elementary teachers reported low efficacy, indicating a lack of confidence in their ability to teach and enhance students' writing skills. Variations in teacher efficacy correspond with the Writer(s)-within-Community model, where teachers possess diverse cognitive capabilities and resources that affect instruction and learning.

Additional teacher variables and their relationships

Research on additional teacher-related factors such as interest in writing instruction, attitudes toward writing, and epistemological beliefs about writing instruction is minimal (Graham et al., 2022). Interest in writing instruction addresses the level of engagement and enthusiasm teachers have toward teaching writing, and attitudes toward writing encompass teachers' feelings and perceptions about engaging in the act of writing (Brindle et al., 2016). Epistemological beliefs about writing instruction denote the underlying assumptions teachers have about the nature of writing skills, such as whether skills are innate or learned through practice (Hsiang et al., 2020). The extent to which attitudes and beliefs may interact with or occur simultaneously to more established constructs such as knowledge of writing instruction, use of evidence-based practices, and efficacy in teaching writing remains largely unknown.

There is considerable variability in teachers' beliefs, interests, attitudes, and writing practices in teaching writing across different countries and grade levels (Troia and Graham, 2002; Brindle et al., 2016; De Smedt et al., 2016; Rietdijk et al., 2018; Graham et al., 2022). Hsiang and Graham (2016) and Hsiang et al. (2018, 2020) conducted a study in China and Taiwan that demonstrated teachers with positive beliefs, interests, and attitudes are more likely to apply evidence-based instructional practices. Graham et al. (2021) and Bañales et al. (2020) surveyed teachers in Norway and Chile, respectively, further reinforcing the evidence that teacher interests, attitudes, and beliefs predicted evidence-based instructional practices. However, not all variables had the same impact on writing instruction across different countries, which aligns with the Writer(s)-within-Community model in the diverse affordances of writing communities such as cognitive resources that exist in each individual and the sociocultural factors influencing their experiences, knowledge, and beliefs (Graham et al., 2023).

Professional development

The premise of the current study is that teacher variables can be positively transformed through high-quality PD (Bifuh-Ambe, 2013; Cremin and Oliver, 2017), which can lead to improved student writing outcomes (Whyte et al., 2007; McMaster et al., 2020; Wolbers et al., 2022). Intensive, sustained PD initiatives with clearly defined goals are more likely to lead to increased pedagogical content knowledge and teaching effectiveness than one-time workshops (Darling-Hammond and Richardson, 2009; Thames and Ball, 2010). Further, robust PD programs should offer supported application of skills contextualized within authentic classroom experiences (Desimone, 2009; Wilson, 2013), and provide teachers with prompt performance feedback (Leko et al., 2015). Scaffolding and ongoing coaching of specific skills are gradually reduced over time as teachers gain confidence and mastery (Leko et al., 2015). In the context of deaf education, Strategic and Interactive Writing Instruction represents a PD program that aligns with research-established quality indicators, targeting the enhancement of teachers' knowledge and application of evidence-based practices.

Strategic and interactive writing instruction

The Strategic and Interactive Writing Instruction (SIWI) program, incorporating intensive and sustained PD for educators, seeks to address the language and writing needs of deaf and hard of hearing students, taking into consideration their diverse linguistic backgrounds (Wolbers, 2008a,b). SIWI comprises evidence-based strategic and interactive instructional methodologies. Through deliberate, co-constructed writing activities with teachers and peers, students learn to plan, draft, revise, and edit their writing for communication with authentic audiences (Dostal et al., 2015). Successful SIWI implementation necessitates high-quality PD for educators, as altering traditional instructional practices can be challenging. Wolbers et al. (2016) explored the impact of a multi-year PD program on teachers' knowledge and implementation of SIWI, discovering that 1 year of the PD program positively influenced

teachers' comprehension of SIWI principles and their capacity to incorporate these principles into their instructional approaches. Furthermore, teachers' knowledge and implementation continued to more advanced levels with a second and third year of SIWI PD. Although not experimental in design, this study represented a vital step in designing an intensive, sustained PD experience that yielded substantial improvements in pedagogical knowledge and application among deaf education teachers. To isolate the effects that the SIWI PD program has on teachers' knowledge and capacities for teaching writing, however, a randomized controlled trial is needed.

Previous studies have focused on the development of students' language and writing skills rather than the teachers' development. Wolbers et al. (2012) investigated the writing outcomes of 29 middle school deaf students after 1 year of SIWI implementation, observing substantial improvements in syntactic complexity, vocabulary, and expanded texts. In a repeated measures study comparing 5 weeks of typical writing instruction to 5 weeks of SIWI instruction, Dostal and Wolbers (2014, 2016) observed that deaf students ($n = 23$) produced significantly longer writing as well as longer and more complex American Sign Language (ASL) samples upon receiving SIWI instruction. Wolbers et al. (2015, 2020) conducted single-case research design studies, revealing positive changes to deaf elementary students' written language (e.g., increased compound and complex sentences, T-unit counts, and verb variance) and writing skills (e.g., inclusion of persuasive and informative writing traits) once SIWI was provided. In a randomized controlled trial of 79 deaf students in grades 3–5, Wolbers et al. (2022) found that students who received SIWI significantly outperformed their comparison group counterparts on a standardized assessment, the Woodcock-Johnson IV Broad Written Language, thus highlighting the effectiveness of SIWI in bolstering deaf students' writing and language abilities. The current study represents the first experimental examination of the ways in which SIWI PD and subsequent implementation effect change in the teachers who provide efficacious writing instruction to deaf students.

The current study

This study aligns with the Writer(s)-within-Community model, which suggests that the contexts in which teachers operate are adaptable based on internal and external forces, thereby influencing their writing instruction. Teachers possess the potential to transform the writing community through their decisions and actions, derived from newly acquired knowledge and skills from PD, collaboration with other teachers, and supported application and coaching. Thus, experimental studies are encouraged to assess the efficacy of PD in enhancing teachers' capabilities (Graham, 2023).

Writing communities are not predetermined; rather, they exhibit organic variations based on the contributions of all participants, with teachers serving as one significant influential factor. In the current study, we examine the extent to which SIWI PD impacts teacher-level variables. Specifically, we address two research questions:

(1) (Main question) To what extent does SIWI PD appear to improve teacher's knowledge, use of evidence-based practices, and efficacy for teaching writing?

(2) (Exploratory question) To what extent does SIWI PD appear to improve teachers' interest in teaching writing, attitudes toward writing, and epistemological beliefs about writing?

As a result of teacher engagement in SIWI PD and SIWI implementation, we hypothesize a positive shift in the main teacher factors--greater pedagogical knowledge, increased use of evidence-based practices, and higher self-efficacy for teaching writing.

Methods

This RCT included 50 teachers over two academic years. School partners from across the United States were recruited during the grant application process through email and national conference listservs. School partners provided a letter of support for the project to be included in the grant application. Once funded, teachers at partner schools were given priority enrollment. Enrollment was then opened to all interested teachers who had not previously participated in the PD program. The inclusion criteria for teachers included: (1) agreeing to the randomization process, (2) signing a contamination agreement that they would not share SIWI information or materials with other educators, and (3) providing two to two and a half hours of writing instruction a week to deaf students in grades 3–6. Upon approval of the study by the Institutional Review Board, teacher consent forms were collected, and teachers were randomly assigned to comparison and experimental groups through computer generated randomization. Comparison group teachers proceeded with their planned writing instruction, while experimental group teachers participated in the year-long SIWI PD program and implemented SIWI with their students. After the year of data collection concluded, comparison group teachers received access to the SIWI PD program. Pre- and post-data were collected through surveys and interviews. The effects of treatment were analyzed using the statistical design of pre-post regression analysis.

Random assignment

In the first year, more teachers were assigned to the comparison group ($n = 17$) than the treatment group ($n = 13$) to allow for a waitlist control approach in which teachers who serve 1 year in the comparison group could move into the treatment group in the second year. In the second year, there were more teachers in the treatment group ($n = 13$) than in the comparison group ($n = 7$). Eight of these teachers were newly enrolled and randomized teachers. The waitlist control approach prevented student crossover from treatment to comparison group when more than one teacher participated from the same program. It also aided recruitment and retention of school partners. Randomization adhered to the following rules:

(1) Teachers with prior SIWI experience were assigned to the treatment group. One teacher had learned about SIWI in a college class, and one teacher had learned about SIWI from a teacher colleague. In both cases, they had a limited understanding of the approach, yet were both assigned to treatment to avoid contamination.

(2) Teachers who were not available to attend summer training were assigned to the comparison group. This applied to one teacher.
(3) When there were two or more teachers from the same program, they were evenly assigned to groups. Teachers from schools where there were no other participating teachers were assigned to the comparison group in the first year.
(4) Teachers who enrolled after randomization were included in the comparison group. This was applied to three teachers.

Teacher participants

There were 26 teachers in treatment and 24 teachers in the comparison group. Teachers self-reported demographic data. In the treatment group, all reported as female. There were 2 teachers of color (1 black and 1 Asian/pacific islander) and 24 white teachers. A total of 4 teachers self-identified as Deaf and 22 as hearing; of the Deaf teachers, 2 used hearing aids. In the comparison group, there were 23 female participants and 1 male. There was 1 black teacher, while the remainder were white. A total of 4 teachers self-identified as Deaf, and used a hearing aid. There were a total of 4 native users of ASL in each group; all other teachers learned ASL later in life as a second or additional language. An independent t-test was applied to the number of years teachers have used ASL (treatment $M = 16.67$, SD = 10.96; comparison $M = 17.43$, SD 8.88), which was not statistically significantly different by group, $t(40) = -0.25$, $p = 0.20$. In terms of participants' highest level of education, there were 6 teachers (2 treatment, 4 comparison) with an Ed.S. degree or Master's degree plus 30 credits, 36 with a Master's degree (19 treatment, 17 comparison), and 8 with a Bachelor's degree (5 treatment, 3 comparison). Independent t-tests were conducted to compare years of teaching experience across groups (treatment $M = 12.58$, SD = 10.81; comparison $M = 13.33$, SD = 9.16), and these were comparable, $t(48) = -2.66$, $p = 0.27$.

Just over half of the teachers worked at one of 8 participating schools for the deaf, while just under half taught at one of 12 participating local education agencies with self-contained classrooms or pull out services for deaf students. Teachers largely reported that their school programs adhered to a bilingual or multilingual education philosophy where ASL and English were utilized for instruction (N = 19 treatment; $N = 19$ comparison). Fewer teachers reported a monolingual approach to education using spoken English and/or some signs paired with speech ($N = 7$ treatment; $N = 6$ comparison).

To further characterize similarities and differences between groups, we asked teachers to rate their preparation to teach writing on a 3 point scale. In the treatment group, 3 teachers rated their writing preparation as exceptional, 18 as adequate, and 5 as minimal. In the comparison group, 4 teachers said their preparation was exceptional, 18 adequate, and 2 minimal. At the start of the year, 20 teachers in the treatment group and 18 in the comparison group indicated they were using a writing curriculum, and 6 in each group said they were not. We list the curricula from most frequently mentioned to least frequently: Lucy Calkins' Writer's Workshop (8); Framing Your Thoughts (8); McGraw Hill Wonders (7); Houghton Mifflin Harcourt Journeys (6); National Geographic Inside Series (5); Reading A-Z (4); Bilingual Grammar Curriculum (2); Bedrock Literacy Curriculum (2); 6 + 1 Traits of Writing (1); Orton-Gillingham Approach(1).

One teacher from each group withdrew during the academic year--one due to a change in position and the other due to being overcommitted. Both teachers who withdrew reported as white and hearing.

Measures

Interview and survey data were collected from teachers in both groups at the beginning and end of the school year. Teachers in the treatment group completed pre-data before starting the SIWI PD program.

Interview

Levels of Use of the Innovation (LoU) semi-structured interviews were used to examine teachers' **knowledge** of writing instruction with deaf students. The LoU is a criterion-referenced measure grounded in the Concerns-based Adoption Model (Hall, 1974) with six operationally defined behavioral profiles (Hall, 2013; Hall and Hord, 2020): non-use (0), orientation (1), preparation (2), mechanical use (3), routine use (4a), refinement (4b), integration (5), renewal (6). Profile 3, routine use, indicates a teacher is reporting their thinking about daily instruction in specific contexts, and changes to instruction are teacher-centered. To score at a level 3 or higher, the teachers' instruction must contain evidence-based practices for (1) teaching strategies for writing process and skills, (2) apprenticing students as writers through supported writing practice and interaction, and (3) providing specialized language instruction for bilingual/ multilingual students and students experiencing language deprivation. Profile 4, refinement and integration, demonstrates that a teacher is moving beyond mechanical instruction to making student-centered changes to instruction informed by evaluation and motivated by improving student outcomes. Renewal, profile 5, indicates that a teacher is flexibly applying the instructional approach with different students, and also collaborating with other educators and family members to further the impact of instruction. Finally, profile 6 suggests that a teacher is refining and innovating based on reflection of their own practice.

The last two authors and one SIWI coach conducted LOU interviews with each SIWI and BAU teacher prior to the start of the academic year (pre-interview). All teachers were interviewed again at the end of the academic year (post-interview). During a 45 min interview, teachers were asked 24 questions designed to elicit information about their knowledge of writing instruction (e.g., What do you see as the strengths and weaknesses of the writing instruction you are implementing with deaf students? Have you made any attempt to address the weaknesses?) and the impact of their teaching (e.g., What do you see as being the effects of the writing instruction you are implementing with deaf students?).

Each teacher's interview was transcribed and assessed for knowledge of the characteristics, use, and consequences of the instruction. Scores were based on teachers' expressed knowledge of instructional practice, which was grounded in classroom-based situations and their interactions with diverse learners. The LOU scoring chart (Hall et al., 2006) includes a description of each score as well as seven decision points (existing between each score) that describe what the teacher is doing. The decision points aid the scorer in determining whether they should advance to the next score level.

For example, the first decision point between a score of 0 and 1 states: "Takes action to learn more detailed information about writing instruction." Whereas the descriptions of scores 0 and 1 for knowledge state: "Knows nothing about this or similar innovations or has only very limited general knowledge of efforts to develop innovations in this area." (0) and "Knows general information about the innovation such as origin, characteristics, and implementation requirements." (1). The first two authors and the last author scored LoU interviews. They reviewed the scoring protocol as a group and then scored approximately 20% together to calibrate. The remainder of the interviews were scored by at least 2 members. Any differences in scoring were discussed by the 3-member team to achieve consensus.

Survey

Four established surveys were compiled into one online survey for teachers. In one section of the survey, there were 15 items from the *Survey of Evidence-based Practices* (Brindle et al., 2016) that related to teachers' use of **evidence-based practices while teaching** (8 items) **and supporting writing** (7 items). Teachers responded to the items using an 8-point scale (1 never; 8 several times a day). Example items ask teachers to rate how often they "teach students strategies for planning" (teaching) and "provide feedback on students' writing" (supporting). Internal consistency (Cronbach's alpha) for teaching items was α=0.84 at pre survey and α=0.87 at post survey; supporting writing items were α=0.79 at pre survey and α=0.81 at post survey.

Another section of the survey included 9 items from the *Efficacy for Teaching Writing* survey (Graham et al., 2001; Brindle et al., 2016) that addressed teachers' **efficacy** in teaching writing using a 6-point scale (1 strongly disagree; 6 strongly agree). For example, teachers were asked to rate the following item: "If a student did not remember what I taught in a previous writing lesson, I would know how to increase their retention in the next lesson." Internal consistency was α=0.79 at pre survey and α=0.82 at post survey.

A third section of the survey included items from a subsection of the *Classroom Practices for Writing* survey (Brindle et al., 2016) to measure **interest** in teaching writing and **attitude** toward writing. One six-point Likert type question asked teachers if they like teaching writing, and six questions of the same type asked teachers to rate the degree to which they agree or disagree with statements regarding their attitude toward writing. An example of a question that measured teachers' attitudes is "I enjoy learning about becoming a better writer." Internal consistency of attitude survey items was α=0.81 at pre survey and α=0.87 at post survey.

The last section of the survey included 25 items related to teacher's **epistemological beliefs** about writing from Hsiang et al. (2020). Items assessed four dimensions of beliefs: (a) writing development is **innate** or fixed (e.g., some people are born good writers, others are stuck with limited writing capabilities); (b) writing development occurs through **effort** and process (e.g., with practice, one can become a good writer); (c) writing knowledge comes from **experts** and authority figures (e.g., experts know more about teaching writing than I do, so I rely on their judgment); and (d) writing knowledge is **certain** (e.g., if two people score a student's writing differently, at least one of them must be wrong). Teachers who have attended the SIWI PD may demonstrate to a greater extent that writing development involves learning effort/process, and less that writing development is innate/fixed. Teachers may also demonstrate to a greater extent that writing knowledge comes from authority/experts, and less that writing knowledge is certain knowledge. Items were rated on a 6-point scale (1 strongly disagree; 6 strongly agree). Internal consistency for innate survey items was α=0.76 at pre survey and α=0.67 at post survey. It was α=0.78 and α=0.82 for effort survey items, α=0.60 and α=0.75 for expert items, and α=0.51 and α=0.67 for the certainty of writing knowledge items.

Research design

The independent variable differentiating treatment and comparison groups was the presence of the SIWI program. All teachers regardless of group provided deaf students in grades 3–6 with writing and language instruction for 2 to 2.5 h a week; however, the treatment group teachers were involved in SIWI PD and subsequent implementation of SIWI as their form of writing instruction. Comparison group teachers continued with their typical writing and language instruction during the academic year (business as usual), after which they were provided the SIWI training. The dependent variables examined in this study include (a) knowledge of writing instruction, (b) evidence-based practices related to teaching writing, (c) evidence-based practices related to supporting writing, (d), efficacy in teaching writing, (e) interest in teaching writing, (f) attitude toward writing, (g) innate epistemological beliefs, (h) effort epistemological beliefs, (i) expert epistemological beliefs, and (j) certain epistemological beliefs. A correlation matrix is available in the Supplementary material.

SIWI professional development

The overarching goal of the SIWI PD is to develop teachers' pedagogical and content knowledge through intensive and sustained programming (Darling-Hammond and Richardson, 2009). The SIWI PD engages teachers in simulated and authentic activities paired with ongoing, contextualized feedback for enacting the driving principles--strategic instruction, interactive instruction, and metalinguistic knowledge and linguistic competence.

Teachers in the treatment group began the PD program by attending a week-long summer workshop. The workshop was structured by cycles of learning, application, and feedback. The experience was cumulative, and teachers were expected to integrate information from each new learning cycle with previously applied knowledge until they were exposed to the full SIWI framework. By the conclusion of the week, teachers began planning how to set up SIWI instruction in their classrooms and how to introduce SIWI to their students. After approximately 2 months of implementation of SIWI in their classrooms, teachers came together for a two-day workshop where they analyzed their students' writing and planned for a transition to a new genre of writing. In addition to the two in-person workshops, teachers received eight one-on-one virtual coaching sessions *via* Zoom to support implementation of SIWI throughout the academic year. With the exception of the spring semester of 2020 when Covid-19 began impacting the operation of schools, teachers also received two site visits from a SIWI coach.

SIWI implementation

Teachers implementing SIWI provided recount, information report, and persuasive writing instruction to their students for approximately 18 h across 9 weeks per genre. The major principles of

SIWI were used to plan, teach, and reflect on all writing units. Writing instruction included the co-construction of text in a guided and interactive environment with the teacher and students working collaboratively, and embedded opportunities for shared and independent writing. During writing time, the teacher ensured the students were writing for an authentic purpose to a relevant audience, modeled and invited students to use strategies designed to support engagement in the writing process – including genre-specific features and skills – and employed language zone techniques to clarify and expand students' use and knowledge of language. For more information about SIWI, see *Enactment of SIWI Principles* and the *SIWI Observation and Fidelity Instrument* at siwi.utk.edu.

Instructional fidelity

Teachers video recorded their SIWI lessons and shared these with the research team *via* Swivl platform. From the database of recorded instruction, one unit of each genre of writing instruction per teacher was scored for instructional fidelity. A unit began with determining a purpose and audience for writing and concluded with publishing and sharing the writing. On average units ranged between 5 and 8 lessons.

The SIWI instructional fidelity instrument includes 53 items or indicators of instruction that are organized by major SIWI principles: strategic (e.g., text structure associated with the genre of writing is explicitly discussed); interactive (e.g., learning from one another is encouraged through peer interaction); and, metalinguistic/linguistic (e.g., strategies to get to a point of shared understanding are employed in the language zone). See Dostal and Wolbers (2016) for the full instrument. Each item is given a rating of (1) fully implemented, (0.5) partially implemented, or (0) not implemented to reflect the teacher's level of implementation. Each teacher's scores were added up, divided by the maximum possible points, and then multiplied by 100 to convert them into percentages.

Twenty-percent of the units were rated by four research team members to ascertain interrater reliability. The intraclass correlation was 0.87. Afterwards, team members discussed and reached full consensus on the final score. The remainder of the units were scored by one research team member.

The instructional fidelity for treatment group teachers' units ranged from 47 to 90%, averaging 71% for recount writing instruction, 70% for information report instruction, and 73% for persuasive writing instruction (often the last taught genre of the year). These levels of fidelity are consistent with prior SIWI PD research demonstrating that first-year SIWI teachers average approximately 75% fidelity. With continued implementation and participation in the SIWI PD program after the first year, average fidelity is known to increase to above 90% (Wolbers et al., 2016). Nonetheless, prior studies have demonstrated that first-year SIWI teachers significantly impact their students' writing and language outcomes even while they are learning to implement with greater fidelity (e.g., Wolbers et al., 2015, 2018, 2020; Dostal and Wolbers, 2016).

Differences between treatment and comparison group instruction

Teachers in both the treatment and comparison (or BAU) groups provided writing and language instruction for 2–2.5 h weekly, which was inclusive of recount, informative, and persuasive writing genres. BAU teachers continued with their usual instruction while treatment group teachers implemented SIWI. To describe and distinguish the instruction that was provided to students in the comparison and treatment groups, researchers collected information from teachers *via* a 26-item survey at the beginning and end of the academic year. The questions in the survey were of four types that were randomly placed throughout the survey: (a) evidence-based practices for teaching writing (7 items; e.g., teach students to use genre-specific language and domain-specific vocabulary in their writing); (b) evidence-based practices for supporting writing (8 items; e.g., have students work together to plan, draft, revise, and edit a paper); (c) deaf education practices drawn from the literature (Strassman and Schirmer, 2013; Mayer and Trezek, 2015) and in alignment with SIWI implementation (7 items; e.g., collaboratively problem solve and make decisions about writing with students), and (d) widely used practices in deaf education that are not aligned with SIWI (4 items reverse scored; e.g., have students write a first draft and then a second or final draft). For each item, teachers rated how often they implemented a specific practice on an 8-point likert scale (1 = never, 2 = several times a year, 3 = monthly, 4 = several times a month, 5 = weekly, 6 = several times a week, 7 = daily, 8 = several times a day).

A two sample t-test was performed at the beginning of the academic year (prior to the treatment group receiving SIWI PD) to compare the teachers' writing instruction practices. There was not a significant difference in instructional practices between the treatment group ($M = 4.16$, SD = 0.80) and the BAU group ($M = 4.44$, SD = 0.54); $t(48) = -1.45$, $p = 0.15$. At the end of the academic year, however, the same independent samples t-test was performed, and significant differences were found between the treatment ($M = 5.06$, SD = 0.68) and BAU ($M = 4.19$, SD = 0.68) groups; $t(46) = 4.43$, $p < 0.001$. As demonstrated through teacher responses to the survey, the treatment group teachers displayed significant increases from pre to post in the frequency with which they engaged in evidence-based writing instruction; these increases were not observed in the BAU group. Changes among SIWI teachers were reflected in strategic instruction (e.g., teaching students strategies for planning, writing paragraphs, revising/editing, and self-regulating the writing process), interactive instruction (e.g., having students work together to plan, draft, revise and edit a paper), and metalinguistic/linguistic instruction (e.g., teaching the differences between ASL and English grammars). For example, during a post LoU interview, one SIWI teacher reflected on the interactive nature of her instruction by reporting that she "saw students start to recognize what they were good at with writing, and that sort of development happened through the [classroom] community as [they] wrote." Another teacher reflected on how her explicit attention to language during writing instruction allowed for, "a connection between language in print and with expressive ideas and [students] communicating with each other." There were also increases in genre-specific instruction (e.g., teaching students how different genres are structured), authentic purposes for writing (e.g., having students publish their writing), and using classroom writing data to guide writing instruction. The treatment group also showed a reduction in the frequency with which they used practices not in alignment with SIWI (e.g., teaching grammar using a grammar curriculum or structured approach); whereas, the BAU group showed an increase in the frequency of practices misaligned with SIWI (e.g., editing students' drafts for them, focusing primarily on grammar instruction). For example, one BAU teacher shared that she requires her students to "use a sentence checklist to make sure each sentence has all of the necessary components" while expecting "students [to]

practice implementing the sentence structure, or another specific grammatical component, exemplified in the [teacher's] model."

Data analysis

All teacher outcomes were analyzed with a pre-post regression of the general form:

$$Posttest = Intercept + Pretest + SIWI + e.$$

where *Intercept* is the model-predicted outcome (*Posttest*) at the mean of the *Pretest* (mean-centered), *SIWI* is a dummy variable for a teacher in the treatment program, and *e* is random error. All models were fit in SAS PROC MIXED (Littell et al., 2006) so that the residual variance could be used to compute the model-based effect size for the treatment effect (g; Hedges, 2007).

Results

The main research question of this study was: To what extent does participation in SIWI PD and subsequent implementation impact teachers' knowledge of writing instruction, use of evidence-based practices for teaching and supporting writing, and efficacy in teaching writing compared to those in a BAU condition? The descriptive statistics for the main teacher outcomes are presented in Table 1 at two time points (beginning and end of the academic year), and the results of the pre-post regression model are presented in Table 2. Three types of estimates are provided in Table 2: fixed effects, random effects, and effect sizes. The fixed effects represent the results of the pre-post regression equation, where intercept represents the model-predicted year-end score for teachers in the control group, pretest is the effect of teachers' fall score (grand mean centered), and SIWI is the change expected in teachers from baseline to the end of the year (i.e., the treatment effect). The random effect represents the residual variance (and SD), or error. Last, an effect size, Hedges' *g*, is provided for each variable to demonstrate the SIWI treatment effect (as the treatment effect divided by the residual SD; Hedges, 2007).

TABLE 1 Pre and post outcomes for main research questions.

		Pretest			Posttest		
Outcome	Group	*N*	Mean	*SD*	*N*	Mean	*SD*
Knowledge	BAU	24	0.08	0.28	23	0.09	0.29
	SIWI	26	0.23	0.51	25	3.82	0.43
Evidence-based practices							
Teaching writing	BAU	24	4.28	0.94	23	3.97	1.07
	SIWI	26	3.82	1.20	25	5.09	0.99
Supporting writing	BAU	24	4.64	0.59	23	4.29	0.88
	SIWI	26	4.38	1.08	25	5.02	0.92
Efficacy	BAU	24	4.49	0.58	23	4.25	0.62
	SIWI	26	4.34	0.78	25	4.77	0.63

Knowledge represents the mean behavioral profile from 0 to 6, non-use to renewal. Evidence-based practices is the mean score on an 8-point scale (1–8), ranging from never to several times a day. The efficacy score represents the mean of a 6-point scale (1–6), from strongly disagree to strongly agree.

All four main teacher outcomes had statistically significant treatment effects with large effect sizes, suggesting SIWI teachers made considerable gains in knowledge, evidence-based practices, and efficacy for teaching writing that were not observed in BAU teachers. It should be noted that the extremely large effect size on knowledge was due to minimal variance accompanied by no gain in the control group.

In addition, we asked the following exploratory research question: To what extent does participation in SIWI PD and subsequent implementation impact teachers' interest in teaching writing, attitudes toward writing, and epistemological beliefs? The means and standard deviations for these teacher outcomes at the beginning and end of the year are presented in Table 3. The fixed and random effects and effect sizes of the pre-post regression model are presented in Table 4; these are organized similarly to the results of the main research question.

Teachers who were involved in the SIWI PD experienced statistically significant growth in their interest in teaching writing compared to BAU teachers, and the magnitude of the experimental effect was large. Regarding attitudes toward writing, there was a moderate effect but not a statistically significant difference between groups. By the end of the year, SIWI teachers more strongly agreed that writing develops through effort and process. Group differences were significant and accompanied by a large effect size. Other epistemological beliefs (i.e., innate, expert, certain) did not show notable differences between groups.

Discussion

This randomized-controlled trial used interviews and surveys to measure the impact of the SIWI PD program on deaf education teachers' knowledge of writing instruction, use of evidence-based practices (EBPs) for teaching writing, and efficacy in teaching writing--all of which are teacher-related factors of the Writer(s)-within-Community model that influence how writing is taught (Graham, 2018, 2023). Exploratory analyses were additionally conducted for potentially interrelated teacher-level variables including interest in teaching writing, attitudes toward writing, and epistemological beliefs. The results demonstrated the SIWI PD program to have a statistically significant impact and a large effect on all main research variables and two exploratory variables. Significant differences were not identified between groups pertaining to attitudes toward writing and some epistemological belief components. In this section, we discuss the implications of these findings for deaf education and teacher education, shedding light on the importance of high-quality PD programs.

Our findings demonstrate an increase in SIWI teachers' use of EBPs for teaching and supporting writing, which are practices documented in the literature and in alignment with SIWI practices. Prior to SIWI PD, teachers reported using common practices found within deaf education that are not evidence-based nor aligned with SIWI, such as having students write a first draft and then a second or final draft rather than engaging them in recursive writing and revising processes. Following the SIWI PD, SIWI teachers reported decreasing their use of practices unaligned with SIWI while BAU teachers

TABLE 2 Model results for pre-post main outcomes.

Effect	Knowledge		Teaching writing		Supporting writing		Efficacy	
Fixed	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Intercept	0.11	0.07	3.89	0.21	4.21	0.17	4.21	0.11
Pretest	0.29	0.12	0.25	0.14	0.45	0.14	0.52	0.11
SIWI	3.69*	0.10	1.27*	0.30	0.90*	0.24	0.59*	0.15
Random	Var.	SD	Var.	SD	Var.	SD	Var.	SD
Residual	0.12	0.35	1.01	1.00	0.68	0.82	0.26	0.51
Effect Size	10.48		1.26		1.08		1.15	

Est., estimate; Var, variance; SE, standard error. *$p < 0.05$ for fixed effects. Effect sizes are Hedges *g*: the treatment effect divided by the residual SD (Hedges, 2007).

TABLE 3 Pre and post outcomes for exploratory research questions.

		Pretest			Posttest		
Outcome	Group	*N*	Mean	*SD*	*N*	Mean	*SD*
Interest	BAU	24	4.58	0.97	23	4.43	1.20
	SIWI	26	4.46	1.14	25	5.24	0.72
Attitude	BAU	23	4.52	1.01	23	4.36	0.92
	SIWI	26	4.31	0.90	24	4.37	1.03
Epistemological Beliefs							
Effort	BAU	24	4.70	0.72	23	4.60	0.68
	SIWI	26	4.49	0.76	25	4.84	0.68
Innate	BAU	24	2.24	0.84	23	2.18	0.63
	SIWI	26	2.12	0.59	25	2.37	0.67
Expert	BAU	24	3.74	0.65	23	3.48	0.55
	SIWI	26	3.33	0.61	25	3.53	0.97
Certain	BAU	24	3.07	0.54	23	2.87	0.59
	SIWI	26	2.76	0.60	25	2.79	0.64

Outcomes represents the mean of a 6-point scale (1–6), from strongly disagree to strongly agree.

maintained their use of such practices. Given that teachers in this study were randomized into SIWI or BAU groups, this finding demonstrates that the SIWI PD was effective at increasing teachers' use of EBP and decreasing other instructional practices that are not established as effective practices.

The features of the SIWI PD align with widely recognized aspects of effective PD, such as active learning, collaboration, expert support, feedback, reflection, and sustained learning (Darling-Hammond et al., 2017). Throughout a year of SIWI implementation, teachers had ongoing conversations with SIWI coaches about their implementation of the instructional principles, with a focus on integrating and increasing the strategies that support student growth. The approach to coaching as a part of a PD program is key, with such strategic planning being more effective than evaluating instructional fidelity (Kennedy, 2016). During the SIWI PD, teachers were encouraged to use the SIWI instructional fidelity instrument to reflect on their pedagogical practices and set instructional objectives for themselves. These goals, taken along with the teachers' immediate needs for addressing what is currently transpiring in the classroom, provided the direction of the coaching conversations and collaborative planning. The potential for responsive PD to influence teacher change is well documented (e.g., Kennedy, 2016; Darling-Hammond et al., 2017), and in this study, the change was substantial, including teachers integrating and increasing their use of a range of EBPs (see Graham et al., 2012). Among the EBPs for teaching and supporting writing are providing time for students to write daily, teaching them to engage in the writing process with authentic purpose and audience, establishing specific writing goals, supporting their development in constructing sentences, teaching revising strategies, creating a motivated community of writers (Rogers and Graham, 2008; Graham et al., 2012), and teaching the differences between ASL and English grammar (Andrews and Rusher, 2010). This highlights the importance of PD that is embedded and responsive to individual teachers' use of practices.

Importantly, interviews with teachers demonstrated that SIWI teachers are able to articulate their knowledge of effective writing instruction while providing evidence about how they teach and support student writing. For example, BAU teachers at the beginning and end of the year and SIWI teachers prior to PD reported that they modeled writing skills and then allocated instructional time for their students to apply the skills during independent writing. One teacher shared: "I show my own writing model on Monday morning. Then, students practice implementing the sentence structure, or another specific grammatical component, exemplified in the model." However, after teachers attended the SIWI PD, they reported a shift in their instructional practice to include modeling for both genre traits and grammar or conventions during the collaborative and supported construction of authentic texts. A teacher noted that through collaborative writing she "saw students start to recognize what they were good at with writing and [their] development [of writing] through the community as we wrote." As teachers' instructional practices integrated EBPs, they more frequently shared about improvements they observed in their student's independent writing.

Reported knowledge of EBPs for writing instruction and use of these practices increased among treatment group teachers in this study, along with beliefs in their abilities to carry out such practices. This aligns with literature that highlights the importance of building pedagogical content knowledge (e.g., Thames and Ball, 2010; Fauth et al., 2019) as well as the importance of teachers' sense of efficacy (e.g., Tschannen-Moran et al., 1998; Zee and Koomen, 2016). As written by Lauermann and ten Hagen (2021, p. 279):

> "Teachers are unlikely to engage in activities that they believe exceed their capabilities and may give up on valued goals if they view these goals as unattainable. Furthermore, teachers' competence, beliefs, and especially their sense of self-efficacy, have

TABLE 4 Model results for pre-post exploratory outcomes.

Effect	Interest		Attitude		Beliefs (Effort)		Beliefs (Innate)		Beliefs (Expert)		Beliefs (Certain)	
Fixed	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Intercept	4.43	0.17	4.30	0.12	4.47	0.11	2.12	0.10	3.33	0.15	2.76	0.12
Pretest	0.54	0.11	0.89	0.09	0.67	0.10	0.61	0.10	0.60	0.16	0.53	0.14
SIWI	0.83*	0.23	0.25	0.16	0.44*	0.15	0.28	0.14	0.31	0.22	0.11	0.17
Random	Var.	SD	Var.	SD	Var.	SD	Var.	SD	Var.	SD	Var.	SD
Residual	0.65	0.81	0.30	0.55	0.24	0.49	0.23	0.48	0.50	0.71	0.30	0.55
Effect size	1.03		0.46		0.90		0.58		0.44		0.20	

Est., estimate; Var, variance; SE, standard error. *$p < 0.05$ for fixed effects. Effect sizes are Hedges *g*: the treatment effect divided by the residual SD (Hedges, 2007).

> been consistently linked to their long-term commitment to the profession".

In this way, self-efficacy may be viewed as a key outcome which drives the use of EBPs and creates positive cycles of instruction. As illustrated in the Writer(s)-within-Community model, we understand variables as reciprocally related, whereby the use of EBPs are influenced by and are influencing teachers' knowledge and efficacy. Given the low efficacy reported by teachers across the SIWI and BAU groups at the start of the study, we are particularly interested in capitalizing on the positive relationship between increased efficacy and use of EBPs. Previous research findings indicate a connection between teachers and their students' achievement; for example, student achievement and motivation is positively impacted by increased teacher efficacy (Caprara et al., 2006; Barni et al., 2019). Thus, drawing upon research to design quality PD programs for teachers is essential to improving teaching practices in ways that are meaningful to students' learning. The potential implication of having increased teacher efficacy is an increased belief in students' competence and capacity as learners.

Findings from this study support the idea that the design of teacher learning should be symmetrical with principles for student learning (Watkins et al., 2018). That is, effective principles of learning designed for students can and should be applied to PD designed for teachers. This is particularly true when it comes to the role that active learning and reflection play in propelling a learner's practices and knowledge. Such principles of learning are enacted effectively in PD programs through engagement of teachers in analyzing their current teaching approaches in comparison to standards that guide effective professional practice, and by having teachers identify goal areas for their practice and then testing these new teaching practices (Ingvarson et al., 2005). Further, scaffolded learning opportunities that are important to students are equally important to teachers; modeling and providing feedback during initial training and during follow up training sessions are associated with larger magnitudes of effects on teacher practices (Brock et al., 2017). Similar to how thematic units can connect various subject matter and skills that students are learning around one coherent theme, PD programs that are coherent – or connected to teachers' prior experiences, use of standards and assessments, or professional conversations – are more likely to positively influence changes in practice (Garet et al., 2001). Because SIWI is not a scripted curriculum but rather a comprehensive framework for writing instruction that is composed of driving principles that teachers enact in response to their students' needs, it is possible for teachers to integrate other curricula, programs, or graphic organizers during enactment. Several coaching conversations with teachers provided support on how to, for example, align their reading curriculum with SIWI, or how to draw on the social studies or science curriculum during writing instruction, or how to embed other literacy programs such as Thinking Maps or Framing Your Thoughts within SIWI rather than teaching these programs separately. The active engagement of teachers along with the scaffolded, coherent, and individualized support provided as part of SIWI PD actualizes evidence-based features of effective PD (Van Driel and Berry, 2012; Kennedy, 2016). These features of learning are symmetrical across students and adults, which reflects the complex nature of learning new knowledge and applying new skills.

Exploratory teacher variables

In addition to the main variables related to our research questions, we examined six exploratory variables that may illuminate additional teacher-level factors impacted by SIWI PD. The statistically significant increase in teachers' interest in teaching students writing is accompanied by their changes in reported efficacy and use of EBPs. This suggests that interest grows as competence develops, which can promote a positive cycle of improvement. It is also important for considering the potential trajectory of interest change over time when initiating and supporting teachers' use of EBPs in writing instruction.

Interestingly, teachers' own attitudes toward writing did not change significantly across the study, which demonstrates that interest in teaching writing and personal engagement with writing may be independent of one another. A systematic review on teachers' attitudes toward writing revealed that most teachers, irrespective of their teaching experience, possessed negative perceptions about themselves as writers (Cremin and Oliver, 2017). Most teachers, and even literacy specialists, exhibited mixed attitudes toward writing, with most identifying as avid or passionate readers, rather than writers. Nevertheless, some of these teachers, despite lacking a passion for writing, remained committed and interested in fostering a love for writing in their students (Draper et al., 2000). Brooks (2007) also discovered that effective writing teachers did not write frequently, suggesting that this particular variable on attitudes toward writing may not be crucial for effective instruction when other variables are factored in. However, a few studies observed that teachers' lack of writer identity negatively impacts their willingness to model the

composition process from the perspective of the writer, which in turn, may reduce the quality of writing instruction (Street, 2003; Cremin and Oliver, 2017). Since the SIWI PD program did not enhance teachers' attitudes toward writing but improved other key domains for effective writing instruction, questions arise about the significance of this particular variable in teaching contexts. It is possible that, much like some professional sports coaches who never played the sport themselves but excel in developing their players, writing teachers may not enjoy writing themselves but can still provide effective writing instruction.

In addition to interest and attitudes related to writing, we examined teachers' epistemological beliefs about writing. Teachers in the SIWI group reported a change in their belief that one can become a stronger writer with effort and practice. This belief in the malleability in writing proficiency is likely to have a significant impact on the approach to writing instruction and engagement with students during writing activities (Graham, 2023). Given the historically low student performance on average in writing, this belief is important not only for setting and communicating appropriately high expectations for deaf students, but also for a teacher's belief that their efforts will make a difference. However, for three other belief variables, teachers' beliefs did not transform after a year of SIWI PD. They demonstrated similar beliefs to BAU teachers about whether writing skills are fixed, writing knowledge comes from authority figures, and writing knowledge is certain. A systematic review of research in the larger literature documented mixed outcomes in teacher beliefs about writing development (Cremin and Oliver, 2017). Some teachers perceived writing ability as fixed, while others believed it could be improved through instruction and practice. Several studies have found that teachers' beliefs often conflicted with their actual teaching practices, and teachers struggled to reconcile these contradictions (McKinney and Giorgis, 2009; Whitney, 2009; Cremin and Baker, 2010). The findings in our study did not diverge from the literature on these belief variables.

Limitations

There were four dimensions of epistemological beliefs that were examined in this study--(1) the belief that writing develops through effort and process; (2) the belief that writing development is innate or fixed; (3) the belief that writing knowledge comes from experts; and (4) the belief that writing knowledge is certain knowledge. Teachers in the SIWI group showed an increase from beginning to the end of the year in their belief that writing develops through effort and process; this is a change that was not seen in the BAU teachers. The other dimensions of epistemological beliefs did not demonstrate statistically significant group differences. A potential limitation surrounding these data was the low internal consistency among survey items. Internal consistency for the belief that writing develops through effort was the only dimension with acceptable internal consistency at both pre and post (α>0.7). Other dimensions were in the poor to questionable range for internal consistency of survey items (0.5–0.7). There was greater variability in teachers' scores on the clustered items of these three dimensions, indicating conflicting responses (some high, some low) across items. Therefore, we hypothesize that internal consistency of survey items for the epistemological beliefs clusters impacted findings in these areas. In future research, we propose a larger sample of participants to conduct a factor analysis.

Lastly, we were unable to collect video observations from BAU teachers due to the scale and scope of this study. The inherent risk with self-reported data of instructional practices is the potential for teachers to overstate the elements they implement and the extent to which they apply these elements in their instruction. Despite this risk, our study revealed the BAU teachers reported significant differences in teaching methodologies when compared to SIWI teachers. Although the absence of video observations from BAU teachers could be perceived as a limitation, we believe it did not significantly affect the validity of our results.

Future directions

The full SIWI PD program is provided to teachers over 3 years. With each year of participation in the program, teachers' implementation fidelity, and knowledge of writing instruction increases (Wolbers et al., 2016). During the last year of the program, teachers have demonstrated the highest adherence to SIWI instructional principles (mid-90's), which is in stark contrast to the instructional fidelity levels of first year teachers, as shown in this study (70's). Future research exploring teachers' knowledge, efficacy, and use of EBPs across multiple years of participation in the SIWI PD program as their instructional fidelity increases could bolster current findings about the program. In response to a reviewer's suggestion, we conducted a dosage analysis (not reported here) using the overall fidelity measure. The results of the dosage analysis showed statistically significant, large effects, even larger than those reported here. We report the standard, group-based analysis as yielding conservative, more realistic effects (i.e., with less-than-perfect fidelity).

Additionally, future studies could be extended to explore the ways in which differential levels of instructional fidelity and teacher-related variables impact student writing outcomes. While prior experimental studies evidence that first year SIWI teachers with comparatively low instructional fidelity percentages still have a statistically significant impact on students' writing outcomes compared to those in a BAU group (Wolbers et al., 2018, 2022), we are interested in whether there is a larger impact on students' outcomes when receiving instruction from a master SIWI teacher. Lastly, the current study explored teachers' personal attitudes toward writing, such as if they enjoyed learning about becoming a better writer. These attitudes did not demonstrate significant changes. However, future studies could explore whether SIWI PD leads to a change in teachers' attitudes about writing instruction.

Conclusion

Teachers play an extraordinarily important role in writing instruction; in fact, they are central to its success. Further, teachers of deaf students must possess additional specialized knowledge to provide writing instruction that responds to students' varying language needs. Greater teacher pedagogical knowledge, use of evidence-based practices, and higher self-efficacy in writing have a direct impact on how teachers approach writing instruction in the classroom. In this randomized controlled trial of 50 deaf education

teachers, those receiving 1 year of SIWI PD and ongoing coaching increased their knowledge and implementation of evidence-based practices in writing instruction and positively reframed their beliefs about their ability to teach writing as well as their students' abilities to improve their writing. In previous research, these factors have been shown to have a direct, positive effect on students' writing outcomes. This underscores the importance of evidence-based PD programs for teachers of writing. The SIWI PD is a sustained, coherent program that pairs active learning with supported implementation of writing instruction and ongoing teacher reflection, which leads to statistically significant changes in deaf education teachers' knowledge and use of empirically supported writing practices.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Institutional Review Board, University of Tennessee with authorization agreements filed with University of Connecticut, Georgia State University, and Arizona State University. The participants provided their written informed consent to participate in this study.

Author contributions

KW, HD, SG, LB-M, and TA contributed to conception and design of the study. RS coordinated the data processing and scoring. KW developed the database with assistance from RS. LB-M performed the statistical analysis. KW, HD, and LH wrote the first draft of the manuscript. All authors contributed to manuscript revisions.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1214246/full#supplementary-material

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Text quality and changing perceptions of teacher feedback and affective-motivational variables: a study with secondary EFL students

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Introduction: Feedback can support students' writing and has the potential to enhance writing motivation and reduce writing anxiety. However, for feedback to fulfill its potential, it has to be accepted by students and perceived as motivating.

Methods: In this study, we investigate changes in less proficient English as a foreign language (EFL) students' (N=53) writing motivation and affect, as well as their perceptions of teacher feedback and how these relate to students' argumentative text quality. Measurements were taken before EFL teachers attended a professional learning intervention on feedback (T1) and 8 months later (T2).

Results: From T1 to T2, students felt that general feedback quality improved, their writing self-efficacy increased, and their writing anxiety decreased. However, no significant changes in text quality could be observed between T1 and T2, and students continued to struggle with creating structure and coherence in their texts. Regression analyses revealed that feedback perceptions and affective-motivational variables did not predict students' text quality at T1. Yet at T2, students' perception of general feedback quality and the effect of feedback on writing motivation were significant predictors of text quality; self-efficacy and writing anxiety were not.

Discussion: Our results suggest that more attention needs to be paid to feedback's motivational impact, especially among less proficient EFL writers.

KEYWORDS

writing self-efficacy, writing anxiety, feedback on writing, intervention, secondary school, English as a foreign language (EFL), text quality development, writing motivation

1. Introduction

Writing plays a vital role in communication. However, developing the ability to write texts that adequately convey the writer's intention to a target audience is a time-intensive and demanding process (Kellogg, 2008) and may be even more challenging when writing in a foreign language (FL) (Hyland, 2003; Galbraith, 2009). The challenges FL writers face may not only be based on text knowledge that develops through time and teaching but can additionally be rooted in motivational problems, such as low competence beliefs, a lack of writing enjoyment, or the presence of writing anxiety (e.g., Teimouri et al., 2019; Zumbrunn et al., 2019; Sun et al., 2021).

Feedback can be a powerful educational tool to support students' writing development (Parr and Timperley, 2010; Biber et al., 2011; Graham et al., 2015; Busse and Scherer, in press) and writing motivation (Bruning and Horn, 2000; Camacho et al., 2021). Hattie and Timperley (2007) define feedback as information about one's performance or comprehension and emphasize that feedback should answer three questions to enhance learning: Where am I going? How am I going? Where to next? Teachers, thus, need to make learners aware of the learning goals (*feed up*), make progress toward the learning goals visible to students (*feed back*), and explain how to move forward to close the gap between current performance and the desired goals (*feed forward*). This has been referred to as the old feedback paradigm where feedback is considered an information-sharing process aiming to improve student learning (see Winstone and Carless, 2020).

Current literature, however, often moves beyond an information-based approach and frames feedback as an interactive process in which teachers and learners engage in meaningful dialog (Henderson et al., 2019; Carless and Winstone, 2020; Lee, 2021). By placing the student at the center of feedback, the student's role in generating, making sense of, and using feedback is emphasized. This new feedback paradigm broadens the view toward students' perceptions, motivation, and understanding of feedback. For instance, students need to be motivated and able to regulate their emotions to act upon the feedback, make sound judgments, and use it for improvement (see also Carless and Boud, 2018).

Given that writing motivation is receptive to change (Graham, 2018a), one may also assume that changes in motivation attributable to feedback may generate different writing outcomes. As students' writing motivation declines throughout the course of schooling (Boscolo and Hidi, 2007; De Smedt et al., 2020), exploring how feedback could be used to foster writing motivation seems particularly relevant. Yet, little is known about students' perceptions of feedback's quality and its motivational impact, and there is a general scarcity of research on how feedback perceptions and affective-motivational beliefs are associated with individual differences in writing quality. This study addresses existing research gaps and investigates the effect of feedback, self-efficacy and anxiety on text quality in English as a foreign language (EFL).

2. Theoretical and empirical background

2.1. Affective-motivational variables related to writing

Writing is perceived as motivationally challenging for many students, with EFL learners being no exception (Lee et al., 2018). For writing to be successful, special attention needs to be paid to students' motivation (Bruning and Horn, 2000). Reconciling different definitions of the past 40 years, Abdel Latif (2021) frames writing motivation as "an umbrella term encompassing learners' liking or disliking of writing situations and perceived value of writing, the situational feelings they experience while writing and the way they regulate them, the beliefs about their writing ability and skills, and their desired goals for learning to write" (p. 3). This definition illustrates that writing motivation is a multidimensional construct (see also Graham, 2018b) subsuming several concepts. Although research on writing motivation is still in its early stages (Lee et al., 2018), a systematic review by Camacho et al. (2021) offers insight into this research area and identifies 24 motivation-related constructs. Writing self-efficacy appears to be the most studied construct ($n = 37$), while relatively few studies explore affective variables such as writing anxiety ($n = 2$) or enjoyment of writing ($n = 7$). In the following paragraphs, we look at what exactly constitutes these constructs and how they relate to writing achievements.

2.1.1. Self-efficacy in writing

Self-efficacy beliefs can be understood as the confidence to perform successfully in a particular domain (Bandura, 1997). It is assumed that four factors contribute to self-efficacy beliefs: mastery experience, vicarious experience, verbal persuasion, and physiological arousal (Bandura, 1997). Self-efficacy can thus stem from having successfully managed a similar situation in the past (mastery experience), from knowing that people with similar abilities are capable of managing the situation (vicarious experience), from gaining self-confidence in one's own abilities through positive affirmation by others (verbal persuasion), or from successfully dealing with physical tension and turning it into relaxation (physiological arousal). Usher and Pajares (2008) compiled a review of the role each source of self-efficacy plays in different domains. Mastery experience is reported to be the most impactful source of self-efficacy for various academic fields, while vicarious experience and social persuasions appear to be less associated with self-efficacy. This finding, however, needs to be viewed with caution given that measures of the two latter sources are inconsistent across studies. While the first three sources generally are related positively to self-efficacy, physiological arousal was found to predict self-efficacy negatively. In the context of writing, Pajares et al. (2007) investigated writing self-efficacy among 1,256 students at elementary, middle, and high school. Similar to the general results presented above, the largest proportion of variance in students' self-efficacy was explained by the experience of mastering writing, regardless of school type, while vicarious experience had no predictive power. For elementary and middle school students, physiological indices (operationalized by Pajares et al., 2007 in terms of anxiety/stress) also significantly predicted self-efficacy, with middle school students showing a quadratic relationship between anxiety and self-efficacy. That is, while low and high anxiety scores predicted self-efficacy beliefs, moderate anxiety did not. In contrast, for high school students, social beliefs instead of anxiety were significant for self-efficacy beliefs. Therefore, Pajares et al. (2007) suggest focusing on writing skill development to facilitate students' mastery experience and, thereby, strengthen their writing self-efficacy. Looking at the authors' findings on high school students, one may also argue that self-persuasion methods or praise related to specific aspects of students' work or progress (for a detailed discussion see Hattie and Timperley, 2007; Hattie et al., 2016) can foster students' writing self-efficacy which can, in turn, also affect their writing achievements.

Literature reviews from the early twenty-first century report that students' beliefs in their L1 writing capabilities are usually positively associated with writing outcomes (Klassen, 2002; Pajares, 2003). Studies show that students with higher levels of self-efficacy often tend to perform better in writing (e.g., Pajares et al., 2000) and that students with high writing proficiency possess higher levels of self-efficacy (Raoofi et al., 2017). Self-efficacy was found to positively predict

writing quality of students in grade 4 (Graham et al., 2017), up to grade 10 (Troia et al., 2013) and in grade 11 (Yilmaz Soylu et al., 2017). However, single studies also report no or opposite relations between self-efficacy and writing performance. For example, in a study by Braaksma et al. (2018), self-efficacy and text quality were positively correlated among students in grade 11, but there were no significant correlations between those variables among students in grade 10. Similarly contradicting the literature presented above, Wijekumar et al. (2019) reported that self-efficacy in L1 writing did not independently predict writing quality of students in grade 5. Such findings may be explained partially by the fact that not all students succeed at evaluating their performance adequately. Although it appears reasonable that confidence to perform well in writing coincides with actual writing performance, some findings also show a mismatch between self-efficacy beliefs and writing achievements among less proficient writers with learning disabilities in grades 4 to 10 (Graham et al., 1993; Klassen, 2002). Particularly, these writers tend to overestimate their performance, revealing an illusion of competence (Kruger and Dunning, 1999), a phenomenon also found in other studies with less proficient writers (Anastasiou and Michail, 2013; Busse et al., in press). Such a mismatch between self-efficacy beliefs and actual performance is also referred to as low calibration (Schunk and Usher, 2012; Schunk and DiBenedetto, 2016) which students may especially encounter when feeling efficacious about performing difficult tasks without actually being aware how to complete them successfully (Wigfield et al., 2012; Chen and Zhang, 2019).

To what extent these results can be transferred to L2 writers in general and EFL writers in particular needs to be further investigated. A meta-analysis by Sun et al. (2021) revealed that self-efficacy had an even higher impact on L2 than L1 writing. The studies compiled in the meta-analysis were often conducted among adult learners. For example, Sun and Wang (2020) found that writing self-efficacy contributed significantly to college students' scores in EFL essay writing. Similarly, Zabihi (2018) reported that writing self-efficacy positively predicted complexity, accuracy, and fluency in university students' EFL narrative texts. While these studies imply high calibration between students' self-efficacy and writing performance, a study by Chen and Zhang (2019) that investigated the relation between self-efficacy beliefs about surface and deep-level text revision and the frequency of such revisions in EFL university students' argumentative writing showed no significant relation between beliefs and performance. Thus, in the EFL context, there is evidence for a positive relationship between self-efficacy and writing performance as well as for a mismatch as described above. However, the available studies mainly provide insight into possible associations among adult learners, while findings for school students are scarce. Closing this research gap by exploring ways to improve the low EFL writing proficiency of secondary school students (see Harsch et al., 2008; Siekmann et al., 2022) through self-efficacy development might therefore be beneficial.

2.1.2. Writing anxiety

Another motivation-related construct that has received little attention in the L1 writing context (see Camacho et al., 2021), but even less attention in L2 and FL research, is *writing anxiety*. Anxiety in language learning contexts has often been referred to with notions of tension or apprehension (see MacIntyre and Gardner, 1994; Cheng, 2002). As seminal work by Cheng (2004) suggests, FL writing anxiety can be seen as a three-dimensional construct. The author established and validated a scale to measure writing anxiety (the Second Language Writing Anxiety Inventory, SLWAI) which uses three subscales: somatic anxiety, cognitive anxiety, and avoidance behavior. Firstly, somatic anxiety refers to the increased physiological arousal learners may encounter when writing in a FL. Secondly, cognitive anxiety represents the individuals' perception of arousal and also their worry or fear of negative evaluation. Lastly, avoidance behavior addresses learners' tendencies to avoid FL writing.

Cheng's (2004) scale has been widely used by researchers to investigate FL writers' anxiety (see Tahmouresi and Papi, 2021). In general, studies report negative relations between students' writing anxiety and their L2 writing performance. For example, a meta-analysis by Teimouri et al. (2019) investigating L2 and FL anxiety focusing on different language skills found that L2 and FL writing anxiety negatively impacted learners' engagement in writing and their writing performance. Their analyses also show differences between students of different educational levels. L2 language anxiety and achievement seem to be closely related among elementary students, but this effect decreases up to junior high school. In senior high school and college, the relationship between students' anxiety and writing achievements increases again. However, these findings must be considered with caution given that studies focusing on junior high learners are limited (see Teimouri et al., 2019). Interestingly, Teimouri and colleagues also report that the negative relationship between anxiety and achievement is less pronounced when English is the target L2 or FL. Teimouri et al. (2019) explain this with English's status as *lingua franca*; due to its presence in daily life, students may be more familiar and less anxious when learning EFL. These findings, however, may not refer directly to EFL writing given that most studies in the meta-analysis investigate anxiety when speaking in a L2 or FL.

Focusing on anxiety in EFL writing, Tahmouresi and Papi (2021) also found anxiety to predict university students' writing course grades negatively. Similarly, Zabihi (2018) showed that anxiety negatively predicted complexity, accuracy and fluency in EFL university students' narrative texts. Although these effects seem to be unambiguous, some studies also suggest that writing anxiety interacts with other motivation-related constructs when affecting students' writing; self-efficacy beliefs seem to mediate writing anxiety and negative effects of anxiety on writing performance may disappear when students' self-efficacy is controlled for (Pajares et al., 1999; Pajares, 2003). For example, Han and Hiver (2018) found that EFL writers at middle school with elevated levels of writing anxiety still performed successfully on writing tasks, if they also displayed moderate to strong levels of self-efficacy. Interestingly, Busse et al. (in press) also found that anxiety was positively related to text quality in low-efficacious students with a migration background. These studies thus suggest that anxiety in L2 and FL writing may impact students' writing performance in a more nuanced way than reported in other studies. Therefore, further studies investigating the effect of different motivational constructs and its effect on FL writing of high school students seem necessary (see also Camacho et al., 2021).

2.1.3. Enjoyment of writing

While research has already begun to examine self-efficacy and anxiety in L2 writing, studies of positive emotions associated with motivation such as *enjoyment* have long been neglected (see Dewaele, 2022). In general, enjoyment can be understood as feelings of pleasure

one encounters during an activity (Tahmouresi and Papi, 2021). Transferring this to the context of L2 learning, enjoyment is also described as "positive emotions that language learners experience in the process of learning or using the target language" (Teimouri, 2017, p. 689). Similar to other motivation-related constructs, enjoyment is reported to affect students' performance. For instance, more advanced and proficient language learners at secondary school experience higher levels of FL enjoyment (Dewaele et al., 2018; Dewaele and Alfawzan, 2018; Mierzwa, 2018). While enjoyment was found to be positively correlated with FL achievement among high-achieving high school students, no such relations were found among low-achieving students (Li et al., 2020).

Considering that the interest in researching enjoyment is only gaining momentum, it is not surprising that studies on enjoyment of writing are relatively scarce. The few existing studies tend to examine the effect of different interventions on students' enjoyment of writing. For instance, single studies investigated to what extent writing in digital contexts had an impact on students' enjoyment of writing and found positive effects (Beck and Fetherston, 2003; Lan et al., 2011). How students' enjoyment of writing is related to their performance remains rather unclear. Initial insights are presented in a study by Zumbrunn et al. (2019), in which the authors investigated how elementary students' enjoyment of writing was related to their quarterly writing grades. Using structural equation modeling, the authors found that students with higher writing enjoyment tended to receive higher writing grades. Arguably, more research investigating students' FL writing enjoyment in general and, particularly, its effect on writing performance and text quality is needed.

2.2. The impact of feedback on text quality and affective-motivational variables

Formative feedback has proven effective in enhancing teaching and supporting students' learning progress (see Shute, 2008; Hattie, 2009; Brookhart, 2018). Likewise, feedback was shown to have beneficial effects for students' writing (see meta-analyses by Biber et al., 2011; Graham et al., 2015). Feedback is particularly useful because it can be provided during the writing process and thereby enhance learners' writing development. Beginning writers tend to connect their ideas associatively without adapting them to the reader or to certain text purposes. As their writing develops, however, learners increasingly succeed in organizing their texts coherently and adapting them to the audience (Bereiter, 1980). In order to promote such writing development, feedback should not only address surface but also deep-level features of texts. On the surface level, high-quality texts may feature linguistic accuracy in terms of grammar, spelling, and punctuation. On the deep level, high-quality texts will be meaningfully organized and include coherently linked ideas so that readers can discern the information and meaning of the text. Accuracy on a surface level is important and might be demanding especially when writing in a FL (Manchón et al., 2009). However, focusing on deep-level features in FL writing might better serve the purpose of prioritizing higher-order goals of communication (see Lee, 2021), according to which writing aims at conveying meaning. Based on this communicative goal, we follow a definition of writing quality as "coherently organized essays containing well-developed and pertinent ideas, supporting examples, and appropriate detail" by Graham and Perin (2007, p. 14), referencing Needels and Knapp (1994).

Studies have shown that producing coherently organized texts poses challenges to students writing in a FL. For instance, texts of college students writing in EFL compared to students writing in their L1 seem to be of simple structure and are less coherent, given that ideas necessary to be included may be lacking (Silva, 1993). An older nationwide study in Germany showed that many students in Year 9 ($N = 10{,}639$) struggle with writing well-structured and comprehensive texts in English (Harsch et al., 2008). This finding was confirmed in a more recent study, where 56.2% of EFL students ($N = 166$) in German middle and low performance track schools reached half of the maximum score for text coherence and only 4.2% achieved doing so regarding text structure (Siekmann et al., 2022). Based on these studies one can conclude that many adolescent EFL students struggle with writing organized and comprehensible texts (Harsch et al., 2008; Siekmann et al., 2022) and may particularly need formative feedback regarding deep-level features.

In general, one may assume that if teachers provide high-quality feedback, particularly incorporating feedback on deep-level features, students can make significant progress in their writing (Parr and Timperley, 2010). A study by Brooks et al. (2021) further examined the potential of a new student-centered feedback model in influencing writing achievement of fourth graders ($N = 1{,}060$). Teachers and principals participated in a six-month professional learning intervention in which they were introduced to the relevance of a student-centered feedback culture and feedback that promotes learning based on Hattie and Timperley's (2007) model. Before and after the intervention, students' writing achievements and their perceived helpfulness of several feedback strategies were assessed. Increases in students' perceived helpfulness regarding teachers' feedback strategies including clarifying success criteria, checking in on progress, and promoting improvement through specific comments or use of models as well as possibilities for students to talk with peers and enact *feed up*, *back*, and *forward* were positively associated with gains in writing achievement.

Feed up, feed back, and *feed forward* are generally perceived as helpful by students (Brooks et al., 2019). Therefore, one may also expect these aspects of feedback to enhance affective-motivational variables related to writing. However, the evidence in this regard is more nuanced and suggests that single aspects of feedback may contribute differently to variables such as students' writing self-efficacy and anxiety. While information on students' progress (*feed back*) seems necessary to increase students' writing self-efficacy, information on learning goals only (*feed up*) can lead to increases in students' writing anxiety (Zarrinabadi and Rezazadeh, 2020). Therefore, combining the three aspects of feedback seems beneficial (Zarrinabadi and Rezazadeh, 2020). Additionally, providing these aspects in the right balance might also be relevant. Providing information on how to move forward is arguably important for learning improvement (Brooks et al., 2019), however, focusing too heavily on such *feed forward* might signal to students with low self-efficacy in writing that there is still a lot to be improved (Duijnhouwer et al., 2012). This could ultimately result in these learners believing themselves to have lower writing capabilities than initially thought, which may explain results from our pilot study where students' self-efficacy in writing decreased after a feedback intervention (Busse et al., 2020).

While the above-mentioned findings on the positive impact of formative feedback on writing self-efficacy and anxiety are promising,

studies focusing on the impact of feedback on enjoyment of writing remain scarce. In general, researchers have already called for further intervention research on FL enjoyment in the classroom (see Dewaele, 2022). Considering that FL enjoyment is particularly salient when students perceive themselves as autonomous and empowered instead of being passive learners (Dewaele and MacIntyre, 2014), formative feedback that places learners at the center of the learning process could have a particularly positive effect in this respect.

To sum up, feedback that enables students to derive specific information on learning goals (*feed up*), their progress toward these goals (*feed back*), and how to move forward to close the gap between their current performance and the desired goals (*feed forward*) can be beneficial for students' writing quality and motivation. *Feed up, back,* and *forward* should address text deep-level features to help students successfully communicate their thoughts through organized and coherent texts. To unlock the potential of sustaining students' self-efficacy, decreasing their writing anxiety, and possibly increasing their enjoyment of writing, additionally, all three aspects of feedback should be provided in a balanced way. Yet, not many studies have yet addressed feedback's potential for enhancing students' writing performance and motivation.

3. Materials and methods

3.1. Aims and research questions

Our study is part of a larger project aimed at promoting writing among secondary school students through a professional learning intervention (PLI). Teachers participated in a PLI on providing formative feedback on writing and were then asked to implement feedback in language classes. In this study, we investigate how EFL students' ($N = 53$) perceptions of feedback and their writing self-efficacy and anxiety affect their argumentative text quality. Measurements were taken before EFL teachers attended the PLI (T1) and 8 months later (T2). First, we analyze EFL students' text quality, their feedback perceptions, and affective-motivational variables at T1 and T2. We then examine the extent to which students' feedback perceptions and affective-motivational variables predict text quality. We address the following research questions in particular:

RQ1: Are there changes in students' perceptions of feedback and affective-motivational variables from T1 to T2?

In general, feedback needs to activate students to be effective. Still, various researchers have highlighted that students may not always perceive teachers' feedback as useful and motivating and, thus, fail to act on it (e.g., Carless and Boud, 2018; Brooks et al., 2019). As teachers participated in the PLI on how to provide formative feedback, we expect students to perceive teachers' feedback to be more useful and more motivating in terms of writing enjoyment at T2 (H1a).

As studies indicate that teachers' feedback to students' writings can positively influence affective-motivational variables (e.g., Duijnhouwer et al., 2012; Zarrinabadi and Rezazadeh, 2020), we further assume that students' self-efficacy increases and that their writing anxiety decreases at T2 (H1b).

RQ2: Are there changes in text quality from T1 to T2?

Although there are little data on the effect of feedback on deep-level text development, particularly for secondary students, one could assume that text quality improves due to the PLI. We therefore hypothesize that students are better able to establish structure and coherence in their texts (H2).

RQ3: Are feedback perceptions and affective-motivational variables predictors of text quality?

Based on findings regarding the relevance of affective-motivational variables for students' writing achievements (see Sun et al., 2021; Tahmouresi and Papi, 2021), self-efficacy can be expected to be a positive predictor and writing anxiety a negative predictor of students' text quality both at T1 and T2 (H3a). Assuming that the PLI will lead to students perceiving the feedback as more useful and motivating, we also expect feedback perceptions to positively predict text quality at T2 (H3b).

3.2. Design and participants

Our article examines data from a quasi-experimental study with a pre-post test design (for an overview of the intervention project design see Figure 1) involving 53 EFL students (18 females, 33 males, two did not reveal their gender; mean age = 15.04 years, $SD = 0.55$ at T1) from three Year 9 classes at secondary schools (*Realschule* and *Hauptschule*) in North-Rhine Westphalia, Germany. The majority of students (45.3%) started learning EFL in Year 1. Students' English grades from their last report card indicated medium levels of achievement in our sample ($M = 3.38$, $SD = 0.80$, on a six-point scale with *1* being the highest and *6* the lowest grade awarded in the German schooling system).

3.3. Procedure

We informed secondary schools in North-Rhine Westphalia about our intervention project to solicit teachers and their EFL students. Six teachers from five different schools consented to participate in the project. In the first phase of the intervention, teachers participated in a PLI on how to implement formative feedback on students' writing (for more information on the PLI content see section 3.4). In the second intervention phase, teachers were asked to incorporate feedback on writing in their EFL classes for 8 months. To facilitate teachers' implementation of the PLI content in class, teachers received a logbook including a summary of the PLI content and materials to be used in class. Teachers were asked to document the methods and materials they used within a chart in the project's logbook as a fidelity measure. However, as the feedback implementation period coincided with pandemic-induced partial and full home learning, teachers stopped documenting their

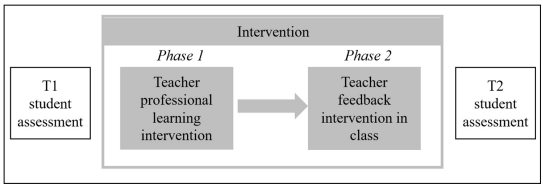

FIGURE 1
Overview of intervention project design.

writing and feedback practices after the first 2 weeks of the term when schools closed for the first time.

Before teachers participated in the PLI (T1) and after 8 months of the in-class feedback intervention (T2), students indicated via questionnaire to what extent teacher feedback was effective in emphasizing learning goals, progress and areas of improvement as well as motivating students in writing, that is, to what extent students' enjoyment of writing was enhanced. Students also revealed how self-efficacious and anxious they were in writing. Following the questionnaire, students wrote an argumentative text within 20 min. The full assessment (questionnaire, writing tasks, test on general cognitive ability, see section 3.5 Instruments) was conducted during 90 min of regular school hours.

3.4. Teacher PLI content and materials

In the two-day PLI, the researchers presented five different modules on evidence-based feedback methods and writing exercises that teachers then discussed and practiced using exemplary students' texts from a pilot study and materials designed for the project.

On day one, we covered *general criteria of formative feedback* (module 1) by introducing teachers to the feedback model of Hattie and Timperley (2007), that is, teachers learned about the importance of making learning goals (feed up), progress (feed back), and improvement information (feed forward) transparent to students. We analyzed and discussed feedback samples similar to the following: "The goal of the assignment was to write a pro and con discussion (feed up). There are already many arguments that support your thesis statement, which you improved on compared to your last draft. However, there is only one counter-argument (feed back). Can you think of further counter-arguments? If you need help, you can check the mind-map we prepared in our previous lesson (feed forward)." We also highlighted the relevance of being sensitive to students' needs. In this regard, we discussed feedback and its possible effects on student motivation and engagement. Teachers then practiced giving *feedback on deep-* and *surface-level features of texts* (modules 2 and 3). On day two, teachers extended their knowledge of general criteria of formative feedback (module 4) and learned how to implement *feedback in larger learning groups* in a time-efficient manner (module 5). Here, we concentrated on working with criteria-based rubrics, peer feedback, exemplars/text models, and modeling process-oriented writing tasks in class (for more details on the methods and materials discussed in module 5, see Siekmann et al., 2022). Table 1 shows an overview of the PLI content, following the recommendations for reporting writing interventions given by Bouwer and de Smedt (2018).

3.5. Instruments

We assessed students' *self-efficacy for evaluating and revising*, adapting a scale by Busse (2013). Students were asked to indicate to what extent they felt able to identify strengths and weaknesses and to revise their texts. *Writing anxiety* was assessed using adjusted items of the SLWAI by Cheng (2004) which measured to what extent students displayed cognitive and somatic anxiety as well as avoidance behavior In addition, we used a scale adapted from Rakoczy et al. (2005) to measure students' *perceived general feedback quality* with items referring to the feedback model of Hattie and Timperley (2007), for instance, students had to state to what extent they were informed about the learning goals (feed up) and received improvement information (feed forward) in their EFL classes. We also examined students' *perceived effect of text feedback* and their *perceived effect of feedback on writing motivation* using Harks et al.'s (2014) scales that we had previously adjusted in another study (Busse et al., 2020). The *perceived effect of text feedback* related to possible cognitive and behavioral effects of feedback on writing; students had to indicate the extent to which the feedback helped them identify where they could improve or whether they should prepare better. Students' *perceived effect of feedback on writing motivation* included items addressing the enjoyment of writing, for example, the extent to which feedback made students look forward to future writing assignments and enjoy revising their writing more. All scales were based on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree) and showed satisfactory Cronbach's Alpha at or above 0.70. For an overview of sample items and internal consistency values see Table 2.

We used an independent writing task from the TOEFL iBT® writing assessment, publicly available on the TOEFL website and used in other studies (e.g., Keller et al., 2020), to measure students' argumentative text quality. Students were asked to agree or disagree with the statement "A teacher's ability to get along well with students is more important than excellent knowledge of the subject" and give reasons for their opinion. Following a definition of writing quality focusing on deep-level features of writing (see section 2.2), two raters analyzed students' text structure and coherence using analytic rubrics (for a detailed description of the rating and rubrics see Siekmann et al., 2022). The raters evaluated all texts via common negotiation to guarantee consistency and a shared understanding and application of criteria (Trace et al., 2016). If there was disagreement whether the criterion was fulfilled, they discussed reasons for both options and referred back to benchmark texts selected from a pilot study until they reached a consensus. Students could reach a maximum score of eight points for structuring their text into an introduction (two points for providing and embedding an opening statement), a main body (one point), and a conclusion (two points for providing and embedding a concluding statement), and by setting appropriate paragraph breaks (three points). Regarding coherence, students could achieve a maximum score of nine points for providing a thesis statement (three points for providing a thesis statement and adhering to it throughout the main body to the end of the text), developing arguments (three points for providing an argument, examples and a closing sentence), and creating a common thread (three points for connection of ideas, more logical connection of ideas with mostly correct usage of linking words, and meaningfully connecting the introduction, main body, and conclusion with suitable linking words).

In addition, students did one subtest on figural analogies from the Cognitive Ability Test for 4th to 12th Grades, Revision (KFT 4–12 + R, Heller and Perleth, 2000). We included this measure of cognitive abilities to account for another individual student feature that was found to be related to text quality in other studies (e.g., Hajovsky et al., 2018; Köller et al., 2019).

TABLE 1 Teacher professional learning intervention content.

Module	Learning objectives	Instructional focus	Theoretical/ empirical grounding	Activities	Materials
(1) General criteria of formative feedback: basic module	Teachers understand that feedback is more than feedback on the present performance (feed back) and that students need transparent goals (feed up) and specific recommendations for improvement (feed forward). Feedback should be formative and address affective-motivational variables to facilitate student engagement.	Feed up, feed back, feed forward I	Hattie and Timperley (2007)	Analyzing exemplary feedback on students' texts regarding feed up, feed back, and feed forward	Teacher feedback samples
		Teacher and student agency in the feedback process I	Hattie (2009), Shute (2008), and Henderson et al. (2019)	Discussing teacher characteristics to promote students' learning progress	
		Process-oriented and diversity-related feedback practices	Cooper and Allen (1998), Lam et al. (2017), Brookhart (2018), see also Busse et al. (2022)	Analyzing and comparing teacher-student interaction	Transcript of a class recording
(2) Feedback on deep-level features of texts	Teachers understand that developing communicative competence in writing is a complex process that students need support with. To communicate their means, students have to establish structure and coherence in their texts; thus, feedback on text quality should also address such deep-level features of writing.	Writing development	Bereiter (1980) and Kellogg (2008)	Analyzing students' texts for stages of writing development	Exemplary students' texts from a pilot study
		Writing as a process	Hayes and Flower (1986)	Discussing prompts to initiate planning, writing, and revision phases	Student worksheets: *Five steps of writing a text, Setting writing goals*, Poster: *The writing process*
		Feedback on text structure and coherence	Graham and Perin (2007), Harsch et al. (2008), and Parr and Timperley (2010)	Analyzing structure and coherence in students' texts (worksheet: *analyzing paragraph structure*) Providing formative feedback on structure and coherence in students' texts (worksheet: *How to write well-structured paragraphs*)	Exemplary students' texts from a pilot study Student worksheets: *Analyzing paragraph structure, How to write well-structured paragraphs*
(3) Feedback on surface-level features of texts	Teachers understand that feedback on surface-level features of texts serves communicative needs and should consider students' level of progress. Focused error correction can be used to achieve this goal.	Focused error correction	Ellis et al. (2008), van Beuningen (2010), and Kao and Wible (2014)	Identifying error patterns in students' texts	Exemplary students' texts from a pilot study
		Direct vs. indirect feedback	Ellis (2009) and Bitchener and Ferris (2012)	Providing formative feedback and explanations to error patterns	Rubric for common error codes and patterns
(4) General criteria of formative feedback: advanced	Teachers understand that for students to engage with the feedback process, feedback needs to provide specific information and address learners' diverse (affective-motivational) needs.	Levels of feedback	Hattie and Timperley (2007)	Describing differences between feedback focusing on the task, process, self, and self-regulation	Teacher feedback samples
		Feed up, feed back, feed forward II	Hattie and Timperley (2007) and Graham (2018a)	Providing formative feedback (including feed up, feed back, feed forward) to deep- and surface-level features in student texts	Student worksheets: *Feedback in three steps, Feedback for improvement: what and how?*
		Teacher and student agency in the feedback process II	Lee (2009), Shute (2008), Jonsson and Panadero (2018), and Stiggins (2018)	Discussing problems students face in the feedback process and how teachers can respond to these problems	Student worksheets: *Understanding and implementing feedback, My learning goals*

(Continued)

TABLE 1 (Continued)

Module	Learning objectives	Instructional focus	Theoretical/ empirical grounding	Activities	Materials
(5) Feedback in larger learning groups	Teachers understand that feedback on writing can be implemented in various ways. Including peers in the feedback process, using rubrics, model texts, or modeling provides feasible possibilities to incorporate evidence-based feedback to writing practices time-efficiently in larger learning groups.	Working with rubrics	Rezaei and Lovorn (2010), Panadero and Jonsson (2013), and Lipnevich et al. (2014)	Providing feedback to deep- and surface-level features in students' texts using rubrics	Rubrics for teacher feedback on argumentative writing
		Peer feedback	Cho and MacArthur (2011), Panadero et al. (2018), and van Zundert et al. (2010)	Discussing the relevance of criteria for peer feedback on writing	Student worksheets: *Two stars and a wish*, *Text magnifying glass*
		Working with model texts	Hillocks (1984), Martínez Esteban and Roca de Larios (2010), and Lin-Siegler et al. (2015)	Analyzing exemplary work with model texts in class Formulating task instructions for working with model texts	Class recording
		Modeling of the writing process	Regan and Berkeley (2012) and Graham et al. (2016)	Analyzing exemplary modeling of text revision	Class recording

3.6. Data analysis

To examine differences in students' writing scores, affective-motivational variables, and feedback perceptions between T1 and T2, we calculated paired t-tests using SPSS v.26. Drawing on Cohen (1988), we calculated effect sizes by dividing the mean difference by the standard deviation of the difference $d = \frac{mean_D}{SD_D}$ and interpreted effect sizes of $d \geq 0.2$ as generally small, $d \geq 0.5$ as medium, and $d \geq 0.8$ as large effect sizes for *t*-tests. In addition, we conducted multiple regression analyses to explore the predictive validity of affective-motivational variables and feedback perceptions for writing competence at T2 when controlling for students' writing scores at T1 and cognitive ability.

4. Results

4.1. RQ1: Are there changes in students' perceptions of feedback and affective-motivational variables from T1 to T2?

4.1.1. Feedback perceptions

On average, we observed moderate values among students' questionnaire data; that is, the mean values were centered around the midpoint of the scales. Students perceived teachers' *general feedback quality* as moderately positive both at T1 and T2 (see Table 3). A *t*-test showed a significant difference between both time points with a small effect [$d = 0.43$], indicating an increase in the perceived *general feedback quality* after teachers participated in the PLI (see Figure 2). Students also perceived teachers' *text feedback* to be moderately positive, but they perceived feedback to be less beneficial for their *writing motivation* in terms of enjoyment of writing. T-tests showed no significant differences between students' perceptions before and after the PLI regarding these two scales.

4.1.2. Affective-motivational variables

Students indicated they were moderately self-efficacious in evaluating and revising their texts. A *t*-test showed a significant increase in students' self-efficacy after the PLI with a small effect size [$d = 0.28$] (see Figure 2). The lowest values were found in the items on writing anxiety, with the scale mean values at both time points being minimally below the scale mean. Although differences between T1 and T2 were not very pronounced, t-tests showed a significant decrease with a small effect size [$d = -0.35$].

4.2. RQ2: Are there changes in text quality from T1 to T2?

Our analysis shows that students struggled with establishing text structure and coherence at both time points (see Table 4). Only 7.2% of students reached half of the maximum score for *structure* at T1, and even fewer students (3.8%) did so at T2. We identified an introduction in only 9.4% of students' texts at T1 and 7.5% at T2. Moreover, only 22.6% of students wrote a conclusion at T1 and 28.3% at T2. Paragraph breaks were also largely missing at both T1 and T2.

Regarding *coherence*, 47.9% of students reached half of the maximum score at T1, but only 35.9% did so at T2. While most of the students' texts (T1: 81.1%, T2: 84.9%) stated their position concerning the statement prompt at the beginning of their texts and most texts (T1: 67.9%, T2: 60.4%) also referred back to this thesis in the main body, only a few students (T1 + T2: 15.1%) returned to their thesis at the end of their texts. Most students provided arguments for their thesis (T1: 84.9%, T2: 86.8%), with a total of two arguments appearing most frequently in students' texts at T1 (37.7%) and T2 (39.6%). However, students mostly failed to elaborate on their arguments, with examples present in less than half of the students' texts (T1: 47.2%, T2: 39.6%). Regarding the common thread, ideas were at least loosely connected in most argumentative texts (T1: 84.9%, T2: 77.4%). However, students widely failed to use linking words correctly. Students often picked up new thoughts unexpectedly, and they logically connected their ideas in a broad common thread in only 24.5

TABLE 2 Overview of scales on perceptions of feedback and affective-motivational variables.

Scale (number of items)	Sample items	Internal consistency Cronbach's α	
		T1	T2
Self-efficacy for evaluating and revising texts (4)	When I write a text in English, I am able to revise the text on my own.	0.86	0.79
Writing anxiety (9)	I usually feel tense when I write English compositions.	0.74	0.79
Perceived general feedback quality (5)	In English class, I learn how to improve what I am not yet very good at.	0.76	0.78
Perceived effect of text feedback (5)	The feedback on my text shows me if I need to prepare better.	0.87	0.83
Perceived effect of feedback on writing motivation (5)	The feedback makes me want to work on more writing tasks.	0.69	0.78

Scales were based on six-point Likert scales: (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) somewhat agree, (5) agree, and (6) strongly agree.

TABLE 3 Students' perceptions of teacher feedback, self-efficacy for evaluating and revising texts, and writing anxiety: means and standard deviations at T1 and T2.

	T1	T2					95% CI		
	M (SD)	*M (SD)*	Δ	*t*	*df*	*Sig.*	Lower	Upper	Cohen's *d*
Perceived general feedback quality	4.17 (0.70)	4.52 (0.73)	0.35	3.099	52	0.003	−0.57	−0.12	0.43
Perceived effect of text feedback	4.55 (0.93)	4.57 (0.80)	0.02	0.229	51	0.820	−0.25	0.20	0.03
Perceived effect of feedback on writing motivation	3.75 (1.00)	3.78 (0.87)	0.03	0.213	51	0.832	−0.31	0.25	0.03
Self-efficacy for evaluating and revising texts	3.78 (1.00)	4.05 (0.78)	0.27	2.059	52	0.044	−0.53	−0.01	0.28
Writing anxiety	3.36 (0.83)	3.13 (0.94)	−0.23	−2.488	50	0.016	0.05	0.42	−0.35

Min: 1; max: 6. Significant differences between T1 and T2 are highlighted in gray.

and 18.9% of the argumentative texts at T1 and T2, respectively. Thus, students had problems establishing structure and coherence in their texts at both T1 and T2, and *t*-tests confirmed no significant difference between the two time points.

4.3. RQ3: Are feedback perceptions and affective-motivational variables predictors of text quality?

We calculated Pearson correlations to investigate the relationship between all variables (see Table 5). There were no significant correlations between feedback perceptions and text quality at T1. However, at T2, we found medium positive correlations between text quality and not only the perceived *general feedback quality* ($r = 0.422$, $p = 0.002$) but also the perceived *effect of text feedback* ($r = 0.451$, $p < 0.001$), and the perceived *effect of feedback on writing motivation* ($r = 0.488$, $p < 0.001$). That is, the extent to which students perceived they received not only feed up, feed back, and feed forward (*general feedback quality*), but also feedback on writing that helped them identify whether they should prepare better (*effect of text feedback*) and made them enjoy writing (*effect of feedback on writing motivation*) was correlated with students' text quality at T2. Contrary to our expectation, self-efficacy and writing anxiety were not significantly correlated with text quality either at T1 nor T2.

In a multiple regression analysis, we included feedback perceptions, self-efficacy, and writing anxiety to find out to what extent they predicted text quality when controlling for cognitive abilities. All assumptions for multiple regression analysis were met.

As a lack of significant correlations between variables at T1 indicated, the variables mentioned could not significantly predict students' writing at T1 [$F(6, 44) = 1.485$, $p = 0.206$]. Yet at T2 our Model 1 was significant [$F(6, 43) = 9.199$, $p < 0.001$] (see Table 6) and *general feedback quality* ($\beta = 0.502$, $p < 0.001$), the perceived *effect of feedback on writing motivation* ($\beta = 0.368$, $p = 0.009$), and students' general cognitive abilities ($\beta = 0.345$, $p = 0.003$) made significant contributions. Surprisingly, however, students' self-efficacy and writing anxiety made no significant contribution to the model; neither did the perceived *effect of text feedback*. In total, Model 1 explained 56% of the variance in students' writing at T2. When adding students' writing scores at T1 as another controlling variable in Model 2, the regression coefficients of students' perceived *general feedback quality* and the perceived *effect of text feedback* remained similar. In Model 2, students' perceived *general feedback quality* ($\beta = 0.411$, $p < 0.001$), the

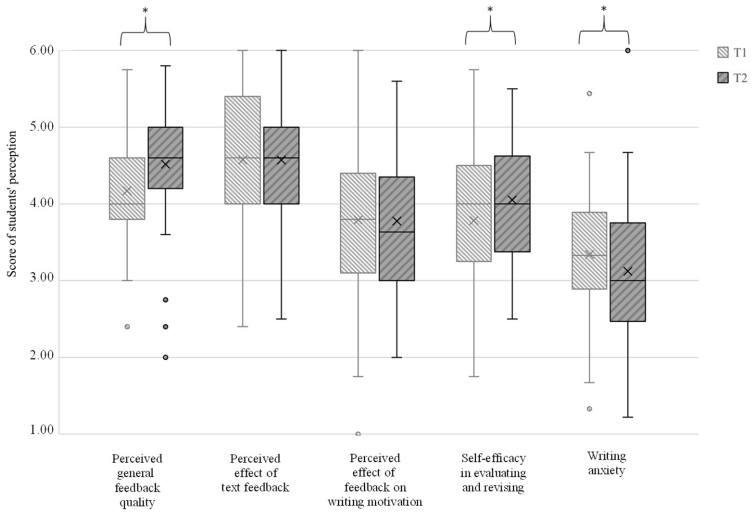

FIGURE 2
Students' perceptions of teacher feedback, their self-efficacy for evaluating and revising texts, and writing anxiety. Lines in the boxes represent median scores, and the crosses represent mean scores; boxes range from the 25th to the 75th percentile; vertical lines range from the minimum to the maximum score, with the symbol ° representing outliers.

TABLE 4 Performance on an argumentative writing task: means and standard deviations at T1 and T2.

	T1	T2					95% CI		
	M (SD)	*M (SD)*	Δ	*t*	*df*	*Sig.*	Lower	Upper	Cohen's *d*
Structure score (max.: 8)	1.43 (1.10)	1.51 (1.01)	0.08	−0.504	52	0.616	−0.38	0.22	−0.07
Coherence score (max.: 9)	4.13 (1.73)	3.94 (1.17)	−0.19	0.882	52	0.382	−0.24	0.62	0.12
Total score (max.: 17)	5.64 (2.40)	5.45 (2.28)	−0.19	0.653	52	0.587	−0.39	0.77	0.09

perceived *effect of feedback on writing motivation* ($\beta = 0.328$, $p = 0.007$), and text quality at T1 ($\beta = 0.387$, $p < 0.001$) significantly predicted students' writing score at T2. In contrast to Model 1, general cognitive abilities did not significantly predict students' writing in Model 2, while students' perceived *effect of text feedback*, self-efficacy in evaluating and revising, and writing anxiety still made no significant contribution to the model. Overall, Model 2 explained 68% of the variance in students' writing scores at T2.

5. Discussion

Our study first compared secondary EFL students' argumentative text quality, feedback perceptions, as well as self-efficacy and writing anxiety before (T1), and 8 months after teachers participated in a professional learning intervention (PLI) on how to provide effective and motivating text feedback (T2). Second, we analyzed to what extent feedback perceptions, self-efficacy, and writing anxiety accounted for variance in students' text quality.

Regarding students' perceptions of teacher feedback (RQ1), at T1 and T2, students perceived teachers' *text feedback* to be moderately positive, but they perceived feedback to be less beneficial for their *writing motivation* in terms of enjoyment of writing with no differences between the two time points. However, students reported teachers' *general feedback quality* (based on the feedback model of Hattie and Timperley, 2007) to be better after the PLI than before, thus partially confirming our hypothesis (H1a).

Looking at affective-motivational variables related to writing, we found that students' self-efficacy in evaluating and revising was high and further increased from T1 to T2, while their writing anxiety decreased significantly. Therefore, our hypothesis was confirmed (H1b). We emphasized the role of regular writing activities and praise related to specific aspects of students' work and progress in our PLI, therefore, teachers possibly focused on a combination of providing opportunities to gain mastery experience and social persuasion to enhance students' writing self-efficacy which resulted in increased writing self-efficacy (see Bandura, 1997; Pajares et al., 2007). However, students' high self-efficacy beliefs do not align with their text quality as measured in our study, indicating low calibration between beliefs and performance also observed in other studies (Schunk and Usher, 2012; Schunk and DiBenedetto, 2016; Chen and Zhang, 2019), which may particularly affect less proficient writers (Graham et al., 1993; Anastasiou and Michail, 2013; Busse et al., in press). In general, however, while feedback should help students make self-evaluative

TABLE 5 Pearson correlations between students' feedback perceptions, affective-motivational variables related to writing and their text quality at T1 and T2.

		1	2	3	4	5	6	7
1	Perceived general feedback quality	0.352**	0.368**	0.021	0.496**	−0.189	0.103	0.422**
2	Perceived effect of text feedback	0.556**	0.558**	0.596**	0.319*	−0.134	0.306*	0.451**
3	Perceived effect of feedback on writing motivation	0.123	0.344*	0.439**	0.128	−0.199	0.319*	0.488**
4	Self-efficacy for evaluating and revising texts	0.284*	0.389**	0.211	0.453**	−0.259*	0.147	0.146
5	Writing anxiety	−0.122	−0.089	−0.041	−0.462**	0.707**	−0.119	−0.255
6	General cognitive abilities [a]	−0.049	0.204	0.147	0.096	−0.172	–	0.465**
7	Argumentative writing score (deep-level)	−0.048	0.016	−0.045	0.059	−0.070	0.398**	0.597**

The lower left cells show correlations for T1, the upper right cells highlighted in light gray show correlations for T2, correlations between T1 and T2 are displayed on the diagonal line highlighted in dark gray. [a] We only assessed students' general cognitive abilities at T1. *$p < 0.05$. **$p < 0.01$.

TABLE 6 Regression coefficients for argumentative writing score (structure and coherence) at T2.

	Model 1			Model 2		
	Regression coefficients *b*	Standard errors (*b*)	Standardized regression coefficients *β*	Regression coefficients *b*	Standard errors (*b*)	Standardized regression coefficients *β*
Intercept	−5.412*	2.296		−4.869*	1.986	
Perceived general feedback quality	1.561***	0.390	0.502	1.279***	0.344	0.411
Perceived effect of text feedback	0.084	0.404	0.030	0.191	0.349	0.067
Perceived effect of feedback on writing motivation	0.963**	0.350	0.368	0.859*	0.303	0.328
Self-efficacy for evaluating and revising texts	−0.593	0.349	−0.206	−0.568	0.302	−0.198
Writing anxiety	−0.204	0.264	−0.083	−0.315	0.229	−0.128
General cognitive abilities	0.072**	0.022	0.345	0.040	0.021	0.193
Argumentative writing score at T1	–			0.381***	0.096	0.387
R^2	0.56			0.68		

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

judgments (Carless and Winstone, 2020), it can be assumed that higher self-efficacy and lower writing anxiety are beneficial for further writing development (Camacho et al., 2021). Considering that studies also indicate that students' self-efficacy in writing only improves if feed up, feed back, and feed forward are equally distributed (Duijnhouwer et al., 2012; Zarrinabadi and Rezazadeh, 2020), future studies should further investigate the relationship between these aspects of feedback and affective-motivational variables.

Students' ability to write well-structured and coherent texts (RQ2) was relatively low at T1 (see also Siekmann et al., 2022) and did not improve over the course of 8 months despite the feedback intervention. Therefore, our hypothesis (H2) was not confirmed. Our results thus contradict older studies reporting improvement in students' texts quality in Year 9 (Harsch and Schröder, 2008; Schoonen et al., 2011). However, in these studies different measurements were applied to assess writing competence. Although our results are of concern and suggest that even more support is needed to help students in EFL text composition, it is also imperative to contextualize our findings. For example, it may take time for teachers to transfer and implement fully the feedback practices learned in the PLI (see also Brooks et al., 2021) to actually improve students' writing. One may also consider that feedback implementation coincided with pandemic-induced partial and full home learning. Indeed, other studies reported learning losses in writing during the pandemic (see the overview by Helm et al.,

2021). Therefore, our results could be interpreted, tentatively, as indicating that teacher feedback may have counteracted a loss in terms of writing performance. This would tie in with other studies indicating that feedback may be imperative in times of pandemic-induced school closures to promote students' writing (see Jiang and Yu, 2021). Irrespective, future studies are needed to explore to what extent stagnating literacy can be attributed to the exceptional learning circumstances caused by COVID-19 or whether the plateauing observed was rather an indicator of little development in text composition in general.

Regarding the effect of feedback perceptions, self-efficacy, and writing anxiety on students' text quality (RQ3), we found differing results between the two time points. While students' feedback perceptions and text quality were not correlated at T1, we observed medium correlations at T2. In contrast, neither self-efficacy nor writing anxiety correlated with text quality at T1 or T2, thus contradicting other studies showing significant relationships between writing achievement and self-efficacy (see the meta-analysis by Sun et al., 2021) or writing anxiety (Tahmouresi and Papi, 2021). Accordingly, feedback perceptions, self-efficacy in evaluating and revising, and writing anxiety did not predict students' text quality at T1.

At T2, we similarly found that writing self-efficacy and writing anxiety did not contribute to students' text quality. Therefore, our hypothesis (H3a) was not confirmed. Missing associations of writing self-efficacy with text quality might be explained by the fact that students' writing self-efficacy and their performance were mismatched in our sample. While students perceived themselves to be capable of evaluating and revising their texts, their performance data revealed an illusion of competence (Kruger and Dunning, 1999). Missing associations between writing anxiety and performance may be related to the fact that students in our sample displayed only moderate levels of anxiety, while high levels of anxiety were particularly found to be indicative for students' writing performance (for similar results see Han and Hiver, 2018; Busse et al., in press). However, students' perceived *general feedback quality* and the perceived *effect of feedback on writing motivation* significantly predicted text quality at T2 after controlling for students' general cognitive abilities. These effects remained stable even after controlling for students' T1 text quality scores. Therefore, our hypothesis was confirmed (H3b). It should be noted that the effect of cognitive abilities diminished when adding students' text quality from T1 as another controlling variable. Thus, our findings indicate that students' cognitive abilities might not be as robust a predictor of EFL writing development as shown in other studies (see Köller et al., 2019) but rather students' previous writing quality may be a better predictor.

While further studies including control groups are needed to corroborate our findings, our study suggests that feedback that provides transparency regarding learning goals, information about students' performance, and feed forward that closes the gap between students' level of performance and learning goals, plays an essential role for students' text development (see also Parr and Timperley, 2010; Gadd and Parr, 2017). Although FL enjoyment and achievement in general may not be associated (Li et al., 2020), writing enjoyment can be related to student achievements (Zumbrunn et al., 2019) and be predictive for EFL students' text quality if enjoyment is fostered through teacher feedback. Our results thus underline that students' perceived usefulness of feedback is associated with student achievement (Brooks et al., 2021) and that teachers might pay particular attention to the motivational impact of feedback to facilitate student uptake (Carless and Winstone, 2020). Arguably, there may also be mediating effects of feedback perceptions on affective-motivational variables for students' text quality which future studies with larger sample sizes could further explore.

Certainly, there are other limitations to our study that must also be acknowledged. Our study's major limitation is that the intervention period coincided with pandemic-induced partial and full home learning. The latter resulted in less shared class time and a drop-out of our control groups. The increased pandemic-induced demands also explained why teachers stopped documenting their writing and feedback practices in the project logbook. Thus, it is uncertain to what extent teachers implemented feedback and used material from the PLI as envisioned by the research team. Although no direct evidence on teachers' feedback practices is available, additional questionnaire data collected from the teachers after the PLI indicated that teachers perceived the feedback methods discussed as valid and practicable for fostering students' writing in everyday EFL teaching (Siekmann et al., 2022). In future studies, researchers might wish to collect additional information through classroom observations, considering different aspects of feedback. Another limitation is the length of the PLI (a 2-day workshop) which is, admittedly, a short time for teachers to learn about feedback literacy and how to sustainably implement PLI content in class (see Jesson and Parr, 2019; Lee, 2021). However, the length of the PLI is also shaped by a systemic problem in German professional learning. Although PL courses are mandatory for teachers, only a few federal states require evidence of attendance, which can influence participation in PL courses (Kuschel et al., 2020). Teachers' further work involvement, disengagement, and perceived quality of PL also negatively affect participation in PL courses (Richter et al., 2018). Therefore, to make PL courses more attractive, it is advisable to offer them in a condensed form. Nevertheless, it is still promising that despite the brevity of the PLI, we observed that the predictive power of feedback for text quality was substantial after teachers attended the PLI indicating that the feedback content provided helpful input for participating teachers.

Lastly, in this paper we focused on coherence and structure and did not explore changes in surface-level features although these are also part of overall text quality. As we also addressed feedback on these features in the PLI, we acknowledge that teachers may have provided feedback on these features as well which we did not capture with our writing measures. To address this limitation, we currently also explore surface-level features in students' texts. With regard to the lack of research addressing feedback on deep-level features, however, our study offers valuable insights into an under-represented topic and highlights the need to examine the influence of feedback on deep-level features in more detail, in terms of both research and practice.

6. Conclusion

The study responds to the paucity of research on EFL writing among secondary students, particularly regarding text deep-level features and affective-motivational variables related to writing. Our data suggest that feedback perceptions play an important role for students' writing. Feedback perceived to adhere to quality criteria by providing information on learning goals (feed up), progress (feed back), and further improvement (feed forward) was positively related

to students' text quality which ties in with findings by Brooks et al. (2021). Interestingly, students' writing self-efficacy and anxiety did not predict text quality, which could be related to the fact that we also found a mismatch between writing self-efficacy and actual text quality in our sample of less proficient EFL writers. Yet feedback perceived as motivating was positively associated with students' text quality. Thus, our findings suggest that future research should further investigate the value of high-quality motivating feedback. We also advocate raising practitioners' awareness of the necessity to provide information on learning goals, progress, and further improvement (Hattie and Timperley, 2007) and the motivational power of feedback (Carless and Winstone, 2020), particularly when working with less proficient writers.

Data availability statement

The datasets presented in this article are not readily available because the authors do not have permission to share data. Requests to access the datasets should be directed to leasiekmann@uni-muenster.de.

Ethics statement

The studies involving human participants were reviewed and approved by the Local Ethics Committee of Department 5 of the University of Koblenz-Landau. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

VB conceived the project and supervised the study. JP served as an external advisor. VB, JP, and LS jointly contributed to final design of the study. LS executed the study, conducted the PLI, collected the data, organized the database, performed the statistical analysis, and wrote the first draft of the manuscript. VB and JP contributed to manuscript revision. SV advised on statistical analyses. All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Dialogic literary argumentation and close reading: effects on high school students' literature-related argumentative writing and motivational beliefs

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Given evidence that adolescent students' motivation to read and write about literature declines with age, we proffer an approach called dialogic literary argumentation (DLA) that asks students to explore literature through argumentation in pursuit of understanding the meanings and possibilities of being human. This quasi-experimental study compared the effectiveness of DLA with close reading (CR), a common approach to teaching literature in high school English language arts classrooms, in improving students' motivational beliefs about writing and literature-related argumentative writing. The study also examined how the links between motivational beliefs and argumentative writing performance varied by instructional contexts. Participants were 278 high school students in 14 classrooms across 8 public high schools. Classrooms of students received either DLA or CR throughout the academic year. While both the DLA and CR groups improved in literature-related argumentative writing, the DLA group demonstrated more growth than the CR group. Neither group exhibited changes in motivational beliefs. However, at the end of the year, both DLA and CR students' transactional writer beliefs were predictive of writing self-efficacy. Transmissional writer beliefs negatively correlated with argumentative writing in the CR group and had a null relationship in the DLA group. Overall, motivational beliefs and argumentative writing were more positively correlated in the DLA group than the CR group after the intervention. We posit that the argumentative elements unique to DLA may act to protect students from the negative impacts of transmissional beliefs. Our findings provide theoretical explanations and pedagogical recommendations on how DLA and CR can be jointly employed to heighten students' motivation and strengthen their argumentative writing competence.

KEYWORDS

close reading, dialogic literary argumentation, writer beliefs, writing self-efficacy, literature-related argumentative writing

Introduction

Although conceptualized differently according to discipline or theoretical framing, common features of argumentative writing often include a well-reasoned claim, with relevant evidence, warrants, and occasionally counterarguments, or rebuttals (Toulmin, 1958). Teachers, scholars and other professional educators have viewed argumentation and argumentative writing as an important literacy skill and academic practice necessary for students to become part of a

democratic citizenry. Specifically, the teaching and learning of argumentative writing is important to study in part because it is an academic and practical life skill students will repeatedly make use of in and out of schooling (Graham and Perin, 2007; Shanahan and Shanahan, 2008).

Reviews of research and the experiences of teachers and scholars alike have revealed that the dominant approach to teaching and learning argumentative writing in US schools consists of slotting information into preexisting forms of the Toulmin elements (Hillocks, 2005; Newell et al., 2011; Campbell and Latimer, 2012). Writing scholars have argued that this dominant model may limit writers (DeStigter, 2015) or promote binary thinking (Newell et al., 2015). Perhaps because the approach is driven by test-preparation rather than as a way to communicate ideas to a reader, many high school students do not feel motivated or confident to write (Pajares et al., 2007). Research further suggests that adolescent students' writing motivation and their relationships with writing performance decline over the school years (Boscolo and Gelati, 2019; Camacho et al., 2021). This decline is concerning because writing motivation beliefs play an influential role in the quality and amount of writing produced (Troia et al., 2013; Graham et al., 2017). Unfortunately, little instructional time is devoted to teaching writing in elementary (Gilbert and Graham, 2010) or high school (Applebee and Langer, 2013), making it more difficult for teachers and researchers to address these concerns.

Our scholarly interest is focused on secondary English language arts (ELA) classrooms, a content area in US secondary schools focused on reading and writing with a large focus on literary texts (Applebee, 1993). The teaching of literature is defined not only by the choice of texts to teach but equally important are questions regarding what teachers do to support and guide students' readings of those texts and how they assess what students have learned. A reading of, say, a Langston Hughes poem that raises students' experiences with unfairness and racism is a very different reading from the same poem that focuses on reading comprehension or techniques of literary analysis.

The most recent 2019 National Assessment of Educational Progress (NAEP) included results for grades 4, 8 and 12 showed that the average literary text comprehension score was lower in 2019 than in 2015 overall. Perhaps just as concerning is the seeming decline in motivation to read literature. In 2019, 26% of all twelfth graders in the nation reported that they never read stories or novels, and 51% of twelfth graders reported that they never read poems outside of school. Larger percentages of lower-performing students (below the 25th percentile) than higher-performing students (at or above the 75th percentile) reported never reading these types of literary texts.

Dialogic literary argumentation (DLA) and close reading (CR) stand in as potential answers to this educational quandary. Built upon our research over the past 15 years (Newell et al., 2015, 2018; Bloome et al., 2020), DLA was developed as a framework for the teaching, learning, reading, and writing about literature. It asks students to read and write about literary texts with an open mind and to engage in dialogue with others using the literature they have read to explore what it means to be human. DLA begins with the assumption that the role of dialogic argumentation as a social practice is to shape students' and teachers' understanding of literary texts, the human condition, and the complex social world. Research suggests that argumentation can increase engagement (Chinn et al., 2001), motivation (Chinn, 2006), and written arguments (Deane and Song, 2015), and theorizes that dialogic pedagogical approaches can lead to increased student motivation (Matusov, 2009).

The most recent study of literature instruction in US secondary schools, revealed that close reading (CR) is a common practice in high school classrooms (Applebee, 1993). Although defined differently across studies and pedagogical approaches (Catterson and Pearson, 2017), CR has the potential to improve student writing (Dollins, 2016). For our purposes, we follow Brown and Kappes (2012, p. 2) and the Aspen Institute to define CR as "an investigation of a short piece of text, with multiple readings done over multiple instructional lessons."

However, our interest in the effectiveness of CR and DLA is not concerned with assessing which "works better" but to consider how they may be employed jointly to motivate students and to deepen their ways of responding to and understanding issues, ideas and themes in literary texts. To our best knowledge, research that integrates DLA and CR has not been done to this day. Note too that we agree with Catterson and Pearson (2017) that despite all the talk and concern about close reading, "[research] findings lack the sort of specificity needed to make precise pedagogical recommendations" (p. 470). We see our work as a single step in the direction of their suggestion and for good reason.

Our study examines the relationships between motivational beliefs about writing and literature-related argumentative writing in high school English language arts classrooms. We explore the effects of DLA on high school students' motivation to write and performance on argumentative writing in comparison to an active control-comparison approach called CR. Our central hypothesis is that DLA would demonstrate added values to the CR approach based on its impacts on high school students' motivational beliefs and literature-related argumentative writing. Specifically, compared to students who were taught using a CR approach, students receiving the DLA instruction would experience more positive changes in writing motivation and in their performances of literature-related argumentative writing, and demonstrate stronger linkages between writing motivation and the quality of argumentative writing. This study provides the first set of quantitative findings on the relative effectiveness of DLA instruction and close reading for students in high school ELA classrooms.

Research background

Dialogic literary argumentation

Dialogic Literary Argumentation (DLA) is a framework grounded in social practices and processes for teaching and learning to write literary arguments. This includes discovering and exploring complex ideas that values and that respects multiple perspectives, shifts social relationships from competitive to collaborative roles, and requires redefining knowledge as situated, multiple, and continuously evolving. Simply put, rather than positioning the teacher as transmitter and students as recipients of full formed literary interpretations, dialogue in DLA classrooms can take place with an open mind and take up argumentation as a social practice and process of learning with others and with literature (Seymour et al., 2020).

One way DLA seeks to foster a better understanding of the human condition and the text itself is by utilizing argumentation as an inquiry and learning strategy (Newell et al., 2015). Importantly, rather than

emphasizing argumentative writing as a way to demonstrate a final analytic performance of synthesizing texts and ideas, a tradition of writing-to-learn research has offered students an opportunity to think analytically and to learn about the content of writing through composing (Langer and Applebee, 1987; Scardamalia and Bereiter, 1987). The DLA approach reframes argumentation as less than a way to present full-formed ideas and more as arguing-to-learn in which students and teachers use argumentation as a social means for exploring and examining their social worlds (Newell et al., 2015).

As an approach to literature instruction, DLA has teachers take on a dialogic stance. Rather than taking on ideas blindly, students are encouraged to understand how their ideas exist in relation to others' ideas for the purposes of learning and understanding the world more fully. In addition, DLA requires students to have open conversations with differing, enriching perspectives about the text and its connections to their lives. The primary goal is to bring to their interactions textual evidence that includes the targeted literary texts as well as ideas from prior discussions, previously read literature and narratives from and about students' own experiences, as well as from their communities among others (Bloome et al., 2020).

While consensus may develop, it is not the goal of argumentation; the goal is to lead to "learning, growing, appreciating complexity, valuing diverse perspectives and experiences, and increasing acumen in arguing-to-learn are the goals" (Bloome et al., 2020, p. 38). This skill has always been important in a democratic society (Dewey, 1916), but it is particularly important today as society and politics become increasingly divided (Iyengar et al., 2012) and a majority of Americans have strong negative feelings toward those with different politics (Pew Research Center, 2022).

To develop a more informative dialectic, students engage in arguing to learn *via* a process of alternatively arguing (Newell et al., 2015). This is distinct from counterarguing because students are not aiming to win the argument; instead, alternative arguing is used to explore the text by adding layers of meaning and insight as students bring up new ideas in such a way that respects the text and recognizes the context of the individual (Bloome et al., 2020). For students to take up these meanings, they must engage with their peers' alternative theses of the text and its relation to their own lives. As such, argumentation as learning requires students to consider more complex, multi-perspectival definitions of knowledge often focusing on race, class, gender, and sexuality due to their prevalence in classical and contemporary literature as well as their relevance to students' everyday lives. This is designed to help them grow in their understanding that the human condition, including their own, is continuously changing [see (VanDerHeide et al., 2023) for a fuller explication of a DLA framework for teaching argumentative writing].

Close reading

Close reading (CR) has been given various definitions and has been associated with various interpretations regarding its value in taking readers deeply into the processes of responding to the text itself as the central influence on student learning and comprehending literature (Brown, 2013; Fisher and Frey, 2015). Additionally, teachers have a wide range of interpretations and applications of close reading in their classrooms (Brown, 2013; Fisher and Frey, 2015). Broadly speaking, CR involves multiple re-readings of a shorter text selection with each reading focusing on a different technical aspect to better help students understand what the text means (Shanahan, 2012). A narrower definition of CR focuses solely on driving students to focus on "understandings that can be derived from analysis of the relationships and patterns found, as some have described it, within the four corners of the page" (Beers and Probst, 2013, p. 34).

In the current study, we follow Brown and Kappes (2012) definition that defines CR as an investigation of a short piece of text using multiple instructional methods, such as text-based questions and discussion, attention to form, tone, imagery and/or rhetorical devices, and word choice and syntax. The goal of CR is to bring the text and the readers *close* together through paying "close attention to the relevant experience, thought, and memory of the reader; close attention to the responses and interpretations of other readers; and close attention to the interactions among those elements" (Beers and Probst, 2013, pp. 36–37). Beers and Probst (2013) list key features of close reading as accomplished through multiple re-readings of a short passage with an intense focus on the passage itself. Readers draw out subjective feelings and thoughts that eventually return to the text to explore the words, events, ideas, and connections of the elements in the passage that, through exploratory discussions, extend to other parts of the text.

Fisher and Frey (2014) recommend that multiple re-readings can be spaced out over several lessons as students analyze different aspects of the text with text-dependent questions. The first reading can be done for "big picture" ideas, the second should focus on specific lesson goals such as author's purpose or text structure. Subsequent re-readings should focus on shared read alouds whether the teacher models their thinking or on having students respond to text-dependent questions by locating evidence in the text. Text-dependent questions can be closed- or open-ended and are defined as questions where students meaningfully engage with the text to come up with an answer. These questions are scaffolded and can range from general comprehension questions to complex inference questions, and can even include opinion, arguments, and intertextual connection questions (Fisher and Frey, 2014).

The purpose behind this pedagogical choice is for students to draw meaning out of the text through the transaction between the reader and the text (Beers and Probst, 2013). To accomplish this, in close reading students should notice, question, and weigh things against their lives and the world. Beers and Probst developed signposts as a scaffolding strategy to allow students to independently conduct close reading of the text and to connect close reading to their own life experience, other texts, and world events. While students are able to do CR individually, over the course of a lesson they are also involved in dialogic conversations where they reflect, ask questions, and propose answers and explanations together. This can be fostered through carefully crafted text-dependent questions, answered through dialogic discussion with teachers and peers (Beers and Probst, 2015, p. 28–29). Discussion is seen as a key component of CR because it allows students to "engage in the interplay of ideas, some contradictory, that support reasoning" (Fisher and Frey, 2014).

The added values of DLA to CR

Both DLA and CR involve the use of student-oriented, teacher-guided discussions to help students analyze the text. Discussions are

centered around a key concept, question, or problem posed by the text. These discussions in DLA and CR tend to be more transactional than traditional lecture-based approaches to teaching and learning because they involve students' active participation in the dialogic process of understanding the world around them (Applebee et al., 2003). Teachers provide students with numerous opportunities to talk, maintaining an egalitarian social dynamic in the classroom. However, one instrumental distinction between DLA and CR is that CR does not intentionally incorporate argumentation into classroom discussions about the text. DLA's multi-perspectival approach encourages students to engage in arguing-to-learn where students support their arguments with claims, evidence, and warrants under the assumption that their argument will continuously change through engaging in dialogue with others (Bloome et al., 2020). Another key distinction is how the text is considered in each framework. Unlike CR, DLA does not view literary texts as worthy of study in and of themselves. Specifically, DLA views texts as "argumentative props" (Seymour et al., 2020, p. 29). Rather than a rejection of the text itself, however, DLA emphasizes the flexibility of how teachers and students might read and use literary texts to engage in their social worlds. Here the value of using literature as an argumentative prop opens the possibilities for students of differing experiences and perspectives. In this way, argumentation and argumentative writing become ways of taking social action to deepen analysis of the text and to understand perspectives of others.

To engage students in literary argumentation, questions posed within a DLA classroom are not only open-ended but involve some level of conflict based on controversial or socially contested topics to increase students' engagement and motivation to consider multiple perspectives. Effectively engaging in these conversations and writings requires risk taking and trust by and between teachers and students (Seymour et al., 2020). Teachers take a risk by relinquishing a level of control and giving students the space to compose interpretations with depth and nuance. Students take a risk when they engage in argumentation because these the questions involve ambiguity and uncertainty. And even though the teacher is giving students freedom to have these conversations and compositions, students still need to trust that the teacher will provide ongoing support, beyond the initial prompt.

One way DLA teachers create an environment where these conversations and compositions are more likely to be successful is in fostering a class culture surrounding the arguing-to-learn approach that is supportive, understanding, and collaborative. Fostering an arguing-to-learn class culture where students are supportive, understanding, and collaborative plays a central role in increasing the success of these conversations and compositions. Without this, discussing controversial topics can become adversarial and rude, often creating a vicious cycle (Chiu and Khoo, 2003). DLA teachers address these concerns by embracing the tensions in order to more deeply explore them with others.

Another tangible difference between CR and DLA is that DLA has an explicit expectation that students will make connections to their daily lives as they explore what the text can reveal about the human condition, often using personally relevant topics such as race, class, gender, and sexuality as productive analytical lenses (Bloome et al., 2020). DLA's focus on the human condition and multiple perspectives helps students go beyond themselves and their own experiences by incorporating others' perspectives with their own leading to a more informative dialectic. This contrasts with CR's approach where students may use the text to connect to their own lives and world events (Beers and Probst, 2013) albeit, in a much more individualistic sense.

Motivational beliefs about writing

Although DLA has been developed through collaboration with over 60 teachers through 15 years of collaboration (Newell et al., 2015), research has yet to assess how, when, and why DLA may influence student motivation. Similarly, even though CR has been incorporated in the Common Core State Standards for over a decade (Hodge et al., 2020), CR has not been systematically studied, and individual empirical studies are difficult to find (Hinchman and Moore, 2013). Any effects CR may have on student motivation are largely understudied, despite some anecdotal evidence or theoretical arguments (Brown and Kappes, 2012). While neither DLA nor CR have been studied in regard to student motivation, both theoretically could influence student motivation.

According to Writer(s)-within-Community Model Graham (2018), motivational beliefs about writing include beliefs about the utility and value of writing, motives for writing, attitudes and interests towards writing, beliefs about writing successes or failures, self-efficacy for writing, reasons for writing, writer's identities, and beliefs about the communities in which writing occurs. Writing is simultaneously shaped by these motivational beliefs along with other cognitive capacities of individuals, as well as resources and capacities of the community. In the current study, we specifically focused on two types of motivational beliefs: self-efficacy for writing and argumentative writing, and writer's transactional and transmissional beliefs as a form of writers' identity. We chose to study writers' self-efficacy for writing and argumentative writing because it directly aligns with our study goal to enhance students' writing competence. It is also the most researched motivational belief in writing research, as reviewed below. We chose to study transmissional and transactional writer beliefs because the Dialogic Literary Argumentation instruction is centered on the social practice perspective that strongly aligns with the transactional writer beliefs. If students demonstrated a positive change in the writer's belief, it would strongly support the effectiveness of the DLA instruction.

Self-efficacy for writing is defined as a learner's perceived ability to write (Martinez et al., 2011; Bruning et al., 2013). It has been a strong predictor of self-regulation for writing (Zimmerman and Risemberg, 1997; Paul et al., 2021) and writing performance (Pajares, 2003; Bruning and Kauffman, 2016; Graham et al., 2017; Graham, 2018). According to the social cognitive theory (Bandura, 1977, 1997), students with high self-efficacy for writing are more likely to engage in cognitive and behavioral regulation processes of writing such as goal setting, monitoring and evaluating goal process, and creating effective environments that result in improved writing (Schunk and DiBenedetto, 2016). As the student continues to write, they receive self-feedback and external feedback on their progress; when they believe they are making positive progress, their self-efficacy increases and leads to better writing performance (Graham, 2018).

Despite the fruitful amount of evidence supporting the relationship between self-efficacy for writing and writing performance, few of the studies have examined whether such a relationship is genre specific.

Writing genres differ by their communicative goals, sociocultural practices, roles, and skills (Ravid and Tolchinsky, 2002). Narrative writing, for example, requires that the writer describes events with a focus on people and their actions (often in response to a crisis) that unfold over a period of time in specified locations. Argumentative writing focuses on making a reasoned, justified argument about an unresolved and oftentimes controversial issue. Among different genres of writing, argumentative writing has been considered a complex genre to teach and learn (Jagaiah et al., 2020). Differing rhetorical demands and purposes between writing genres raise a question about whether the association between self-efficacy and writing performance applies broadly across writing genres (Hidi et al., 2002). This motivated us to measure and triangulate between self-efficacy for writing (genre-general) and self-efficacy for argumentative writing (genre-specific) to identify any genre-specific patterns in our findings.

In addition to self-efficacy for writing, students' beliefs about writing, hereafter called writer beliefs, can influence their writing process and the writing outcome (Graham et al., 1993). Writer beliefs shape writer's actions (Pajares and Johnson, 1996). Two particular sets of writer beliefs that are the foci of our analysis are transmissional and transactional writer beliefs. Transmissional writer beliefs assume that meaning exists independently of the writer and writing is transmitted from sources of reading to the writer (Baaijen et al., 2014). Conversely, transactional beliefs assume that meaning is actively constructed by the writer (Schraw and Bruning, 1999). The two types of writer beliefs have been shown to orthogonally relate to each other (Mateos et al., 2011), suggesting that each of the beliefs can independently shape students' understanding of their roles as the writer in an instructional context, orienting them to approach the tasks of writing in particular ways (White and Bruning, 2005).

As transmissional writer beliefs encourage students to view meaning as external, such beliefs tacitly encourage writers to passively engage with writing with lower levels of affective and cognitive engagement (White and Bruning, 2005). High transmissional writer beliefs have been associated with prioritizing "objective" facts without the writer expressing their own point of view, putting the writer in a bind as it becomes more difficult to express their own thoughts (Baaijen et al., 2014). Affectively, transmissional writing beliefs have been associated with greater writing apprehension, grammar apprehension, and lower self-efficacy for writing (Sanders-Reio et al., 2014). In school, writers with high transmissional beliefs, who believe writing is about citing authorities, produced lower quality text than writers with low transmissional beliefs (Baaijen et al., 2014).

In contrast, high transactional beliefs have been associated with better writing quality than low transactional beliefs (White and Bruning, 2005). Students who have high transactional writer beliefs may be more intrinsically motivated to express their own ideas in writing arising from content learning, background knowledge, and through the process of revising (Baaijen et al., 2014). High transactional writer beliefs have been associated with greater levels of enjoyment, reduced writing apprehension in writing (Sanders-Reio et al., 2014) and higher self-efficacy for writing (White and Bruning, 2005).

The current study

In this study, high school students received either a DLA or a CR approach to teaching literature-related argumentative writing during their English language arts sessions throughout an academic year. The purpose of this study was to compare differences in motivational beliefs (writer beliefs and self-efficacy for writing) and literature-related argumentative writing performance, as well as the links between motivation and writing, between students in the DLA classrooms with students in the CR classrooms. We addressed two research questions. First, how do students in the DLA and CR classrooms differ in their writer beliefs, self-efficacy for writing and literature-related argumentative writing, and argumentative writing at the post-test, controlling for baseline differences and student characteristics (gender, grade level, academic track)? Second, at the end of the academic year, how do the relationships between motivational beliefs and literature-related argumentative writing differ between the DLA and CR groups, controlling for gender, grade level, and academic track?

Our working hypotheses are that students taught using the DLA approach throughout the academic year would demonstrate higher transactional writer beliefs, lower transmissional writer beliefs, greater self-efficacy for writing/argumentative writing, and higher literature-related argumentative writing performance than students experiencing CR, showing the added values of DLA to CR. For the second research question, we hypothesize that literature-related argumentative writing performance would be positively correlated with self-efficacy for writing/argumentative writing and transactional writer beliefs, and negatively correlated with transmissional writer beliefs. Similarly, self-efficacy for writing/argumentative writing would be positively correlated with transactional writer beliefs and negatively correlated with transmissional writer beliefs. With the caution that our findings would be correlational and not causal, we explored the mediating role of self-efficacy for writing/argumentative writing between writer beliefs and literature-related argumentative writing performance. Since transactional writer beliefs are more aligned with DLA's design principles than transmissional writer beliefs, we predicted that transactional writer beliefs would be more correlated with self-efficacy for writing/argumentative writing and literature-related argumentative writing performance in the DLA group than in the CR group. The associations between transmissional writer beliefs, self-efficacy for writing/argumentative writing, and literature-related argumentative writing performance would be null or negative for both the DLA group and the CR group.

Methods

Participants

This quasi-experimental study was conducted during the piloting phase (Year 3) of a four-year project (2016–2017 school year) focusing on developing and implementing a principled approach to teaching and learning literature to effectively support students' literature-related argumentative writing. Participants included 278 high school students (47.1% female) in 14 classrooms (2 in 9th grade, 5 in 10th grade, 7 in 11th or 11th/12th grade) from eight schools across six school districts in the Midwestern United States. In terms of students' race and ethnicity, 63.7% ($n = 177$) of the students were White, 12.6% ($n = 35$) were Black, 2.5% ($n = 7$) were Asian, 2.2% ($n = 6$) were Hispanic, 1.4% ($n = 4$) were Native Hawaiian or Pacific Islanders, 7.6% ($n = 21$) were multi-racial, and 10.1% ($n = 28$) were missing. About

5.8% of students reported speaking languages other than English at home. Five of the classrooms were Advanced Placement (AP) classrooms focusing on either literature or written composition, while the other classrooms were "college preparation" (CP) academic level classrooms. The 14 teachers were selected based on recommendations by building principals, their respective English department chairs, and university-based teacher education professionals.

Study design and procedure

Prior to the quasi-experimental study, during school years 2014–2015 and 2015–2016 we carried out multiple design-based research and development projects based on the principles and practices of social practice theory (Gee, 1990; Street, 1993; Newell et al., 2015) with 13 collaborating teachers across Year 1 and Year 2 to iteratively design, refine, and adapt a feasible and effective intervention on literature related argumentative writing that we refer to as a "Dialogic Literary Argumentation" approach. In summer 2014, summer 2015, and summer 2016 during Summer Workshops, in collaboration with ELA high school teachers we developed exemplary curricular units, including formative assessments for high school ELA classrooms. We also met with these teachers monthly to not only articulate their developing approaches to literature-related argumentative writing but also to garner support for some of the challenges they face in introducing argumentation into the study of literature.

During school year 2016–2017 we collected more formal, pilot study data to determine whether the Dialogic Literary Argumentation intervention was operating as intended to change students' learning opportunities and outcomes, with particular concern for high quality performance of literature-related argumentative writing. Eight teachers were recruited to participate in the DLA group, and six teachers in the CR group. During summer 2016 we held separate teacher workshops for the DLA and CR groups. During the workshop with the DLA teachers, we reviewed the principles of the curricular intervention and then asked the teachers to develop ideas for instructional plans shaped by those principles. During the workshop with the CR teachers, we reviewed the principles of close reading based on the conceptualization proffered by Beers and Probst (2013) and engaged them in practicing the uses of "signposts" or moves fiction authors make in literary texts taught in middle school and high school language arts classrooms.

During the Summer Workshops, we also met with teachers from both groups individually to support curriculum plans for each teacher's target classroom. At the end of each workshop, the teachers and the research team met as each teacher presented his or her curriculum plan. We then met with all teachers in an additional meeting just before school districts opened for the 2016–2017 school year to discuss research procedures and design issues for implementation and observation of the enactment of the curriculum in each classroom.

By May 2017, we had met with all teachers and provided ongoing support in separate groups about 5 times with each meeting lasting about 90-min. At these teacher meetings we had each teacher report-out "how things are going." With the DLA group teachers, we also discussed two on-going ways to frame literary argumentation: learning to argue and arguing to learn with particular attention to how these ways of framing argumentation might evolve across the school year. We also studied how the DLA teachers enacted the principles and practices of our curricular intervention that we refer to as an "Dialogic Literary Argumentation" approach to ensure the inclusion of teachers' ideas in its formative development.

During CR teacher meetings, we discussed the transition from teaching students the signposts (Beers and Probst, 2013) of close reading (e.g., contrasts and contradictions, etc.,) to teaching students how to use the signposts as text-analytic tools for close reading of literature, centering on noticing and interpreting author's intentions, individuals' sense-making processes, and the structural aspects of argument/argumentation. At these meetings, each teacher reported-out "how things are going." In this way, the teachers not only articulated their developing approaches to close reading of literature but also garnered support for some of the challenges they faced in introducing close reading into the study of literature. We also discussed two on-going ways to frame close reading: learning the signpost of close reading and learning to use the signposts for close reading.

As an alternative to a fidelity measure of the 14 teachers' instruction, we conducted extensive classroom observations of the teachers across the 2016–2017 school year grounded in microethnographic discourse methods (Weyand et al., 2018). This approach allowed us to consider the teachers' instructional principles as grounded in either DLA or CR. Each teacher was observed by a field researcher. To ensure that the teachers in each condition relied on the instructional principles of either DLA or CR, the field researchers collaborated with their case study teachers in planning the instructional units. They observed each classroom several times (n = 63 observations across 8 DLA teachers; n = 44 observations across 6 CR teachers) to learn how those activities were carried out. These activities were planned as a school-university collaboration in which the various participants contributed their particular expertise to the ongoing work.

Measures

Each of the measures below were administered at the pre- and post-tests. Students were instructed to indicate how true each response was to them on a 5-point Likert scale (1 = not at all true, 5 = always true). Item reliability was reported using Cronbach's Alpha. To determine if the measures of writer beliefs and writing self-efficacy function comparably for the DLA and CR groups (in preparation for the multigroup analysis), we examined measurement invariance of writer beliefs and writing self-efficacy. Three types of measurement invariance were examined: configural invariance, metric invariance, and scalar invariance (van de Schoot et al., 2012). The measurement invariance test was conducted using the MODEL = CONFIGURAL METRIC SCALAR function under a multigroup confirmative factor analysis framework in Mplus. Based on the results of item reliability and measurement invariance tests, we identified reliable items and used them to compute composite scores of writer beliefs and writing self-efficacy for multiple regression and structural equation modeling analyses.

Writer beliefs

The writer beliefs scale was adopted from White and Bruning (2005). It consists of two subscales: transactional beliefs (9 items: "I

enjoy interpreting what I read in a personal way."; Pre-test α = 0.730, Post-test α = 0.802) and transmissional beliefs (10 items, "The main purpose of reading is to understand what the author says."; Pre-test α = 0.718, post-test α = 0.800). We removed redundant items based on modification indices and retained five items under each subscale. As shown in Table 1, the two-factor model with the final items resulted in fair to good model fits for the configural models at both pre- and post-tests (i.e., CFI > 0.90, RMSEA <0.08) (Yuan et al., 2016). The metric invariance models at the pre-test fit the data slightly better than the configural model (based on the increased CFI and the decreased RMSEA), and model fit indices were comparable between the metric and scalar invariance models. At the post-test, CFI and RMSEA did not change much ($\Delta CFI \leq 0.01$, $\Delta RMSEA \leq 0.015$) between the configural and metric invariance models and between the metric and scalar invariance models at the post-test. We therefore concluded the writer beliefs measure met the measurement invariance criteria. For the later analyses, we calculated the composite scores of transactional beliefs and transmissional beliefs based on the final items.

Self-efficacy for writing/argumentative writing

The self-efficacy for writing scale was adopted from Kaplan et al. (2009) and Prat-Sala and Redford (2010). It consists of two subscales: self-efficacy for writing (6 items: "I can compose a strong conclusion for an essay."; Pre-test α = 0.88, post-test α = 0.85) and self-efficacy for argumentative writing (5 items: "While writing an essay, I can think of evidence against contrasting ideas without using personal opinions."; Pre-test α = 0.82, post-test α = 0.80). As shown in Table 1, the two-factor writing self-efficacy model had a fair to good model fits for the configural models at both pre- and post-tests. CFI and RMSEA did not differ significantly between the configural, metric, and scalar models, suggesting that the two-factor writing self-efficacy measure met the measurement invariance criteria. Composite scores of self-efficacy for writing and self-efficacy for argumentative writing were calculated.

Literature-related argumentative writing

Two literature-related argumentative writing tasks were administered in the fall (September–October) and spring (April–May) of the 2016–2017 academic year. Each writing task required students to read a short fictional narrative and respond to a writing prompt that asked students to justify their interpretation of the literary text with a "well-crafted" argument. The order of the literary texts was fixed. At the pre-test, students read and argued about *The Story of an Hour* (Chopin, 1894/1976). The title of this story refers to the time elapsed between the moments at which the protagonist, Mrs. Mallard, hears that her husband is dead, and when she discovers that he is alive after all. After a quiet celebration, this turn of events leads to her sudden death, perhaps due to surprise and shock. At the post-test, students read and argued about the story of *War* (Pirandello, 1994/1918). War is set in a train carriage in Italy during World War 1. While their nation is at war with the Central Powers, the passengers worry about the loss of their sons. As the passengers describe their frustrations and anxieties, a man counters with the importance of patriotic sacrifice, but in doing so realizes his own sense of loss. Both stories were piloted during the development and field-testing phase of the project in Year 1 and Year 2. The stories were randomly distributed to a total of 307 students at the beginning of the academic year. Based on the scoring rubric described below, the student essays were scored by two professional raters who achieved a satisfactory inter-rater reliability (α = 0.80) based on 20% of the total essays. An analysis predicting students' beginning-of-the-year argumentative writing performance by story type suggested no significant story effect ($p = 0.21$).

TABLE 1 Fit statistics from a set of multigroup CFAs run on the items of writer beliefs and writing self-efficacy to evaluate measurement invariance.

Group of Models / Stage of MI evaluation	# of param	χ^2			CFI	RMSEA	Model comparison	ΔCFI	ΔRMSEA
		Est	*df*	*p*					
T1 writer beliefs									
Configural invariance	62	92.48	68	0.03	0.93	0.05			
Metric invariance	54	93.12	76	0.09	0.95	0.04	With configural	0.02	−0.01
Scalar invariance	46	102.80	84	0.08	0.95	0.04	With metric	<0.00	<0.00
T2 writer beliefs									
Configural invariance	62	89.55	68	0.04	0.96	0.05			
Metric invariance	54	103.88	76	0.02	0.95	0.06	With configural	−0.01	0.01
Scalar invariance	46	116.49	84	0.01	0.94	0.06	With metric	−0.01	<0.00
T1 writing self-efficacy									
Configural invariance	68	131.26	86	0.001	0.96	0.06			
Metric invariance	59	143.13	95	0.001	0.96	0.06	With configural	<0.00	<0.00
Scalar invariance	50	152.37	104	0.001	0.96	0.06	With metric	<0.00	<0.00
T2 writing self-efficacy									
Configural invariance	68	141.61	86	<0.001	0.94	0.08			
Metric invariance	59	162.04	95	<0.001	0.93	0.08	With configural	−0.01	<0.00
Scalar invariance	50	173.09	104	<0.001	0.92	0.08	With metric	−0.01	<0.00

T1 = Pre-test, T2 = Post-test.

TABLE 2 Scoring Rubric for the Literature-related Argumentative Writing Task.

8	7	6	5	4	3	2	1	Evaluation (0)
A sophisticated organizational framework is used to present the main arguments clearly and how the elements of arguments are related to one another. Interpretation and generalization that offers a thematic framing of the story with extensive, warranted and specific support from the text as well as other sources; multiple perspectives are considered; use of elaborated world knowledge and text evidence; may also include counter-claims that anticipate other interpretations.	A sophisticated organizational framework is used to present the main arguments clearly and how the elements of arguments are related to one another. Interpretation with extensive support that is warranted by and explained with elaborated detail from the text; may also include counter-claims that anticipate other interpretations.	An organizational framework is used to present the main arguments clearly and how the elements of arguments are related to one another. Interpretation with extensive support or evidence in the form of quotations or retelling of the story to support a claim.	A weak organizational framework makes it difficult to follow the arguments and how the elements of arguments are related to one another. Interpretation with some support or evidence in the form of quotations or retelling of the story to support a claim.	Lack of an identifiable organizational framework; A series of claims or warrants exists with minimal interpretations.	Retelling with elaborated details from the text with an interpretive tag.	Retelling with more elaborated details from the text.	Retelling with little elaboration.	Writer judges the quality of the work, character's behavior, idea or author's vision of the world; content may not relate to the prompt.

Assessment of literature-related argumentative writing

A primary trait scoring rubric for evaluating the quality of students' performance of a literary argument (Table 2) was developed based on Marshall (1987) and Newell (1994) studies of literary understanding and theories of argumentation (Toulmin, 1958). The rubric contained three levels of literary argumentation: evaluation, retelling, and interpretation. Evaluation refers to the writer's judgement of the quality of the work, character's behavior, idea ("War is always bad.") or author's vision of the world ("The author seems to think that all people are stupid.") without explanation or justification and was considered as an off-task response to the literary text. Retelling refers to the writer summarizing the text with or without interpretive tags (elements suggestive of interpretation without integrating it into the essay to make the interpretation significant or central to the meaning of the essay).

Depending on the extent to which students' retelling was elaborated by interpretive tags, the retelling level was further classified into three sub-levels, labeled as Level 1–3 in the rubric. Interpretation refers to the writer going beyond what is in the text to justify motivations for characters or the meaning of the unfolding plot and to interpret the writer/reader motives. A high quality literary interpretation contains (a) a sophisticated organizational framework, defined as an argument structure that allowed the reader to follow the presentation of claims, evidence, warrant, and reasons, as well as the writer's central claim and conclusions; (b) thematic framing, defined as a framework developed by the writer to make conceptual distinctions and to develop ideas that are key to what the writer wants to communicate, such as the theme of lost innocence, coping with loss, etc.; (c) multiple perspectives, referring to the writerly moves that rely on more than one point of view in understanding a character or theme or issue. Depending on how well the writer argued for his or her thematic framework and coordinated among multiple perspectives, the interpretation level was further classified into two sublevels (Level 7 and 8) based on the extent to which the three criteria were met. Essays that moved beyond retelling but did not satisfy the three criteria of interpretation were classified into Level 4, 5, or 6. These three intermediate sub-levels demonstrated the writer's potential to shift their literature-related argumentative writing from retelling to interpretation. Essays were evaluated independently by two professional raters blind to study condition. The two raters and the research team met twice to go through 10 randomly selected pre- and post-essays. Based on the discussions, the team modified the scoring rubrics and assigned another batch of randomly selected essays ($n = 38$, 15%) from the current data set to the two raters for inter-rater reliability check. Adequate inter-rater reliability (Krippendorff's $\alpha = 0.77$) was obtained, and disagreements were resolved through discussions.

Data analysis approaches

As shown in Table 3, the proportions of missing values in the key variables of the current study (i.e., argumentative writing performance, composites of self-efficacy for writing, composites of writing beliefs) ranged from 8.6 to 30.9%. The proportions of missing values in students' demographic variables ranged from 0 to 8.3%. Little's Missing Completely at Random test suggested that data were missing completely at random ($\chi^2_{(78)}=80.727$, $p = 0.394$). Even though the probability of missingness on a variable was unrelated to other measured variables and was unrelated to the variable with missing values itself, the maximum proportion of missing data for any variable was high (30.9%). To avoid producing biased results and to capitalize on all of the available information, we handled missing data using the Full Information Maximum Likelihood approach (FIML, Enders, 2001) in Mplus 8 (Muthén and Muthén, 1998/2017). The proportion of variance explained at the classroom level (i.e., intraclass coefficients) for argumentative writing and motivational beliefs ranged from 0 to 41%. However, the number of classrooms (i.e., level 2 clusters, $n = 14$) was not

10.3389/fpsyg.2023.1214773

TABLE 3 Means and standard deviations of writing motivation and argumentative writing performance.

Variable	Pre-test		Post-test	
	n	*M* (SD)	*n*	*M* (SD)
Dialogic literary argumentation (*n* = 155)				
Transactional writer beliefs	145	3.79 (0.54)	126	3.83 (0.63)
Transmissional writer beliefs	145	2.59 (0.67)	126	2.66 (0.75)
Self-efficacy for writing	145	3.63 (0.68)	126	3.59 (0.75)
Self-efficacy for argumentative writing	145	3.82 (0.67)	126	3.71 (0.69)
Argumentative writing performance	137	4.80 (1.73)	108	5.98 (1.63)
Close reading (*n* = 123)				
Transactional writer beliefs	109	3.76 (0.59)	97	3.80 (0.64)
Transmissional writer beliefs	109	2.69 (0.62)	97	2.75 (0.795)
Self-efficacy for writing	109	3.24 (0.82)	97	3.51 (0.69)
Self-efficacy for argumentative writing	109	3.47 (0.75)	96	3.65 (0.58)
Argumentative writing performance	107	4.77 (1.28)	84	5.29 (1.16)

sufficient for Mplus to provide trustworthy estimates and satisfactory model fit in a TYPE = TWOLEVEL model. To account for interdependency of the nested data, we used TYPE = COMPLEX under the ANALYSIS command in conjunction with CLUSTER = Classroom in the VARIABLE command in Mplus. These commends will correct standard error biases using a sandwich estimation procedure (Berger et al., 2017). In addition, we reported standardized β to provide an estimate of effect size. To address the first research question (how students in the DLA and CR classrooms differ in their argumentative writing and motivational beliefs), we conducted multiple regressions and corrected for biased standard errors using TYPE = COMPLEX and CLUSTER = CLASSROOM. Post-test outcomes were predicted by instructional approach (DLA vs. CR), controlling for pre-test outcomes, gender, grade level, and academic track. To address the second research question (how the relationships between motivational beliefs and argumentative writing differ between the DLA and CR groups at the post-test), we conducted multigroup structural equation modeling (SEM) to examine whether the model structure was the same across groups. In the multigroup SEM process, we first tested an unconstrained multigroup SEM to explore potential path coefficients that might be different between the DLA and CR groups. We then compared it with a constrained model in which all path coefficients were set to be equal between the two groups to test model invariance. Finally, based on the constrained model, we release one set of path coefficients and assessed changes in the model fit between the unconstrained model and the constrained model. For the multigroup SEM, we did not test measurement invariance because (a) measurement invariance had been confirmed at the item level (see the Measure section), and (b) a latent construct with only two items is likely to be under-identified with negative degree of freedom during the measurement invariance test. The indirect effect of writing self-efficacy was tested using the Model Indirect command. A parametric bootstrapping approach was used to estimate standard errors of all the parameters and the indirect effects from writer beliefs to argumentative writing through writing self-efficacy (with 1,000 draws; MacKinnon et al., 2002; Shrout and Bolger, 2002).

Results

Exploratory analysis on pre-post differences, baseline equivalence, and correlations

The means and standard deviations of self-efficacy for writing, self-efficacy for argumentative writing, transactional writer beliefs, transmissional writer belief, and literature-related argumentative writing performances (hereafter called argumentative writing) are presented in Table 3. Paired t-tests of the pre-post changes in argumentative writing and motivational beliefs showed that, for the DLA group, students showed a greater argumentative writing performance ($t = 10.00$, df = 96, $p < 0.001$), a decrease in self-efficacy for argumentative writing ($t = -1.99$, df = 118, $p < 0.05$), and no changes in writer beliefs or self-efficacy for writing from pre-test to post-test. The CR group also showed greater argumentative writing ($t = 2.58$, df = 75, $p < 0.01$) and self-efficacy for writing ($t = 2.6$, df = 87, $p = 0.01$). There was no change in self-efficacy for argumentative writing or writer beliefs from pre-test to post-test in the CR group.

Table 4 presents multiple regressions of pre-test variables using Type = Complex and Cluster = Classroom, controlling for gender, grade, and academic track (1 = AP, 0 = CP). The results showed that the DLA and CR groups did not differ in argumentative writing performance and writer beliefs at the pre-test. However, the DLA group showed slightly higher self-efficacy for writing and self-efficacy for argumentative writing than the CR group. Therefore, the baseline equivalence assumption was met except for writing self-efficacy.

The correlations among these variables are presented in Table 5. Self-efficacy for writing and self-efficacy for argumentative writing were highly correlated (pre-test: $r = 0.78$, $p < 0.001$; post-test: $r = 0.77$, $p < 0.001$). Based on this result, a latent construct of writing self-efficacy will be estimated in the later structural equation models based on the two subscales of writing self-efficacy. Self-efficacy for writing and argumentative writing were positively correlated with transactional writer beliefs and were negatively or not associated with transmissional writer beliefs at the pre- and post-tests. Self-efficacy for writing and argumentative writing were positively

TABLE 4 Standardized coefficients and bootstrapped standard errors from multiple regression models of pre-test writing self-efficacy, writer beliefs, and argumentative writing performance (with FIML estimation).

	T1 self-efficacy for writing	T1 self-efficacy for argumentative writing	T1 transactional writer beliefs	T1 transmissional writer beliefs	T1 argumentative writing
	β (SE)	*β (SE)*	*β (SE)*	*β (SE)*	*β (SE)*
Gender (1 = Female)	−0.06 (0.06)	−0.11 (0.06)	−0.27*** (0.06)	0.15** (0.06)	−0.14** (0.04)
Grade Level	−0.05 (0.07)	−0.05 (0.05)	−0.05 (0.05)	−0.02 (0.04)	0.17 (0.11)
Academic Track (1 = AP, 0 = CP)	0.20*** (0.05)	0.21*** (0.07)	0.26 (0.07)	−0.39*** (0.05)	0.48*** (0.14)
Instruction (1 = DLA, 0 = CR)	0.19* (0.08)	0.17* (0.08)	−0.08 (0.07)	0.03 (0.06)	−0.07 (0.12)

Model fit indices are not reported because these models are saturated.

TABLE 5 Pearson's correlations between writing motivation and argumentative writing performance at pre- and post-tests.

		Pre-test					Post-test				
		1	2	3	4	5	6	7	8	9	10
Pre-test	1. Self-efficacy for writing										
	2. Self-efficacy for argumentative writing	0.78***									
	3. Transactional writer beliefs	0.33***	0.33***								
	4. Transmissional writer beliefs	−0.26***	−0.22***	−0.11							
	5. Argumentative writing performance	0.25***	0.26***	0.20**	−0.36***						
Post-test	6. Self-efficacy for writing	0.44***	0.32***	0.24***	−0.15*	0.14*					
	7. Self-efficacy for argumentative writing	0.36***	0.39***	0.24***	−0.19**	0.11	0.77***				
	8. Transactional writer beliefs	0.24**	0.18**	0.50***	−0.10	0.27***	0.40***	0.44***			
	9. Transmissional writer beliefs	−0.27***	−0.30***	−0.23***	0.44***	−0.32***	0.06	−0.001	0.01		
	10. Argumentative writing performance	0.37***	0.35***	0.11	−0.37***	0.64***	0.15	0.20**	0.23**	−0.27***	

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

associated with students' argumentative writing at both time points, although the correlation between self-efficacy for writing and argumentative writing at the post-test was not significant. Transactional and transmissional writer beliefs were negatively correlated at the pre-test and did not correlate with each other at the post-test.

Transactional writer beliefs were positively associated with argumentative writing at both time points, but transactional writer beliefs at the pre-test was not associated with argumentative writing performance at the post-test. Transmissional writer beliefs and argumentative writing performance were negatively correlated at the pre- and post-tests; transmissional writer beliefs at the pre-test was also negatively associated with argumentative writing at the post-test.

DLA versus CR in argumentative writing and motivational beliefs

To address the first research question, we fit the data with multiple regressions in Mplus. In separate models, writing motivation and argumentative writing at the post-test were predicted by instructional approach (DLA vs. CR), controlling for pre-test scores, gender, grade level (9th, 10th, 11th, 12th), and academic track (1 = AP, 0 = CP). A latent variable called writing self-efficacy was estimated by self-efficacy for writing and self-efficacy for argumentative writing at the pre- and post-tests. When predicting transactional or transmissional writer beliefs at the post-test, both types of writer beliefs at the pre-test were included in the models to control baseline differences.

As shown in Table 6, instruction (DLA vs. CR) significantly predicted post-test argumentative writing ($\beta = 0.24$, SE = 0.11, $p < 0.05$), controlling for pre-test argumentative writing and covariates. This suggests that the DLA group demonstrated more growth in argumentative writing than the CR group. The instruction effect was not significant in the models of writing self-efficacy, transactional writer beliefs, or transmissional writer beliefs, suggesting that students receiving DLA or CR did not differ in the level of change in writing self-efficacy or writer beliefs from pre- to post-tests. Students at a higher grade level tended to show higher writing self-efficacy than students at a lower grade level in high school ($\beta = 0.24$, SE = 0.07, $p < 0.001$). Interestingly, students in the AP English class had lower writing self-efficacy ($\beta = -0.21$, SE = 0.08, $p < 0.01$) and lower transmissional writer beliefs ($\beta = -0.12$, SE = 0.06, $p < 0.05$) than students in the CP English class. Gender did not predict any outcome variable at the post-test.

TABLE 6 Standardized coefficients and bootstrapped standard errors from multiple regression models of post-test writing self-efficacy, writer beliefs, and argumentative writing performance (with FIML estimation).

	T2 writing self-efficacy	T2 transactional writer beliefs	T2 transmissional writer beliefs	T2 argumentative writing
	β (SE)	*β (SE)*	*β (SE)*	*β (SE)*
Gender (1 = female)	−0.07 (0.06)	−0.07 (0.07)	0.10 (0.07)	−0.06 (0.05)
Grade level	0.24*** (0.07)	0.13 (0.09)	0.06 (0.07)	0.16 (0.12)
Academic track (1 = AP, 0 = CP)	−0.21** (0.08)	−0.03 (0.06)	−0.12* (0.06)	0.09 (0.13)
Instruction (1 = DLA, 0 = CR)	0.03 (0.05)	0.06 (0.08)	0.02 (0.08)	0.24* (0.11)
T1 Writing self-efficacy	0.54*** (0.08)			0.20** (0.07)
T1 Transactional writer beliefs		0.48*** (0.07)	−0.15** (0.06)	−0.08 (0.09)
T1 Transmissional writer beliefs		−0.03 (0.08)	0.37*** (0.05)	−0.09 (0.06)
T1 Argumentative writing				0.45*** (0.10)
$\chi^2_{(df)}$	20.162 (13)	5.78 (5)	5.78 (5)	3.85 (7)
RMSEA	0.05	0.02	0.02	0.00
CFI	0.99	0.98	0.99	0.99
SRMR	0.08	0.06	0.06	0.01

RMSEA = root mean square error of approximation; CFI = comparative fit index; SRMR = standardized root mean square residual; T1 = pre-test, T2 = post-test.

DLA versus CR in the relationships between argumentative writing and motivational beliefs

Figure 1 presents a conceptual model in which argumentative writing is associated with writing self-efficacy and the two writer beliefs at the post-test, and writing self-efficacy mediates between writer beliefs and argumentative writing. To address the second research question, we tested whether this model structure differed between the DLA and CR groups. Control covariates included gender, grade level, and academic track.

An unconstrained multigroup SEM in which all path coefficients were allowed to be freely estimated had a good model fit ($\chi^2_{(df=23)}$ =27.81, p = n.s., RMSEA = 0.04, CFI = 0.99). Comparatively, a constrained multigroup SEM in which all path coefficients were set to be equal between the two groups showed an acceptable model fit ($\chi^2_{(df=31)}$= 63.461 p = n.s., RMSEA = 0.09, CFI = 0.92). Three indicators were considered in making model comparisons: a likelihood ratio test comparing Chi-square differences between two models, and the level of changes in RMSEA and CFI. If a likelihood ratio test is significant, RMSEA increases by 0.015 or greater, and CFI decreases by 0.01 or greater from unconstrained to constrained models, these indicators suggest that the constrained model has poorer model fit (Chen, 2007). The three indicators ($\Delta\chi^2_{(\Delta df=8)}$ = 35.66, p < 0.001, ΔRMSEA = 0.05, ΔCFI = 0.07) suggests that the unconstrained model had a better model fit than the constrained model. One or more path coefficients might vary between the DLA and CR groups.

To identify which path(s) were not equivalent between groups, we closely examined the unconstrained multigroup SEM presented in Figure 1. For the DLA group, the association between transactional writer beliefs and writing self-efficacy at the post-test was significant (β = 0.38, SE = 0.12, p < 0.01), but the association between transmissional writer beliefs and writing self-efficacy was not significant. Writing self-efficacy was positively correlated with argumentative writing (β = 0.17, SE = 0.07, p < 0.05). The two types of writer beliefs did not correlate with argumentative writing. For the CR group, the association between transactional writer beliefs and writing self-efficacy at the post-test was significant (β = 0.66, SE = 0.07, p < 0.001), and the association between transmissional writer beliefs and writing self-efficacy was not significant. Writing self-efficacy and transactional writer beliefs did not predict argumentative writing, but transmissional writer beliefs were negatively associated with argumentative writing (β = −0.30, SE = 0.10, p < 0.001). The indirect effects from transactional or transmissional writer beliefs to argumentative writing through writing self-efficacy were not significant for the DLA or the CR group.

The unconstrained model suggested that the DLA and CR groups might differ in the association between writing self-efficacy and argumentative writing, and the association between transmissional writer beliefs and argumentative writing. We subsequently conducted an invariance test such that only the direct path from writing self-efficacy to argumentative writing was allowed to vary between the groups. A likelihood ratio test comparing this relatively unconstrained model (M2 in Table 7) and the constrained model (M1) was not significant. We conducted another invariance test such that only the direct paths from transactional and transmissional writer beliefs to argumentative writing were allowed to be different between the two groups. A likelihood ratio test comparing this unconstrained model (M3 in Table 7) to the most constrained model (M1) was marginally significant ($\Delta\chi^2_{(\Delta df=2)}$ = 5.68, p = 0.058), ΔRMSEA = 0.01, ΔCFI = 0.01. These indicators suggest that the pathways between writer beliefs and argumentative writing might be marginally different between DLA and CR groups. Specifically, transmissional writer beliefs seem to be more negatively associated with argumentative writing for the CR group than for the DLA group, while the association between transactional writer beliefs and argumentative writing might be more identical between the groups (Figure 1). In these models, the indirect effects from transactional or transmissional writer beliefs to argumentative writing through writing self-efficacy were not significant for the DLA or the CR group.

10.3389/fpsyg.2023.1214773

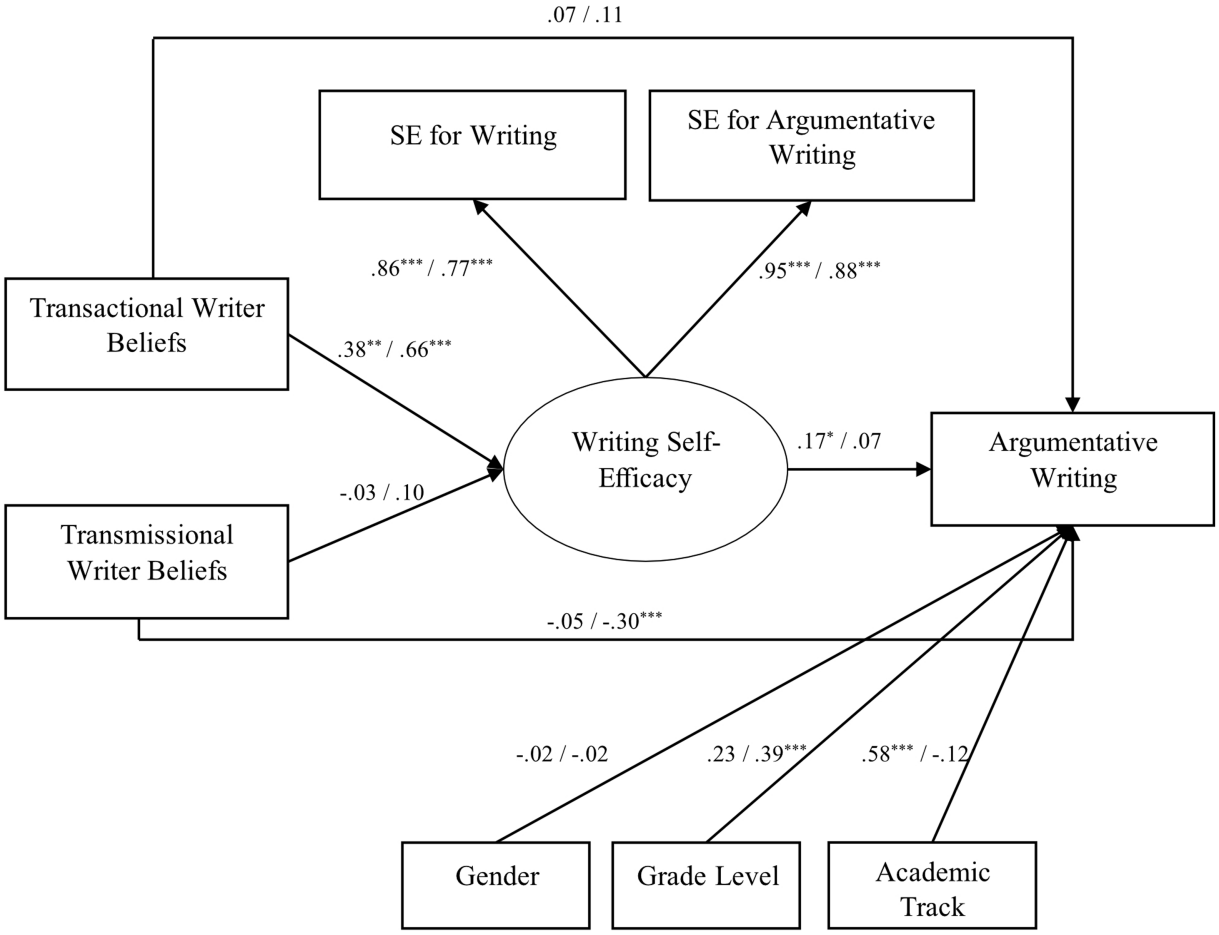

FIGURE 1
Unconstrained multigroup structural equation model (SEM) representing the relationship between writer beliefs, writing self-efficacy, and argumentative writing performance at the post-test. Standardized coefficient are reported. Each path is associated with two coefficient. The coefficient on the left-hand side were from the DLA model, and the coefficient on the right-hand side were from the CR model (DLA/CR). SE, self efficacy. *p <0.05, **p <0.01, ***p <0.001.

TABLE 7 Model comparisons between different multigroup structural equation models.

Model	Freed path coefficients	$\Delta\chi^2_{(\Delta df)}$	RMSEA	CFI	Model comparison	$\Delta\chi^2_{(\Delta df)}$	ΔRMSEA	ΔCFI
M1	None	63.46 (31)	0.09	0.92	M1	35.65 (8)***	0.05	0.07
M2	Writing self-efficacy ➔ Argumentative writing	61.85 (30)	0.09	0.92	M2	1.61 (1)	0.00	0.00
M3	Transactional writer beliefs ➔ Argumentative writing Transmissional writer beliefs ➔ Argumentative writing	57.78 (29)	0.08	0.93	M2	5.68 (2)*	0.01	0.01

M1 = constrained model, M2 and M3 were the same as M1 except for the freed path coefficients listed in the table. *p < 0.05, **p < 0.01, ***p < 0.001.

Discussion

Compared to Close Reading, a method that varies in practice and that has shown promise in promoting students' literacy repertoires as well as metadiscoursal awareness (Fisher and Frey, 2012; Beers and Probst, 2013; Snow and O'connor, 2016; Catterson and Pearson, 2017), our findings suggest that Dialogic Literary Argumentation can add value to Close Reading to improve high school students' literature-related argumentative writing. This may especially be the case when DLA meaningfully includes the reader's background, worldview, activities, and sociocultural context in the sensemaking process. These are key elements for models of writing that emphasize the communal aspects of writing (Graham, 2018), contrasting with CR's primary focus on the "four corners of the text" (Coleman and Pimentel, 2012). Although the DLA and CR groups did not differ in motivational beliefs, post-test motivational beliefs and argumentative

writing performance seem to be more positively correlated in the DLA group than the CR group. Based on the best-fitting unconstrained multigroup SEM model (Figure 1), transactional writer beliefs were positively correlated with writing self-efficacy in both groups, but writing self-efficacy was more positively correlated with argumentative writing and transmissional writer beliefs less negatively correlated with argumentative writing in the DLA group than the CR group.

Although the mechanisms of change underlying DLA are yet to be systematically explored, one plausible explanation of the added value of DLA in fostering students' literature-related argumentative writing may be its deliberate emphasis on social, political, and historical context and on writing within community (Graham, 2018). On top of reading and re-reading literary texts to construct meaning out of the text through the transaction between the reader and the text, DLA focuses on constructing and reconstructing literary understanding through multiple perspectives, arguing to understand literary themes within the context of students' own lives as well as the broader social world, and interactionally construct social relations among and between themselves to form a more informative dialectic through alternative arguing. These instructional principles might have made DLA more effective in connecting students with the literature in personally and culturally meaningful ways, triggering the right form of motivational beliefs about writing, and facilitating them to shift from retelling to argumentative interpretations of literature in students' writing.

Even though paired t-tests suggest that the DLA group showed a slight decrease in self-efficacy for argumentative writing and the CR group showed a slight increase in self-efficacy for writing, the degree of change did not differ between the two groups. Both instructional approaches significantly enhanced students' argumentative writing performance, but contrary to our predictions, neither condition significantly changed students' motivational beliefs. Other studies have found similar results where student performance improves, but motivation remains unchanged (Graham et al., 2005; Harris et al., 2006). An exception to this is the Concept-Oriented Reading Instruction (CORI) program (Guthrie et al., 2004). This program was likely successful due to its five approaches to enhancing student motivation: knowledge content goals, student choice, hands on experiences, interesting texts, and student collaboration.

A possible explanation for our findings is that there could have been a lagging effect on motivational beliefs that were not measured in the current study. That is, motivational beliefs might not change until students have the opportunity to see and reflect on their own improved outcomes (Halper et al., 2018). Existing findings also indicate that changes in students' motivational profiles (i.e., patterns of motivation) during school years tend to show variabilities across subgroups of individuals (Hayenga and Corpus, 2010; Gillet et al., 2017; Xie et al., 2022). A person-centered approach might be used in future research to identify students' motivational profiles in argumentative writing and how students shift among these profiles over time as a function of instructional practices.

Transactional writer beliefs were predictive of writing self-efficacy in both DLA and CR conditions. This result supports the design principles of DLA and CR that meaning is actively constructed by learners in the process of reading and writing. However, the indirect effect of transactional writer beliefs on argumentative writing performance through writing self-efficacy was not significant in the multigroup SEM. Our original hypothesis was that when students hold the beliefs that meaning is not external to the writer but rather is actively constructed by the writer, such beliefs may motivate students to actively learn to write during English language arts instruction. The active learning process may help students evaluate their own competence about writing or argumentative writing more positively, which then fosters their literature-related argumentative writing performance. Unfortunately, our hypothesis was not fully supported by the current study. One possible explanation is that the argumentative essay is a challenging genre to write and may not be predicted by students' writing self-efficacy unless the level of self-efficacy is high. DLA may have a greater promise than CR (as a text-centered only practice) to establish a transactionally dialogic environment to nurture competent writers in the classroom, although the current evidence is not robust enough to support this claim. In addition, high school students are more used to operating out of the transmissional beliefs framework in schools, considering schools' emphases on preparing for and performing well on state mandated standardized tests, a pattern for which Applebee and Langer (2013) have raised significant concerns. The DLA approach may have been one of the few instructional practices in schools that encourage students to operate out of a transactional belief system. Students in the DLA group thus might have had to constantly reconcile these conflicting beliefs, which might have dampened the links between writer beliefs and writing self-efficacy or argumentative writing performance.

Interestingly, transmissional writer beliefs showed a negative correlation with argumentative writing performance in the CR group and a null relationship with argumentative writing performance in the DLA group in the unconstrained model. The pathways between writer beliefs and argumentative writing were marginally significant between the two groups. We conjecture that DLA may have functioned as a buffer against the negative influence that transmissional beliefs had on students' argumentative writing performance. High-quality literature-related argumentative writing requires that writers develop a sophisticated organizational framework of writing that presents a thematic framing of the literature, warranted support of arguments from multiple sources, and elaborated world knowledge. Such expectations contradict the transmissional writer beliefs that meanings are given and transmitted from the external world. While both the DLA and CR approaches advocate for learners' active construction of meanings, DLA is specifically focused on argumentation as a social process by which students build on each other's ideas toward more meaningful understanding of the text, its associated human conditions and worldview (Bloome et al., 2020). When students have the opportunity to engage in alternative arguing about literature with the teacher and peers (Newell et al., 2015), they gain greater sense of agency and flexibility to explore different ways of understanding and using literary texts to engage in their social worlds. This dialogic social process of DLA might lend support to students holding greater transmissional writer beliefs as they joined the arguing-to-learn endeavor with others, which then improved their argumentative writing.

Writing self-efficacy at the pre-test, which incorporated highly correlated genre-general and genre-specific self-efficacy for writing, was associated with literature-related argumentative writing at both pre- and post-tests. However, the multigroup SEM suggests that writing self-efficacy at the post-test was mildly associated with post-test argumentative writing in the DLA group and not associated with post-test argumentative writing in the CR group, although the group difference did not reach a statistical significance. The weakened association between writing self-efficacy and argumentative writing at

the post-test explains the null mediation effect of writing self-efficacy on the relationships between writer beliefs and argumentative writing performance. A possible reason for the trending difference in the association between writing self-efficacy and argumentative writing performance between the DLA group and the CR group might be that the instructional practices of DLA centering on literary argumentation were more aligned with the design and expectations of the literature-related argumentative writing task, therefore maintaining the positive association between students' self-perception of their genre-specific competence and their actual literature-related argumentative writing performance. However, both groups of students showed weakened associations between writing self-efficacy and argumentative writing at the post-test. It is likely that for students with lower self-efficacy for writing or argumentative writing, the level of instructional support that they received from DLA or CR had strengthened their competence for argumentative writing, which then weakened the link between writing self-efficacy and argumentative writing performance.

Study limitations and future research directions

Despite the important findings, the current study is subject to several limitations. One limitation is that the participating teachers were recommended by building principals or other authority figures, and the criteria by which the principals made the recommendations were not completely clear. We were told that the teachers were recommended based on their reputations for teaching literature or writing. However, we cannot exclude the possibility of self-selection or other teacher characteristics such as work ethics. In addition, the study was limited to 14 teachers, and five of their classrooms were taught at the AP level. Even though we controlled the effect of academic track in all statistical models, students who took AP courses might not be representative of the general student populations due to the prerequisites and increases in rigor common to AP courses. The small group of teachers also limited our ability to explore potential teacher influences. For example, the majority of AP teachers have a master's degree in the discipline they teach (Milewski and Gillie, 2002), which contrasts with the statistics that most high school teachers do not have a master's degree in the discipline they teach (National Center for Educational Statistics, 2018).

Another limitation of this quasi-experimental study is the small number of classrooms and that classrooms were not randomly assigned to study conditions, even though baseline equivalence was met. The limited sample size prohibited us from testing more complicated models. Future research should consider a randomized control trial study that aims at recruiting teachers and students who are representative of the populations of the study region. Random assignment of classrooms to study condition would allow researchers to compare the relative strengths, weaknesses, and general applicability of DLA and CR more systematically. Furthermore, multilevel models should be conducted in future studies to corroborate the findings reported in this study.

The paired *t*-tests comparing students' pre- and post-test performance, as well as the multiple regressions comparing instruction effects on writing motivations, did not support DLA as effective means to promote motivational beliefs about writing. Earlier studies (Pajares et al., 2000) suggested that writing motivation could potentially be an outcome of writing achievement, supporting Bandura's (1997) theory that mastery experience is one major source of self-efficacy beliefs. Adding additional data points in a cross-lagged longitudinal study framework to examine the reciprocal relationships between motivational beliefs and argumentative writing performance would likely add important nuance to previous systemic reviews which found that there tended to be weak to moderate associations between writing attitudes and writing performance (Camacho et al., 2021).

Even though we considered genre specificity in writing self-efficacy, the extant literature of self-efficacy suggests that self-efficacy as a three-dimensional construct: conventions (i.e., transcribing ideas into writing), ideation (i.e., generating good ideas), and self-regulation (i.e., managing the cognitive, emotional, and behavioral aspects of writing; Rasteiro and Limpo, 2023). Future research can be done to further examine whether the links between writer beliefs, writing self-efficacy, and argumentative writing performance would vary by sub-dimensions of self-efficacy. In addition, the current study did not include other types of motivational beliefs informed by the Writer(s)-Within-Community Model (Graham, 2018) due to schools' reluctance to give in additional instruction time. These motivational beliefs, such as value and utility of writing, interest in writing, reasons for engaging in writing, and beliefs about writing communities, can be further examined in the context of DLA and CR.

Conclusion

The teaching and learning of writing in the secondary English language arts classrooms in the United States is at stake given evidence suggesting that students' writing motivation decreases with age (Pajares et al., 2007) and writing performance (U.S. Department of Education, 2019) has shown a downward development trend. In addition, the mixed findings on the complex relationships between motivational beliefs and writing performance (Camacho et al., 2021) and a lack of effective approaches to promoting both writing motivation and performance in the classroom suggest a great need of research in these aspects. One major contribution of the current study is to document the complex relationships between writing motivation, argumentative writing, and instructional approaches in the context of high school English language arts classrooms. Overall, our study provides evidence to suggest that Dialogic Literary Argumentation, potentially when implemented with close reading, can strengthen students' literature-based argumentative writing skills through a socially constructive and self-efficacious learning process. This work serves as the first step toward developing an intellectually and socially engaging dialogic writing instruction in secondary education.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Behavioral and Social Sciences Institutional Review Board, The Ohio State University Office of Research. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

KF and T-JL made contributions to the conception and drafting of the manuscript, analyzing data, and revising it critically for important intellectual content. GN and T-JL contributed to seeking grant, developing the study design, and collecting data. GN contributed to critical revision of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The impact of a changed writing environment on students' motivation to write

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Introduction: The act of writing is widely acknowledged to be a complex and challenging activity, and in parallel, we know that student motivation to write is a predictor of writing performance. So understanding what characteristics of the writing classroom support or foster motivation remains a salient concern. Research has shown that UK teachers are more likely to see themselves as readers than writers, which may affect how they teach writing.

Methods: This paper reports on student focus group interview data from a study which sought to strengthen teachers' sense of themselves as writers, and to examine the impact of this on students' classroom experience of writing and their writing outcomes. The participant teachers experienced a creative writing residential, which established a writing community led by two professional writers, with the goal of changing teachers' professional practice in their own writing classrooms. The study was mixed methods, comprising a randomized controlled trial and a comprehensive qualitative dataset collating data from both the residential and the classroom. This paper presents the qualitative analysis of 32 interviews with 16 student focus groups, exploring their responses to their teachers' changed practices and how it connected with their motivation to write.

Results: The interview analysis shows how many students responded positively to new teaching practices which gave them greater autonomy and choice, and established a more collaborative way of working. This led to increased confidence in and motivation to write.

Discussion: The study highlights the importance of the classroom environment in supporting and sustaining motivation to write, and underlines that motivation is not simply an internal characteristic of an individual but is situated within the context of a community of writers.

KEYWORDS

writing, writing motivation, writing environment, community of writers, focus groups

1. Introduction

The act of writing is well-recognized as cognitively and socially complex: indeed, Flower and Hayes argued that a writer is "*a thinker on a full-time cognitive overload*" (1980, p. 33) and Kellogg (2008) has likened its cognitive demand to that of playing chess. It is a multidimensional construct, requiring mastery of multiple skills, ranging from transcription and orthography, the management of sentence and text structures; the generation of ideas; understanding the expectations of a genre; and navigating the relationship between reader and writer. Perhaps it is not surprising, then, that motivation to write in school can be problematic. Research has suggested that that students' motivation to write appears to decline through schooling (Boscolo and Gelati, 2019; Wright et al., 2020) although, of course, it is also the case that students' general motivation in school declines through adolescence

(see, for example, Eccles et al., 1997; Gottfried et al., 2001; Raufelder and Kulakow, 2021). Nonetheless, addressing motivation in writing is important both academically, because so much examination success depends on competence in writing, and socially, because writing is a means of personal communication and expression, and ubiquitous in a digital world. The importance of investigating motivation in writing is further emphasized by studies which show positive links between motivational constructs and writing outcomes (Pajares and Johnson, 1994; Troia et al., 2013; Graham et al., 2017; Camacho et al., 2021). In this article, we investigate writing motivation through a specific focus on the classroom environment for writing, considering student responses to changed teachers' pedagogical practices in teaching writing and how this may connect with their motivation to write. We argue that the nature of the classroom environment is an important factor in nurturing motivation to write.

2. Conceptual framework

In line with Wright et al. (2020, p. 153), we define motivation to write as "*the variety of reasons a child may choose to engage in a writing task or decide to take steps to avoid that task.*" This involves the beliefs, values, goals and dispositions that students bring to a writing task (Boscolo and Gelati, 2019), and, crucially, how these are dynamically shaped over time through student experiences of the writing classroom. We adopt an interdisciplinary perspective on writing and writing motivation, in line with Graham (2018) who argues for an integration of cognitive and sociocultural perspectives. In particular, we recognize that the act of writing involves both cognitive mental processes and beliefs and behaviors shaped by classroom and broader social contexts. Accordingly, we have synthesized the literature into four themes which reflect this interdisciplinary perspective in different ways: self-efficacy beliefs about writing; autonomy, choice and control; writing as social practice; and the classroom environment for writing.

2.1. Self-efficacy beliefs about writing

The concept of self-efficacy is fundamentally concerned with individuals' personal sense of their capacity to be successful in a task, or as Bandura (1997, p. 3) defined them, they are "*beliefs in one's capabilities to organize and execute the course of action required to produce given attainments.*" These beliefs are powerful because they influence individuals' behavior and affective responses to a task, and the extent to which an individual is willing to engage with a particular task: if we believe we can achieve a task, even though it may be challenging, we are more likely to commit the necessary effort, whereas if we believe we cannot accomplish a task, we are less likely to expend effort. Thus self-efficacy beliefs "*play a central role in the cognitive regulation of motivation*" (Bandura, 1997, p. 122). Given that the act of writing is cognitively demanding, as noted above, even for highly competent writers, it is easy to recognize the inter-relationship between the cognitive demands of writing, students' self-efficacy beliefs about writing and being a writer, and motivation to write. In their study investigating motivation for writing in the middle school years, Wright et al. (2020) make the connection between writing motivation and self-efficacy beliefs, maintaining that "*a student with strong self-beliefs as a writer would be more likely to work hard and persevere through a challenging task, knowing he or she has the necessary skills to be successful*" (p. 162). Similarly, Pajares and Valiante (2006) argue that students' confidence in their capability to write (their self-efficacy beliefs) contributes to their motivation to write and their writing outcomes. This association between self-efficacy beliefs and writing performance has been well-established (for example, McCarthy et al., 1985; Pajares and Johnson, 1994; Pajares and Valiante, 1999). However, Bruning et al. (2013) note that research has tended to view self-efficacy for writing as a unidimensional construct, when different aspects of the act of writing might generate differing self-efficacy beliefs. They posit and test a three-factor model of self-efficacy in writing, addressing *ideation* (generating ideas), *conventions* (mastery of norms of spelling, paragraphing, sentence structure etc), and *self-regulation* (managing decisions and behaviors while writing). Their study found that students did indeed hold different levels of self-efficacy beliefs on these three factors. This included finding stronger relationships between enjoying writing, and self-efficacy for ideation and self-regulation which may "*hint at the possibility of greater affect associated with writers*" *confidence for thinking of good ideas (ideation) and managing the writing process (self-regulation) than with believing they can capably execute writings' conventions*' (Bruning et al., 2013, p. 35). Given the focus of this article on the classroom environment for writing, and the strong link between self-efficacy and writing motivation discussed here, it seems pertinent to consider whether and which pedagogical practices might support the generation of high self-efficacy beliefs. Summarizing substantive research on this, Pajares and Valiante (2006, p. 167) conclude that meaningful writing activities; greater autonomy; choice in writing assignments; collaborative writing; self-regulation development; instruction well-matched to learning need; less competitive writing environments; and effective modeling practices have all been found to positively support writing self-efficacy beliefs.

2.2. Autonomy, choice, and control in writing

One set of influences affecting self-efficacy beliefs for writing noted in Pajares and Valiante's review of self-efficacy and writing (2006), described above, is giving greater autonomy and more choice in writing. Self-determination theory (Ryan and Deci, 2000), one of the major theories of motivation, refers to an individual's sense of whether they are able to make choices and feel in control in a particular domain. One of the core concepts in self-determination theory is autonomy, defined as "*the psychological need to behave according to one's interests and values*" (Turner et al., 2014). Pajares and Valiante (2006) note that control is also a key concept in attribution theory to explain motivation. It seems important, then, to consider the extent to which students in school contexts have autonomy as writers, and whether they feel they do have control and can make their own choices. As students progress through formal schooling, their experience of writing changes, from more

typically engaging and expressive writing in the younger phases, through to a widening range of genres and greater emphasis on disciplinary writing. Wright et al. (2019, p. 64) argue that "*by middle school, writing autonomy diminishes as the focus shifts and students are required to produce discipline-specific texts*" and also that their writing experiences offer "*minimal opportunity for creativity and expression.*" Alongside this reduction in choice of *what* to write about, learning about writing inevitably involves explicit teaching about *how* to write, in terms of the genre conventions of different texts and mastering the norms of writing in terms of spelling, punctuation, paragraphing and so on. This can decrease motivation for writing, according to Boscolo and Gelati (2013) because it demands conformity, rather than freedom for self-expression. The study of De Smedt et al. (2020), looking at motivation for reading and writing, found that autonomous motivation decreased with age, and this may correspond to a parallel increase in controlled motivation as the teaching of writing becomes more oriented toward specific outcomes. At the heart of this is a dilemma for teachers: in order to become capable, confident writers, students need to develop proficiency with writing in an increasing range of genres and contexts, but the consequence of this appears to be a demotivating reduction in autonomy and choice.

There are, however, teaching strategies or practices which teachers can adopt which appear to support autonomy. For example, teaching self-regulation skills for writing has been argued to increase student control of the writing process (Hidi and Boscolo, 2006; Pajares and Valiante, 2006; Graham et al., 2017; Wright et al., 2019). In effect, self-regulation shifts control from the teacher to the student, helping them to reflect on and understand how they manage the writing process, and use strategic behaviors to cope with problems or enable writing success. In addition to teaching self-regulation practices, Pajares and Valiante (2006) note that giving greater choice in writing tasks is important for motivation because the increased autonomy generates greater self-efficacy. In England, the experience of school closures during the COVID pandemic has provided unexpected evidence that greater autonomy and choice can affect motivation and enjoyment of writing. The National Literacy Trust's survey (Clarke and Picton, 2020) of 4,140 students in 2020 found that students' enjoyment of writing had increased on previous years, with one in six students reporting that they were writing more during the pandemic lockdowns than previously. Respondents said that lockdown had inspired their writing, given them access to digital formats for writing, and created time and space for thinking and generating ideas. The report authors argue that "*having more time to write freely has contributed to their increased enjoyment of writing. Looking ahead, it seems that providing time for free writing once back in the classroom could help to sustain this positive outcome*" (2020, p. 12). A key point here, however, is not simply about time, but that students were choosing of their own volition to write in this time, reflecting autonomy in their decision-making.

2.3. Writing as social practice

Although, in general, motivation research is typically investigated from a psychological perspective, there is also recognition that writing is not only about cognitive processes but also about social and cultural practices. Indeed, the students in Clark and Picton's survey reported writing for social purposes to help them cope with experience of lockdown, and to connect with others. Students learn to write not only through gradual mastery of transcription and composition, but also through situated learning in the "*contexts in which those practices and activities take their functions and meanings*" (Hidi and Boscolo, 2006, p. 152). Contexts for writing are multi-layered, including (national) curriculum contexts, out-of-school and family contexts for writing, and digital contexts for writing. But for many students, the classroom is one of the most powerful contexts for shaping understandings about writing. The writer(s)-within-community model of writing, proposed by Graham (2018), acknowledges the salience of sociocultural perspectives and integrates them with cognitive perspectives. The two core structures of the writers-within-community model are the writing community, representing the social and cultural contexts in which writing occurs, and writers and their collaborators, representing what individuals and groups bring to the act of writing. A writing community is a community of practice (Lave and Wenger, 1991), bringing together people with a shared purpose, and engaging in "*a process of collective learning in a shared domain*" (Wenger-Trayner and Wenger-Trayner, 2015). From a sociocultural perspective, writing communities are characterized by collaboration and learning together, involving discussion and dialogic processes (Moore, 2003; Hidi and Boscolo, 2006; Prior, 2006).

A social practice view positions writing as fundamentally about meaning-making, not just about text production, and frequently advocates authentic writing tasks (see for example, Behizadeh, 2014, and Rodesiler and Kelley, 2017). This connects directly with research on writing motivation where meaningful authentic writing tasks are seen to enhance motivation (Bruning and Horn, 2000; Hidi and Boscolo, 2006). The increase of enjoyment of writing during lockdown, reported in survey Clarke and Picton (2020) may, in part be attributable to the meaningfulness of the self-chosen writing as the students believed that writing during lockdown made them feel better emotionally.

2.4. The classroom environment for writing

The notion of writing as social practice occurring within a community of writers points to the significance of considering how the classroom context may shape student motivation for writing. This shifts the focus away from individual characteristics to a more complex, situated perspective (Eccles and Wigfield, 2020; Nolen, 2020) which acknowledges the multiple and laminated systems of meaning constructed in a classroom environment. It creates space for consideration of the motivational climate, defined by Robinson (2023) as the "*characteristics of the educational setting that contribute to shaping motivational beliefs among students in that environment*" (p. 5). Robinson argues that the motivational climate is not simply about observable teaching practices but about how students feel about their teaching and the meanings they create from it. She draws on achievement goal theory which brings together both achievement goals—the mastery or performance

goals held by individuals, and goal structures—the teachers' policies and practices in the learning environment and the explicit goal-related messages they convey (Wolters and Taylor, 2012; Bardach et al., 2020). Yet writing research has had surprisingly little to say about how the classroom writing environment might influence student motivation to write, other than frequent references to the technological "environment" for online and digital writing strategies (see Camacho et al., 2021). However, Bruning and Horn (2000) identify four conditions for writing motivation, which draw out the more complex interplay of student, teacher and contextual factors in the classroom:

1) *Nurturing functional beliefs about writing.*
2) *Fostering student engagement through authentic writing goals and contexts.*
3) *Providing a supportive context for writing.*
4) *Creating a positive emotional environment* (p. 27).

Their elaboration of these four conditions includes multiple references which connect well with the earlier discussion of self-efficacy beliefs about writing, autonomy, choice and control, and writing as social practice (for example, positive experiences of writing to boost self-efficacy; writing from personal interest; authentic tasks which connect with real-world experiences; peer feedback; giving students choice of what to write about; a collaborative writing community; and a safe space for writing).

Thus, as this synthesis of the research shows, there is little research, to our knowledge, which addresses the motivational climate of the writing classroom environment. Camacho, Alves and Boscolo (2021) systematic review of research on writing motivation in school concluded that there is a need for future research to give more attention to the relationship between teachers' instructional practices and student motivation, but this assumes, perhaps, a linearity between instructional practices and motivation which belies the situated complexity of the writing environment. Graham's (2018) work on writer(s)-within-community is significant in this respect, positioning learning about writing within a social and cognitive perspective. In this article, we seek to build on this work by investigating what students' responses to a changed classroom environment for writing reveal about its impact on their motivation to write.

3. Methodology

The data informing this paper are drawn from focus group interviews with students who were part of a larger study (*Teachers as Writers*). The study set out principally to explore whether a residential writing course, led by professional writers, would change teachers' beliefs about writing and themselves as writers, which would lead to changed teachers' practices in the classroom, and ultimately to improvements in students' writing. In England, teachers of English are more likely to be English Literature graduates (Shortis and Blake, 2010), and more likely to see themselves as readers, rather than writers (Gannon and Davies, 2007). Thus, in classroom practice they are often more expert in teaching reading and literary analysis, than writing. The benefit of teachers being writers themselves is popularly advocated as important in addressing this imbalance, giving teachers both greater confidence as writers and better professional understanding of the writing process: however, robust evidence of this has been limited (Cremin and Oliver, 2017). Moreover, Bruning and Horn (2000, p. 26) maintain that teachers' "*conceptions of writing will provide a model for and shape students' beliefs*" and argue for a strong connection between teachers' beliefs and students' writing motivation.

The study was mixed methods, involving a Randomized Controlled Trial and qualitative data comprising observations of the residential experience and subsequent classroom teaching; interviews with the professional writers, teachers and students involved; and teacher reflective audio-diaries. The project involved 32 teachers from schools in South-West England, teaching classes with students ranging from age 7–14 years old ($n = 711$). There were eight primary (age 7–11) and eight secondary (age 12–14) classes in both the intervention and control group. The participating teachers attended a week-long writing residential at one of Arvon's writing centers (in SW England). The residential focussed on creative writing, and was led by two professional writers. Following the residential, each teacher and a professional writer together planned a narrative writing teaching unit which was then taught in school, including two lessons co-taught by the teacher and writer.

The findings are reported fully elsewhere (Cremin et al., 2020; Myhill et al., 2021), but, in a nutshell, the "teachers as writers" experience impacted teachers' identities as writers, and led to changes in their classroom practice, but it did not lead to an improvement in student writing quality. However, it did have a positive impact on students' motivation and confidence as writers. It is this latter finding which this paper explores, drawing on the qualitative data from student focus group interviews, and addressing the research question—how do students respond to a changed classroom environment for writing, and how does this connect with their motivation to write?

3.1. The intervention

Because this paper is primarily concerned with students' perceptions of the changed teaching practices and writing environment following the writing residential, it is important here to consider how the intervention was anticipated to impact on teachers' practices in teaching writing and the writing environment the students would experience. A full overview of the residential programme is provided in Appendix A. In summary, the residential had a daily pattern of writing workshops as a group, one-to-one tutorials with a professional writer, and individual time and space for writing, making use of the natural environment of the residential center. In the workshops, tutors emphasized the recursivity or messiness of the writing process, sharing their own experiences as writers and the value of drawing from personal experience as a source of ideas. They used freewriting repeatedly in the workshop sessions to generate a flow of writing, and used a variety of prompts for writing, such as using artifacts, pictures or personal memories. However, teachers always had freedom to choose what to write about, and what form the writing took—and in

the individual time and space for writing, they had autonomy about whether to write, or what pieces of writing to work on. Throughout the residential, the professional writers explicitly emphasized a collaborative writing environment establishing a community of writers, with teachers routinely sharing their writing drafts, and support and feedback from peers actively fostered. The week ended with shared publication of an anthology produced by the teachers and a presentation of writing, intended to give them autonomy, choice and control over what was included or not; to be a final act of collaboration and sharing as a writing community; and overall to boost their sense of self-efficacy as writers. The intention was that this experience would lead to changed classroom practices and ultimately to improved student outcomes in writing. The Theory of Change model is represented in Figure 1.

3.2. Data collection and data analysis process

The data drawn on for this paper derive from 16 student focus groups, each interviewed twice. Focus group interviews were chosen because the participants were children, and the group context is less intimidating than individual interviews, and in education, they are viewed as empowering participants, giving primacy to their voices (Bourne and Winstone, 2021). They also allow for participants to respond to and explore the contributions of others, rather than being wholly interviewer-led: "*they involve the interaction of group participants with each other as well as with the researcher-moderator*" (Wilkinson, 2006, p. 223), and thus, they are seen as generating rich, in-depth data, capable of making visible where agreements and disagreements exist (Gill and Baillie, 2018). In planning for and conducting the focus group interviews, we adopted the method recommended by the National Foundation for Education Research (NFER) because of their understanding of researching in classrooms, and because of its acceptability to both schools and researchers in the UK context. They recommended five steps: (1) Develop the questions; (2) Identify the sample; (3) Conduct the interviews; (4) Draw together and analyse the data; and (5) Report the findings (National Foundation for Educational Research, 2013, p. 3).

The first step, therefore, involved designing a semi-structured interview for each of the two interviews. The first interview sought to explore five constructs: their perceptions of writing; their perceptions of the teaching of writing; their understanding of the writing process; their enjoyment of and motivation to write; and their confidence and perceived skills as writers. The second interview was particularly designed to elicit their responses to any changes in how they were taught writing, or changes in their attitudes toward writing (see Appendix B). It allowed us to build on the ideas and responses of the first interview, supporting member-checking through the interviewing process (Harvey, 2015). The interview questions were designed avoiding closed questions, and taking care to frame questions to invite open responses and within-group discussion. The second step, identifying the sample, drew on the 16 intervention classes, from each of which a focus group of six students was formed. This offered homogeneity in age, class teacher and experience of the teaching following the teachers' writing residential. The students were selected by the class teacher, stratified by gender and by writing attainment, using national assessment data: this added some heterogeneity to the sample, ensuring greater representativeness of students from each class. In line with Flores and Alonso (1995), we feel this created a "*balance between the components of uniformity and diversity, achieving groups homogeneous in those characteristics that affect the discussed topic and groups that are heterogeneous in features that are not relevant in relation to it*" (p. 89). The interviews were conducted by one of the research team of six (Step 3): each researcher was allocated specific schools throughout the project and managed all project liaison, observed lessons, and built relationships with both the students and the teacher. This mitigated the power relationship between interviewer and participants, and all the interviewers were experienced in interviewing children. Each focus group was interviewed twice: firstly, immediately after the teachers returned from the residential, and 3 months later, after the intervention was complete. The interviews were audio-recorded and subsequently professionally transcribed. Steps 4 and 5 of the NFER focus group method are reported further below.

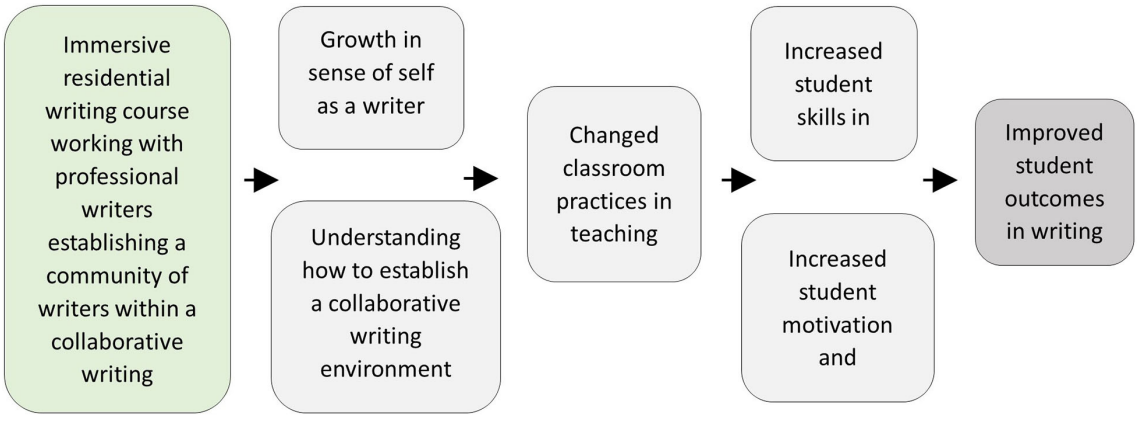

FIGURE 1
The theory of change model.

TABLE 1 The final set of themes and sub-themes derived from the analysis of the focus group interviews.

Themes	Sub-themes	Definition
Perceptions of writing	Genres and their characteristics	Types of writing and their characteristic features
	Positive characteristics	Features or qualities that make writing "good"
	Negative characteristics	Features or qualities that detract from "good" writing
Perceptions of writers	Writers' attributes	Personal characteristics that writers need/possess
	Writers' skills	Skills that writers need or use
Perceptions about the Teaching of Writing	Helpful for writing	Ways in which anything/anyone helps with writing
	Unhelpful for writing	Ways in which anything/anyone is unhelpful
	Perceived changes in teaching	New approaches/recent changes in teaching of writing
	Perceived impact of writer	Professional writers' impact on teaching and learning
Perceptions of writing process	Preparing for writing	Pre-writing activities; personal preferences/dislikes
	Drafting	Processes/strategies involved in drafting a text
	Improving writing	Processes/strategies involved in improving a draft
Enjoyment and motivation	Enhancers	Factors that enhance motivation/enjoyment of writing
	Detractors	Factors that reduce enjoyment/motivation
	Personal writing outside school	Forms of writing that students engage in for pleasure
Confidence and perceived skills as writers	Self-description	Labels students use to describe themselves as writers
	Perceived strengths	Personal strengths or capabilities as writers
	Perceived weaknesses	Personal weaknesses as writers
	Perceived progress	Aspects of writing improved
	Helpful for confidence	Factors that enhance self-confidence
	Unhelpful for confidence	Factors that undermine self-confidence

The analysis of the interviews was principally inductive, following a systematic process of thematic analysis outlined by Braun and Clarke (2006). This means that themes are "*strongly linked to the data themselves…without trying to fit it into a pre-existing coding frame, or the researcher's analytic preconceptions*" (p. 83). The coding was undertaken by the authors and the first step involved shared reading and initial discussion of the interviews. Then each coder independently coded the same interview and allocated an appropriate descriptive code to the data segments. This initial coding was shared, discussed and refined, then developed iteratively, with constant refinement of code labels and checking of appropriate attribution of data segments to codes as more interviews were coded. These were then clustered into sub-themes of related codes, and finally each sub-theme was grouped thematically under the constructs structuring the interview schedule. Throughout the coding process, the coders met to ensure consistency, particularly through constant comparison, which involved refining the codes, identifying their properties, and exploring their inter-relationships (Taylor and Bogdan, 1984, p. 126). When all coding and clustering was complete, a final check of all data segments in each sub-theme was made to ensure consistent application of coding agreements. The final set of themes and sub-themes is outlined in Table 1.

Trustworthiness in qualitative research refers to the confidence of readers that a research study has been conducted and reported in a rigorous manner. It is not concerned with replicability as in quantitative research, it is concerned with trust and transparency. Table 2 provides a summary of trustworthiness in this study.

TABLE 2 The trustworthiness of the study.

Credibility	• Theoretical triangulation- approaching the topic from both cognitive and sociocultural perspectives • Careful reporting of multiple perspectives in the focus groups, including minority or outlier perspectives • Use of two interviews per focus group to accurately identify changed perceptions, allowing member-checking
Transferability	• Sampling strategy balanced by school type, gender and writing attainment to maximize representativeness of the data • Providing a thick description of the data • Constant comparison throughout the coding process
Dependability	• Systematic use of thematic analysis for data coding • Detailed reporting of focus group interview methodology to allow replication
Confirmability	• More than one coder involved in the coding process • Iterative development of a clear coding scheme

4. The outcomes of the focus group interview analysis

In order to address the research question (*How do students respond to a changed classroom environment for writing, and how*

does this connect with their motivation to write?) we will draw on three of the themes—perceptions about the teaching of writing; enjoyment and motivation; and confidence and perceived skills as writers—as these evidence most closely the students' responses to their changed classroom environment for writing and their motivation to write. In presenting the data below, all quotations from the interviews are in italics with speech marks, and we indicate in brackets whether a student was in our primary school sample (aged 7–11) or in our secondary school sample (aged 12–14). The quotations used have been selected to exemplify both typical responses in a theme, and also the diversity of responses.

4.1. Perceptions about the teaching of writing

This theme clustered together comments where students expressed their views about how they were being taught writing, and strategies and approaches which they felt benefitted or hindered their learning as writers. This theme reflects particularly the teaching practices which characterized the classroom environment, and provides a context for later themes, as the students do talk explicitly about changed pedagogical practices which they found helpful. Four sub-themes were generated within this theme, as detailed in Table 3.

Students identified a range of strategies in their lessons which they found **helpful for writing**, and which were largely common across both pre- and post-intervention interviews and across all focus groups. These included, for example, teacher scaffolding and modeling of writing; sharing of ideas for writing; the use of exemplar materials and reference resources; one-to-one support when stuck with writing; and teacher feedback and target setting. These reflect typical national practices in the teaching of writing in England at the time, shaped by curriculum guidance and national assessment. However, some aspects were much more prominent in the post-intervention interviews and some new features emerged. For example, there was an increased emphasis on the value of individual support and feedback from both teachers and peers, particularly in relation to editing. Sharing ideas and writing as a class or with partners was also more frequently cited, especially as a resource for "magpie-ing" (borrowing ideas or language choices from others). This included noting the benefit of teachers who wrote alongside and shared their writing, which meant "*we can sometimes use some of the ideas from hers*" (Primary). There were new references to freewriting and its affordances, which suggest that students found it eased the problems of starting writing. For some, freewriting appeared to reduce the cognitive load of attending simultaneously to idea generation and accurate transcription: *"it's helpful because while you're writing, it doesn't make you think like, oh, I've got to do punctuation, I've got to do this and that. You can just do it after"* (Secondary). For others, it was principally a strategy which enabled idea generation and imaginative engagement: *"it helps you get your ideas flowing"* (Secondary); and *"it helps us use our creative thinking…it lets you access your imagination more"* (Secondary). The use of artifacts and different environments for writing were also identified as helpful for idea generation and descriptive writing, because, as one student explained, being outside *"helps trigger ideas, whereas before just sitting in the classroom with loads of people talking and things, it was quite hard to think of anything" (Primary)*.

Students made far fewer comments about what they felt was **unhelpful for writing**—a total of just 13 comments across both interviews, compared with 264 comments on what they found helpful. This could be attributable to the absence of a direct question in the interview addressing this, and certainly in future research, it would be useful to explore this more explicitly. What students did comment on linked very directly with common teaching practices in England, which are sometimes very directional and over-scaffolded (Barrs, 2019). Students identified tightly-prescribed tasks or processes (such as obligatory planning) as inhibitors. Sentence starters, paragraph starters or "tight themes" were often perceived as disabling, with one student observing that *"I don't know how to write it if it's not my story"* (Secondary).

The post-intervention interview included specific questions about any **changes in teaching** they had observed since the writing residential. Students in all focus groups observed recent changes in teaching followed teacher attendance at the writing residential, and the majority found the changed practices supportive. A common theme was the perceived relaxation of pressure and prescription:

- "*(she's) taking the pressure off us*" (Primary);
- *"she's been a lot more open…(less) precise about what we're going to do"* (Primary);
- *"it's less kind of about rules and it's more about creativity"* (Secondary);

TABLE 3 The sub-themes of the perceptions about the teaching of writing theme.

Sub-theme	Definition	Exemplar data segments
Helpful for writing	Teaching strategies or behaviors which help with learning about writing	"She talks us through what we could improve on" [Freewriting] "*it helps you get your ideas flowing*"
Unhelpful for writing	Teaching strategies or behaviors which are unhelpful with learning about writing	[Prescribed topics] "*I don't know how to write it if it's not my story*"
Perceived changes in teaching	New or changed teaching strategies or behaviors noticed since the writing residential	*"it's less kind of about rules and it's more about creativity"* "*before we were like locked up and we had to do stuff we were told to do, now we've been let out*"
Perceived impact of writer	Ways in which the professional writer has impacted on teaching and learning about writing	[They give] "*a professional view on writing…like how she plans and how she writes it down and how she sees the work*" "*The writer told us how to zoom in on our stories and make them better…like put all the detail in*"

- *"before we were like locked up and we had to do stuff we were told to do, now we've been let out"* (Secondary).

Freewriting was again cited, this time as a newly-encountered strategy which offered particular creative license because "*you don't really have any limitations, so it's literally whatever you want it to be… basically you're free to determine your outcome* (Secondary)." Students also noticed "more active" and "interactive" approaches to writing and greater collaboration, identifying talk partners, editing buddies, paired writing and peer feedback as supportive. They also appreciated more time and "*space to think*" and "*more space to just write,*" without having to "*worry about trying to get bits done right then and there*" (Secondary). Some students observed that teaching had become less didactic: their teachers had *"backed off a bit"* and were less inclined to "*spoon-feed*" (Secondary). Rather than provide detailed guidance, these teachers tended to offer "clues" or prompts, and encourage independent thinking:

- *"(Before), she just gave us something to write down and we just wrote it. And now it's kind of thinking of our own ideas"* (Primary);
- *"Before…she'd have like specific tasks, whereas now she just gives us an idea and we have to use our brains more* (Secondary)*";*
- *"I think she's helping us more by not helping us as much"* (Secondary).
- *"(The teacher) is now a last resort for us"* (Secondary).

These comments regarding a less didactic approach were paralleled by observations that where teachers positioned themselves as co-writers, writing in the classroom, students were more aware of shared learning—"*She can learn at the same time, but then she can teach us what she's learned*" (Primary). This included recognition that the teacher as a writer does not know *"what they're doing 100% all the time … they don't really know what they're doing at some points"* (Primary).

In the post-intervention interviews, students also discussed the experience of being taught by **professional writers**. They welcomed writers' specialist expertise: they could provide *"a professional view on writing…like how she plans and how she writes it down and how she sees the work"* (Secondary), and "*you trust them*" (Secondary). Students noted writers' expert subject knowledge about *"good ways to do it"* (Primary), *"what works well"* (Secondary) and the *"qualities people look for"* (Secondary). This included comments on and growing purposefulness in editing through being advised "*to zoom in on our stories and make them better…like put all the detail in" (Primary)* or "*how to cut in, like cropping a picture but you like cut into what you're actually supposed to be writing about, other than like trailing off"* (Primary).

Writers' approaches to teaching were widely regarded as both "fun" and "helpful." In particular, students identified their help with idea generation: *"the way (the writer) teaches it helps you a bit more because he knows how difficult it is to think of the ideas"* (Secondary). Their use of "fun scenarios," "stories," modeled examples and suggested possibilities *"makes your imagination run wild"* (Secondary). Writers were perceived as encouraging—"*by saying you can do it*" (Primary) and as promoting a sense of ownership—"*he said it doesn't mean that ours is wrong—it's just the way we think of it*" (Primary); *"it doesn't matter what other people think, it's about what you think*" (Primary). They also provided "inspiring" role models. According to one primary group, having a writer in the classroom: *"gives you ideas"; "gives you a voice"; "gives you an idea of what you want to do when you're older"; "(gives you) a sense of what you need to do (to be a writer)"; "helps us improve stuff"; "sharpens the mind"* and *"inspires us."*

However, not all students welcomed all aspects of change in teaching. Some found freewriting stressful and preferred more structure and time to plan: *"I like having a subject to write about more than making up something, because I find it hard* (Primary)." Peer feedback was not always regarded as helpful, often because it was insufficiently critical, and some students preferred to rely on their own judgement. A few students found professional writers *"just a bit over the top"* and *"intimidating"*: *"having a professional writer, you feel like, oh, this has got to be perfect, and if I read it out and it's not good…he's going to criticize me"* (Secondary).

In summary, students' perceptions of the teaching of writing show awareness of the teachers' changed classroom practices after the intervention. In particular, many students enjoyed freewriting because of the freedom it gave them and its support for ideation. They also noted the less didactic teaching with reduced teacher control of the writing tasks and greater student freedom, and they welcomed the expertise of the professional writers. Some students, however, found the greater freedom and reduced teacher direction less helpful.

4.2. Enjoyment and motivation to write

This theme focuses more directly on students' reported enjoyment of their writing lessons, and the established positive connection between enjoyment and motivation to write (Reeve, 1989; Zumbrunn et al., 2019). The pre-intervention interviews invited students to consider whether they enjoyed writing or not, and whether they felt pleased with their writing. This was followed up in the post-intervention interviews with more focused questions on their enjoyment of the writing they had been undertaking during the intervention. The sub-themes are presented in Table 4.

Across both sets of interviews and all age groups, **enhancers** of enjoyment related to creative freedom, autonomy and ownership, and use of imagination—typical comments included:

- *"I just like being free when I write…I like being in my head when I'm writing. I like writing what I'm thinking, what I like. I just enjoy writing…whatever I want"* (Primary);
- *"The thing I most enjoy about writing is how much you can use your imagination…it really is just something of your mind that will go the reader and say 'wow'!"* (Primary);
- *"I really, really do like creative writing because I think that I can just kind of like set my mind kind of like free, just like let everything out because it's my piece of writing and like, well obviously, you can criticize it but it's my point of view"* (Secondary).

With few exceptions, students favored creative genres such as story writing, poetry, and play scripts, which they associated

TABLE 4 The sub-themes of the enjoyment and motivation to write theme.

Sub-theme	Definition	Exemplar data segments
Enhancers	Aspects of the teaching of learning and writing which enhanced enjoyment and motivation	"*The thing I most enjoy about writing is how much you can use your imagination . . . it really is just something of your mind that will go the reader and say 'wow'!*"
Detractors	Aspects of the teaching of learning and writing which detracted from enjoyment and motivation	"*I actually hate planning for creative writing. . . it kind of stops the freedom because if you're sat there planning, say, a mind map. . . it's just really irritating, especially if you already have the entire story plot in your mind*"

with greater freedom and personal expression. Approximately one quarter of students claimed to write at home for pleasure either regularly, *"occasionally"* or *"when bored,"* and invariably chose creative forms. Aside from text messaging, Facebook and snapchat (which they didn't count as *"long"* writing), the most frequently cited genres were stories, poems, songs and diaries.

In contrast, **detractors** from enjoyment included non-fiction writing, notably report writing and essays, which they associated with rules and constraints, such as having to use "PEE" paragraphs (a widely-used paragraphing scaffold in England: Point; Evidence; Example). They also disliked prescribed tasks and topics:

- *"I don't like the fact that most of the time you just have. . . to do stuff that the teacher says"* (Primary);
- *"I don't like people telling me 'you have to write this'"* (Primary).
- *"I don't like doing things I'm told to do"* (Secondary).

Some students found inflexible routines such as planning before writing or correcting after writing painful and demotivating:

- *"I actually hate planning for creative writing. . . it kind of stops the freedom because if you're sat there planning, say, a mind map. . . it's just really irritating, especially if you already have the entire story plot in your mind"* (Secondary);
- *"I hated it when I went to [the teacher], because then my dream was just crushed. . . it's taken me at least two days now to complete two words. . . she put all the mistakes in and I have to go and correct it now, and it's killing me"* (Primary).

One clear message in the post-intervention interviews was the enjoyment students derived from new approaches to classroom writing. Whilst this might be due to a sense that they were supposed to enjoy the post-intervention teaching, the detail in the comments show precise reflections on what enhanced their enjoyment, and did relate specifically to teaching strategies encouraged in the intervention. Many of the students described the changes in teaching approach as liberating and *"fun,"* in terms of pleasure: "*It's a lot more free and it's not as strict, because we get to kind of relax and just have fun and just write*" (Secondary); and in terms of excitement: *"(writing before) was pretty boring, but this is more exciting. . . I like it when I can write without having to think about it"* (Secondary). They identified increased freedom to create and exercise their imaginations as significant, and freewriting was enjoyed particularly.

Students welcomed the more flexible approaches to generating writing, not only the freewriting which "*really let my ideas flow*" (Secondary) but also the greater attention to drafts: "*I've enjoyed doing drafts, because before we didn't do drafts and it's a lot harder to edit it and find every detail. But when you look through it and then you make another draft it's a lot easier*" (Primary). They also enjoyed a greater emphasis on interactive and collaborative approaches, including more sharing of ideas, talk partners, and peer review: "*The whole classroom has become more relaxed—you can share ideas and feedback* (Secondary)*."* Some students identified more relaxed classroom environments for writing (e.g., shoes off; teacher as co-writer) and different locations for writing as promoting engagement.

The encouragement of teachers and professional writers were felt to impact positively on motivation:

- *"(the writer) was well enthusiastic. . . it makes you want to do it more"* (Secondary);
- "*you want to put your best into it. . . you want to make an impression to show that you're capable of the same level when you get older"* (Secondary);
- *"if she likes something in your book she tells you to do it at home and like she encourages you to do more writing at home"* (Secondary).

Some also felt their attitude to writing had changed or that they were more inclined to engage in writing beyond school as a consequence of the intervention:

- *In September I didn't really like writing, now I do* (Primary);
- *I didn't really like writing but now I'm getting into it. I can do more* (Secondary);
- *At the start I didn't really enjoy poetry as much, and when (the writer) came up with the "I remember" poem idea, I've written stuff at home and I've used that kind of technique* (Secondary).

Some students observed changes in behavior and motivation post-intervention, with one student observing that "*People mucking about has gone down—they enjoy the tasks more so they're putting more into it*" (Secondary).

However, enjoyment of intervention activities was not unqualified. A few students disliked the more open writing briefs, preferring a structured approach and greater guidance. Freewriting was sometimes perceived as too pressured:

- *"These past few weeks have been rushed writing. I like to plan and just pause and think. . . setting what it should be, the structure, knowing what to do"* (Secondary).

- *"The 'just write' thing is freeing in some ways but also it pins you down because you know you have to produce a good piece within five minutes of thinking of it… often I don't have ideas straight away"* (Secondary).

For some, the emphasis on editing was tedious and stressful: *"(it) takes loads of time"* and *"makes you stress, you just want to feel free and do what you want in your stories"* (Primary). Less confident writers did not enjoy sharing their writing aloud, because "*I feel like I just can't compete*" (Secondary) or because of dissatisfaction with their writing, "*I always think I can do something better*" (Secondary). Others disliked peer review and found unhelpful feedback from peers irritating, for example, *"you ignore it because sometimes they just point out all your missing full stops and that's it"* (Secondary).

Overall, the students' responses in this theme demonstrate a strong link for many between enjoyment of writing and motivation to write. Greater creative freedom was associated with increased agency and ownership of writing, and greater emotional engagement, whilst the provision of supportive feedback, including peer feedback was welcomed.

4.3. Confidence and perceived skills

The pre- and post-intervention interviews sought to elicit students' confidence in themselves as writers, and their own self-efficacy perceptions, in order to determine whether the intervention had in anyway altered their self-perceptions. The analysis generated six sub-themes, as described in Table 5.

In the pre-intervention interviews, the student **self-descriptions** of themselves as writers divided rather evenly across different proficiency levels. Approximately one third described themselves as "*good*" writers who were usually pleased with the writing they produced. A further third claimed they were "*OK*" writers or were "*sometimes good, sometimes bad*," often depending on the nature of the task or their interest in the topic. A final third considered themselves "*not good*" or "*rubbish*" and a number felt they couldn't judge: *"I don't know, it kind of depends on whether anybody else says it's good or not"* (Secondary). The majority of students also felt their writing had improved gradually over time, with their **perceived strengths** being accuracy, use of the imagination, and ideas for writing. Nevertheless, when reflecting on **perceived weaknesses**, half of all responses across the age groups described difficulties with the "*struggle to get started*" (Primary) and with idea generation. These comments indicated a sense of personal inadequacy in this area: the inability to "*think of ideas*" (Primary), *"to come up with ideas"* (Primary), and for one student, the perception that *"I just don't have any ideas"* (Secondary). A small number identified weaknesses in vocabulary and the need to *"look in a thesaurus more often" (*Primary) and problems with concentration on the writing task, with one student reflecting that *"After a while I just get a bit distracted"* (Secondary).

In the post-intervention interviews, the students made fewer comments about their perceived self-efficacy, but made significantly more comments about their perceived progress, talking about their improvement in relation to the teacher intervention rather than the more general comments about progress over time which featured in the pre-intervention interviews. They also made more comments post-intervention about what supported or diminished their confidence, albeit these numbers are small (see Table 6).

TABLE 6 Showing the number of data segments coded to each sub-theme.

Sub-theme	Pre-intervention	Post-intervention
Self-description	66	47
Perceived strengths	58	52
Perceived weaknesses	69	40
Perceived progress	40	126
Helpful for confidence	4	20
Unhelpful for confidence	4	11

TABLE 5 The sub-themes of the confidence and perceived skills as a writer theme.

Sub-theme	Definition	Exemplar data segments
Self-description	Labels students use to describe themselves as writers	• *"sometimes good, sometimes bad"* • *"I don't know, it kind of depends on whether anybody else says it's good or not"*
Perceived strengths	Personal strengths or capabilities as writers	• *"my imagination"* • *"I don't make many mistakes in my writing"*
Perceived weaknesses	Personal weaknesses as writers	• *"I struggle to get started"* • *"After a while I just get a bit distracted"*
Perceived progress	Aspects of writing improved	Finding *"it easier to think of things to write"* • *"before I didn't use as much description as I do now"*
Helpful for confidence	Factors that enhance self-confidence	*"Because we've had the chance to write what we want… it makes you more proud of what you've done because it's more yours"*
Unhelpful for confidence	Factors that undermine self-confidence	[Sharing writing] *"When my friends read it out, I'm like oh I wish I could be like that. They're much more better than me, so I put myself down"*

Some of the comments on **perceived progress** cited general improvements: for example, one student maintained that "o*ver, say, the last six, seven weeks I've improved drastically… it's had a massive impact*" (Secondary) whilst another felt *"It's made my levels go higher"* (Secondary). However, many of the comments referred directly to the changed teaching strategies introduced after the writing residential, including the use of personal notebooks—*"the orange books* [personal notebook] *and all the new ways we're being helped have definitely helped me a lot"* (Primary). There was particular reference to improved ability to generate good ideas, with students reporting finding "*it easier to think of things to write*" (Secondary), being "*better at making stuff up"* (Primar*y),* and perceiving that *"the teacher likes my stories more now… I've got better ideas*" (Primary). At the same time, far fewer students identified generating ideas as a **perceived weakness**. Other perceived improvements included increased accuracy and control in text structure: *"I've definitely improved on ending and beginning sentences, paragraphs, punctuation, lots of things… all because of (the teacher) and the support she's given us in our story writing*" (Primary); the use of greater descriptive detail (*"before I didn't use as much description as I do now");* and vocabulary choice, using "*a wider range of vocabulary"* (Secondary).

The students reported high levels of satisfaction with the writing they had produced over the course of the project, with many claiming their confidence had improved:

- *"I've got more confident with my writing"* (Secondary*);*
- *"Because we've had the chance to write what we want… it makes you more proud of what you've done because it's more yours"* (Secondary);
- *"Usually I'm not confident… because I don't think I'm very good… but because of this little project I feel a bit more confident with my work because occasionally it's actually quite good and it makes sense*" (Secondary);
- *"I feel a bit more free with my writing… like I feel I could write more… I feel more confident when I'm writing stuff like this*" (Secondary).

Students often associated progress and increased confidence with perceived shifts in classroom approach—in particular, the greater emphasis on idea generation; the use of new drafting and revising strategies which had made writing easier; and more opportunities for collaboration and feedback at formative stages of writing. Improvements in idea generation were often attributed to "*warming up"* activities and sharing of ideas before writing, which "*helps my mind get going and I'm writing better stuff"* (Secondary). Writing activities which encouraged students to draw on their personal experience or memories as a basis for narrative were perceived by some to have strengthened confidence because *"starting with the memories and then making it more imaginary… gave us more confidence in a way"* (Secondary). They were also viewed as increasing the sense of ownership and individuality: *"it's highly unlikely as well that someone's going to have written the same sort of story as yours, which is a nice feeling that you've written your own work*" (Secondary). The emphasis in project activities, and particular the writers' testimonies, on the value personal experience or observation offered for story-writing appeared to have altered some students' self-regulation of their writing strategies:

- *"Well [the writer] said he got his inspiration from real life, like, occurrences, like road names, he'd use them… I've started to use my real-life experiences of seeing things and put that in to a story which I'm going to write for my assessment"* (Secondary);
- *"I have used life experiences and all those things, because you can't just make them out of nowhere. But I'm, sort of, looking out for them now"* (Secondary).

Students' perceived progress was also linked to improvement in revising/editing skills as a consequence of changed teaching strategies. Younger students claimed to have started editing or were doing "more editing." This involved re-reading for sense, correcting errors, improving word choice and sometimes more substantive change such as restructuring for reader impact:

"I read through my story and mine features a ghost. And in the second paragraph it already started about who it was. And then I read through it and actually they could, if I got rid of that bit and put it at the end… then the readers could guess who it is" (Primary).

Some older students described revising their texts in new ways. For some, this related to being more inclined to re-read and "*check*" their work, noting for example, a change from limited attention to revision where "*occasionally I've changed a few sentences… but half the time I didn't*" to greater awareness of the value of re-reading—"*now I will always read, I'll try and get through all of it*" (Secondary). Other students described paying greater attention to deleting unnecessary material and making every sentence count:

- *"In the past I used to… just throw everything in there, you know, ramble. But now I think about every sentence I write and if I feel it doesn't fit… I do cross it out—that makes for very messy writing!"* (Secondary);
- *"I used to ramble quite a lot. And now I think about every single sentence I write, like it has to be part of the story… so I'll write a draft, and then I'll think what I don't need… it may work but it's not relevant to the actual story, it doesn't need to be in there."* (Secondary).

A smaller number of students identified which teaching strategies they perceived as **helpful for confidence**. New drafting strategies such as freewriting were perceived to have helped with fluent idea generation and facilitated a more effective writing process, where planning was conceived more broadly than an outline of the intended text. One student reflected that when "*we have to like plan out our things, sometimes I do the freewriting thing just so I can put it down and it's kind of a draft in itself"* (Secondary). Another student, referring to the experience of being co-taught by the professional writers, had learned about a more flexible approach to generating ideas, where *"instead of just putting like one idea and just sticking with it, you can put multiple ideas and then choose whatever one you want, and edit it"* (Secondary). Students also noted the more collaborative writing environments, which included sharing of writing, as helpful to *"build confidence."* For some, this way of working was "*less competitive*" (Secondary).

Younger students in particular seemed to find support in the mutuality of collaborative working because *"I help her with her writing and she helps me with mine"* (Primary); and *"if you have a problem you can just ask (your talk partner) and they can help you"* (Primary). The collaborative writing environment also built confidence through creating space for positive or "*constructive*" feedback—"*we read all our homework out and she said just give positive feedback and it helped and made you feel nice about what you've done*" (Secondary). When teachers shared their own writing problems or got emotional reading their work aloud, students identified with them and felt reassured:

- *"People think, ah, she's an English teacher, she should be confident, proud in her work, but she's not, she has insecurities about her work and obviously we can relate to her"* (Secondary);
- *"When she was reading it, she started turning round because she got emotional… don't be scared when you're reading your work out"* (Primary).

However, for a few students the changed teaching strategies were perceived as **unhelpful for confidence**. Those already less confident writers sometimes found hearing their friends reading their work demoralizing because, as one student expressed it, "*oh I wish I could be like that. They're much more better than me, so I put myself down"* (Secondary). For these students, sharing their writing was a fearful experience, making them "*so scared that other people would judge it badly."* Equally, in contrast to the many student observations of the helpfulness of freewriting, a minority found it difficult and felt they had lost confidence or that their writing had deteriorated: *"I think I'm going the opposite way with my creative writing…when I was little, I used to be really creative, but now it's kind of just going"* (Secondary).

Comments in this theme show many students were more aware of perceived progress in writing post-intervention than increased self-efficacy, and increased confidence attributed to a more collaborative environment, sharing work with each other.

Overall, the analysis of the focus group interviews shows clear recognition of the changed practices in teaching writing during the intervention, and in general, the students responded with positivity and enjoyment to these changes. Whilst there is always the possibility of a halo effect in their responses, their references to specific strategies or practices with high alignment to those of the teachers' residential experiences suggests they are genuinely commenting on the particular changed writing environment encouraged by the Arvon writing community.

5. Discussion

Before discussing the implications of these findings for our understanding of motivation to write, it is important to be cautious, even parsimonious, in how we interpret these data. Firstly, they are highly context-specific. The Arvon writing residential is founded upon a very definite sense of values and commitment to a particular kind of writing community. The teachers in our study were willing to attend the residential despite its demands on their own free time, so may not be representative of all teachers of writing: certainly some were already keen writers, and others were motivated by a desire to learn more about being a writer in order to help their classroom practice. The writing undertaken was creative writing, thus not reflecting the wider range of writing types student are expected to master as they mature as writers. The focus group interviews are time-specific and closely linked to the intervention, and we cannot be sure that the student responses would be sustained over time. Secondly, the analysis synthesizes the data into themes and sub-themes across the dataset, but this is not generalisable, even within the dataset—for example, not all teachers gave the students notebooks for "messy" writing. As would be expected, the transfer of learning by the teachers from the Arvon writing residential was not uniform, and was mediated by the teachers in different ways. Therefore, in the discussion which follows, we seek to explore the implications of the students' responses through consideration of two over-arching themes, rather than focusing too closely on particular details, and from this suggest fruitful lines of enquiry for further research.

5.1. The importance of autonomy and choice in writing

One over-arching theme running through the students' responses is how they valued the greater autonomy and choice that they experienced in the post-residential intervention. This connects with the emphasis on autonomy and autonomous motivation in the research (Ryan and Deci, 2000, 2020; Turner et al., 2014; Robinson, 2023), and particularly with study De Smedt et al. (2020) in the context of reading and writing. The student comments indicate how they value being able to exercise volition when learning to write: they referred especially to freewriting, which supported idea generation and allowed them to follow their own ideas. They also enjoyed having writing notebooks, or "messy" books, which again gave freedom about what to write, but also freedom for teacher intervention and evaluation. For some, the new sense of autonomy was expressed in terms of greater ownership of their work *("my story"; "my point of view"*), and a reduced dependence on the teacher, who for one student had become a "*last resort."*

In parallel to the students' espousal of autonomy in writing as a positive thing, their dislike of being controlled was also evident, particular when they talked about what diminished their enjoyment and motivation to write (the sub-theme, "detractors"). They dislike the teacher telling them what they have to write, having "*to do stuff that the teacher says,*" and having "*to stay in the boundaries."* On one level, this relates to the desire for greater choice about topic and what to write, but it also relates to very constrained writing practices. The students noted changes in their teachers' behaviors, such as being less prescriptive about what they were doing, having less emphasis on rules, and less constraint—or as one student pithily expressed it, *"before we were like locked up and we had to do stuff we were told to do, now we've been let out."* The students' reflections regarding a lack of autonomy in the writing classroom echo broader national concerns about a highly-constrained writing curriculum (Bearne, 2017; Barrs, 2019; Hardman and Bell, 2019). Typical writing practices in England involve a high level of direct instruction, tending to tell students exactly how they must write a particular text, and more oriented toward normative compliance than to fostering understanding of how texts work and how writers' choices can shape reader responses. Of course, teachers themselves

do not have full autonomy in teaching writing according to their own interests and values as many are required to teach within the expectations of a specified writing curriculum, or with specific writing assessments in mind.

5.2. The importance of a collaborative writing community

The second over-arching theme emerging from our analysis is the students' recognition of a change in the atmosphere of the writing classroom. They felt that the classroom had become more relaxed, and less pressured, and one where collaboration was actively encouraged. The use of talk partners and writing buddies was received positively, and students seemed to enjoy the opportunity to "*share ideas and feedback.*" The sense of a collaborative writing community was strengthened by the visibility of the teachers as writers themselves, sharing their writing, but also sharing their vulnerability, such as becoming emotional when reading aloud their writing, and revealing "*insecurities about her work.*" It also involved teachers being positioned as learners within the community, who can "*learn at the same time*" as the students, and not necessarily be certain about everything. From a socio-cultural perspective, Prior has argued that "*teachers in schools are always co-authors (often dominant ones) in students writing*" (Prior, 2006, p. 58) because of their role in the production of student texts through determining what students, when they write, and the changes made through informal and formal feedback. However, what is perhaps more evident in the classrooms in our study is a sense of teachers as co-writers, not from a position of superiority, but from one of shared learning.

Both Hidi and Boscolo (2006) and Pajares and Valiante (2006) refer to collaborative writing as motivational, but the students did not mention collaborative writing, where one text is produced by two or more authors. What the students seem to be discerning is a change to a more collaborative community of practice for writing, bringing together people with a shared purpose, and engaging in "*a process of collective learning in a shared domain*" (Wenger-Trayner and Wenger-Trayner, 2015). This collective learning community may also have created a stronger sense of the meaningfulness of the writing. The notion of meaningfulness of a task or domain has been linked with motivation (Wigfield and Eccles, 2002; Behizadeh, 2014) and Hidi and Boscolo argue that such meaningfulness is less about the writing tasks themselves but is "*deeply rooted in the context in which writing is a meaningful authentic activity*" (2006, p. 144). The students made no direct reference to meaningfulness, but the comments in Table 6 above may indicate that the changed ways of working together, including the greater autonomy, allowed for more emotional engagement with the writing as intrinsically meaningful to them.

5.3. A motivational climate for writing

The two over-arching themes discussed above are less about specific teaching strategies than they are about the context in which writing occurs. They point to the importance of the environment for writing and how it can be a motivational climate for writing. Robinson (2023) argues that the motivational climate is not simply about observable teaching practices but about how students feel about their teaching and the meanings they create from it. Certainly, the responses of the students in our study reflect more than the like or dislike of particular teaching strategies. The students may have shown high appreciation of the freewriting strategy, but this might diminish over time if repeatedly used over time: its significance is in the autonomy it offers. Previous research on motivation has often identified constructs or characteristics which lead to higher motivation. For example, Turner et al. (2014) structured an intervention around the principles of autonomy, competence, belongingness and meaningfulness; Linnenbrink-Garcia et al. (2016) focused on the need to support students' feelings of competence, autonomy, use personally relevant and active tasks, emphasize learning and de-emphasize social comparison, and encourage feelings of belonging. Specifically related to writing motivation, Bruning and Horn (2000) synthesized research findings into four constructs: nurture positive beliefs about writing; establish authentic writing goals; generate a supportive context; create a positive emotional environment. However, it may be more valuable to think more specifically about a writing environment, within which these characteristics might be integrated, and to conduct more studies which look more holistically at the environment for writing.

As Camacho et al. (2021) review indicates, research in writing motivation has tended to focus predominantly on self-efficacy. Although there have been studies which have investigated the relationship between particular teaching strategies and motivation, these focus on the strategy not the teacher. However, it may be even more important to consider the role of the teacher in establishing a motivational writing environment. Research has addressed teacher competence or self-efficacy in teaching writing (Cutler and Graham, 2008; Hodges, 2015; Wright et al., 2019), rather than considering their identity as writers. The writing residential attended by the teachers changed, to varying degrees, their identity as writers and their stance toward writing: it was this change that translated into the way they altered the environment for writing. Further research might focus more on the relationship between a teacher's identity as a writer and how this plays out in the classroom environment. At the same time, it is important to take account of the realities of the classroom and the educational context. Whilst a writing community might ideally involve members being "*mutually engaged in using writing to accomplish a desired purpose*" (Graham, 2018, p. 259), in many writing classrooms there is limited mutual engagement, and teachers struggle to engage students in writing activities. Although a more constructive writing environment might enable better engagement and motivation to write, in practice, many teachers are juggling with externally-imposed constraints which may conflict with their own espoused beliefs and enacted practices.

6. Conclusion

In this paper, we have highlighted the importance of the classroom environment in supporting and sustaining motivation to write. In particular, we have pointed to students' positive

responses to the collaborative environment they experienced, resonating with Bruning and Horn's advocacy of "*a climate of trust, caring, and mutual concern*" (Bruning and Horn, 2000, p. 34), and their valuing of autonomy and choice. These facets are strongly linked to the nature of the intervention, and further research in different contexts is needed to investigate this further. It is also important to investigate the balance between student autonomy and teacher control, particularly in relation to direct instruction. Given the known importance of explicit teaching of writing (Graham and Perin, 2007), it may be possible to conceive of writing environments where direct instruction is not perceived by students as synonymous with loss of autonomy.

Greater attention to the writing environment would also benefit from more integration of sociocultural and sociological perspectives on writing, which foreground writing as social practice. The Writer(s)-within-Community model (Graham, 2018) is significant in bringing together cognitive and socio-cultural insights, and in emphasizing the notion of a writing community. It conceptualizes the writing community as layers of contextual interactions, including the immediate community of writers, their purposes and collective histories, and also the broader contextual influences from policy, culture and history. Further inter-disciplinary research, ideally with researchers from different disciplines, might usefully expand on this by incorporating sociological thinking about identity, and about structure and agency into existing cognitive perspectives. This has implications for the design of future research, and particularly, writing interventions. Wigfield and Koenka (2020) have suggested that motivation research needs to take a new direction by moving away from interventions focused on individual student motivation toward interventions more attentive to the learning context. Echoing this, we would argue for a more situated perspective on motivation in writing which recognizes that motivation is not simply an internal characteristic of an individual but is situated within the context of a community of writers.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the University of Exeter, United Kingdom and the Open University, United Kingdom. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

DM and TC were responsible for the research design, project management, and data analysis. LO led on the data collection and analysis of the student interviews. DM wrote the manuscript. All authors contributed to the manuscript and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

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The motivational beliefs and attitudes about writing of international students enrolled in online academic English classes during the COVID-19 pandemic

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Despite the growing attention to motivation, less is known about international students' motivational beliefs and attitudes about academic writing. In this study, we aimed to explore the motivational factors influencing international students' performance in academic English classes at a large public research university in the western United States. Specifically, we examined students' self-efficacy, goal orientation, beliefs, and affect for writing, along with their malleability, and their contributions to academic achievement in academic English writing classes. The sample comprised 97 students, predominantly from China, enrolled in online academic English courses. Exploratory factor analysis tended to extract more complex models of the motivational constructs than principal component analysis. Students' self-efficacy and enjoyment of writing significantly increased from the beginning to the end of the 10-week term, suggesting motivational factors' malleability. Hierarchical linear modeling revealed that students' self-efficacy at the beginning of the term positively predicted their final grades. However, logistic mixed modeling revealed that students who held stronger beliefs about writing as a means of exploring and expressing ideas had lower odds of passing. Our findings contribute to the understanding of international students' motivation in academic English settings in higher education and offers potential pedagogical interventions to enhance their academic success.

KEYWORDS

writing, composition, motivation, affect, efficacy, goal orientation, L2 learners, international students

Introduction

In the last decade, the number of international students enrolled in American universities has increased by 26%, to over 900,000 students (Institute of International Education, 2022). Key reasons for studying abroad include receiving a high-quality education at a prestigious institution, increased future earnings, and gaining global cultural capital (Kim et al., 2018). However, many international students face both acculturative and academic challenges in their educational pursuits (Wu et al., 2015; Heng, 2018), with their academic writing skills in their second language (L2), English, being an oft-cited barrier to success (Andrade, 2006; Sherry et al., 2010). Many universities offer basic English as a Second Language (ESL) or academic English

writing classes to provide students with the necessary skills and confidence to succeed in their academic writing tasks (Flowerdew and Peacock, 2001; Ferris and Hedgcock, 2004; Bauer and Picciotto, 2013). However, factors beyond English language proficiency, such as international students' motivation, self-efficacy, beliefs, and affect also play pivotal roles in English language writing and, by extension, their academic achievement (Phakiti et al., 2013; Zheng et al., 2018).

In addition to globalizing the student body, universities have increased online course offerings over the past decade (Xu and Xu, 2019). The pandemic's shift to emergency remote teaching and the subsequent proliferation of post-pandemic online instruction has metamorphosed the educational landscape, making it accessible to a broader spectrum of learners (Johinke et al., 2023). Although online instruction has some advantages, such as greater access and flexibility for students and improved progress to degree completion (Xu and Xu, 2019; Fischer et al., 2020; Martin et al., 2022), it poses new challenges for students, such as a more considerable need for self-regulation skills and intrinsic motivation (Broadbent and Poon, 2015; Xu and Xu, 2019). More specifically, motivational factors such as self-efficacy, goal orientation, beliefs about learning, and affect contribute to students' course engagement and self-regulation, which, in turn, promote superior academic outcomes in their online courses (Broadbent and Poon, 2015; Alemayehu and Chen, 2021). There is some evidence to suggest that international students with greater self-efficacy, positive beliefs, and affinity for English language learning have enjoyed greater success in their online courses (e.g., Zheng et al., 2018; Wang and Zhan, 2020). In contrast, disengagement from the curriculum, low self-efficacy, and anxiety about English language learning have been found to impede international students' success in online writing classes in English during the pandemic (Lin and Nguyen, 2021).

Whereas motivation is a multifaceted construct that plays an essential role in writing achievement and academic success (MacArthur et al., 2016; Ling et al., 2021), its contributions to L2 writing performance among international students needs to be better understood. On the one hand, international students often experience pressure to succeed academically, which, coupled with the stress of adjusting to a new cultural environment, may exacerbate generalized stress and anxiety about writing in English (Pappamihiel, 2001; Yeh and Inose, 2003). Further, international students may experience stigma associated with remedial, academic English courses, which can lead to negative attitudes and lower motivation (Moss et al., 2014). On the other hand, international students' academic histories before studying abroad may bolster their motivational beliefs and affect for writing in English. Unlike domestic students in remedial writing classes who show pervasive motivational problems for writing due to their history of academic struggles (MacArthur et al., 2016), international students may have more productive motivational beliefs and attitudes for writing and learning due to their strong records of academic success in their home countries and primary language. Students' motivation, beliefs, and affect for writing in their first language (L1) have been found to transfer to their L2 (Saeli and Cheng, 2019; Zhu et al., 2022). Consequently, while international students may need the support of academic English classes to better prepare them for the writing demands of undergraduate schooling in English, their past academic achievements and language learning experiences may lead them to exhibit more productive self-efficacy, beliefs, and attitudes toward writing than their domestic peers. Thus, there are mixed and sometimes contradictory accounts of international students' motivation for writing in English. Further, many studies have addressed in-person instruction (Saeli and Cheng, 2019; Zhu et al., 2022), yet less is known about the roles these factors play for international students when academic English classes are delivered online.

Academic English writing and motivation for international students

Writing effectively in an academic context is a complex, multifaceted process that requires domain knowledge, language proficiency, and an understanding of rhetoric and genre conventions (Scarcella, 2003; Bazerman et al., 2017). For international students, academic writing in English is particularly challenging (Robertson et al., 2000). Writing in English requires not only linguistic knowledge of English (Flower and Hayes, 1981; Graham and Perin, 2007) but also a nuanced understanding of the cultural and rhetorical norms and expectations of academic writing in English (Silva, 1993; Zamel, 1995; Connor, 2004; Wang and Zhan, 2020), some of which vary across disciplines. Adjusting to a new educational system can be particularly challenging because the expectations and norms of academic writing in English-speaking countries may differ significantly from those in the students' home countries (Zamel, 1997). Thus, it is important to study the motivation, beliefs, and attitudes of international students in academic English classes, as these can affect their ability to develop writing skills in English. Indeed, international students' English language learning experiences may shape their motivation, self-efficacy, attitudes, and beliefs about writing, which may drive their efforts, persistence, and success in mastering writing skills.

Motivation plays an important role in contemporary models of writing (Hayes, 1996; Graham, 2018). Motivation is critical in the learning process, driving students' engagement, persistence, effort, and academic performance (Eccles and Wigfield, 2002; Pintrich and Schunk, 2002). Motivation is a complex, multidimensional construct shaped by individual characteristics and contextual factors, and when combined with self-regulatory processes, guides student choice, effort, persistence, and achievement (Pintrich and Zusho, 2007). These dimensions reflect a range of interrelated factors, such as their confidence, personal goals, beliefs, values, and emotions (Troia et al., 2012; Conradi et al., 2014; MacArthur et al., 2016; Camacho et al., 2021). Researchers have adopted four dimensions of motivation to explore writing development: self-efficacy, goal orientation, beliefs about writing, and affect (Troia et al., 2012; MacArthur et al., 2016).

The motivational construct that has arguably received the greatest attention from writing researchers is self-efficacy (Camacho et al., 2021). Self-efficacy, a concept derived from Bandura's (1977) social cognitive theory, refers to a person's judgment of their ability to complete a specific task or reach a particular goal successfully. That is, students with high levels of self-efficacy have high expectations that they will complete a task successfully, leading them to be more willing to engage or persist in challenging learning tasks (Eccles and Wigfield, 2002; Pintrich and Schunk, 2002). In writing, self-efficacy describes students' confidence in their writing skills to accomplish writing tasks (Pajares, 2003). However, it is less clear whether self-efficacy for writing can be considered a unitary construct (e.g., Zimmerman and Bandura, 1994; MacArthur et al., 2016) or if it involves distinct factors for basic grammar skills and advanced composition skills (Pajares,

2007). Although single-factor models of self-efficacy have been extracted with undergraduate students who may have greater mastery of the conventions of writing and the writing process (MacArthur et al., 2016; Ling et al., 2021), the two-factor model was supported among K-12 students still learning the conventions, discourse structures and modes of inquiry involved in writing (Pajares, 2007). Because international students enrolled in academic English writing programs may still be developing these skills in English, it is unclear whether self-efficacy for English academic writing can best be characterized as a single- or dual-factor construct.

Self-efficacy is a robust contributor to undergraduate students' writing engagement, persistence, and achievement (Zimmerman and Bandura, 1994). Among multilingual students writing in English, whether in English as a foreign language (EFL) contexts or as international students, self-efficacy often shares a positive relationship with English writing achievement (Phakiti et al., 2013; Chea and Shumow, 2017; Sabti et al., 2019). However, some studies of international students have found self-efficacy to be unrelated to English writing achievement (Wilby, 2022) or correlated with the use of vocabulary and conventions in English writing but not with compositional skills, such as the quality of argumentation, ideation (Ling et al., 2021). Further, most examinations of the role of self-efficacy in international students' writing performance have been conducted when the instruction has been delivered in person rather than in online learning environments (e.g., Phakiti et al., 2013; Chea and Shumow, 2017; Sabti et al., 2019). Because self-efficacy contributes to student engagement and general achievement in online learning environments (Alemayehu and Chen, 2021; Teng, 2021), self-efficacy may have a more robust role in international students' achievement in academic English courses delivered online.

In addition to self-efficacy, researchers have applied achievement goal theory to explain writing achievement (e.g., Troia et al., 2012; MacArthur et al., 2016). Goal orientation refers to the situated reasons why an individual engages in a specific task (Pajares and Cheong, 2003; Kaplan and Maehr, 2007). These goals may be adaptive or maladaptive and have been thought to reflect mastery or performance orientations (Dweck, 1986; Ames, 1992). Mastery-oriented goals emphasize the development of competence and learning (Dweck, 1986; Elliot and McGregor, 2001; Pajares and Cheong, 2003). Mastery orientation is considered adaptive, as students who are concerned with developing their skills show greater persistence and seek out challenges to gain skills (Ames, 1992; Pintrich, 2000). In contrast, two types of performance orientations are considered less adaptive, as students are driven to perform for the sake of being judged favorably (*performance-approach orientation*) or to avoid negative evaluation (*performance-avoidance orientation*; Elliot and McGregor, 2001). Students with performance-approach goal orientations seek to appear competent for recognition or higher grades, whereas those with performance-avoidance goals seek to avoid displaying incompetence or failure (Elliot and Church, 1997; Pintrich, 2000). Students with performance goals may experience heightened anxiety levels and avoid challenging tasks that might expose their perceived shortcomings (Dweck, 1986). Further, performance orientations are often associated with weaker persistence and exerting less cognitive effort (Pajares and Cheong, 2003). Although goal orientation is often thought of as three distinct factors (Elliot and Church, 1997; MacArthur et al., 2016), mastery goals have been found to share moderate to strong correlations with performance-approach goals (Troia et al., 2013; MacArthur et al., 2016; Chea and Shumow, 2017; Sabti et al., 2019).

The relationships between undergraduates' writing achievement and their goal orientations are mixed in the literature. For example, MacArthur et al. (2016) found that undergraduates' mastery and performance-approach goals were uncorrelated with most writing measures, but that avoidance goals negatively impacted writing performance. Farsani et al. (2014) found goal orientation was unrelated to writing achievement in English among EFL undergraduates, whereas other researchers found mastery goals, but not approach or avoidance goals, were correlated with EFL students' writing achievement in English (Chea and Shumow, 2017; Zerey and Müjdeci, 2023). Further, Wilby (2022) reported that mastery and performance-approach goals, but not avoidance goals, were correlated with international students' essay scores. Thus, the relationship between goal orientation and writing achievement in English among international students remains unclear.

Self-efficacy and goal orientation may guide the degree of effort students exert in writing tasks, but their beliefs about what constitutes good writing may inform how they direct their efforts. Beliefs about writing span a broad spectrum of ideas and assumptions that students hold about the nature of writing and what constitutes good writing (White and Bruning, 2005). These beliefs encompass students' perceptions of writing to explore and express ideas and the importance of proper grammar and conventions (MacArthur et al., 2016; Ling et al., 2021). Studies have shown that these beliefs significantly sway students' motivation, writing performance, and eagerness to participate in writing tasks (Bruning and Horn, 2000; Pajares, 2003). These beliefs can either boost or obstruct an individual's writing ability (Flower and Hayes, 1981), as students whose beliefs about writing focus on meaning show greater cognitive engagement while writing (Schraw, 2000; White and Bruning, 2005). Examinations of students' implicit and explicit beliefs about what constitutes good writing have typically yielded two-factor models, with beliefs about the roles of ideas and beliefs about writing conventions loading onto two distinct factors (MacArthur et al., 2016; Ling et al., 2021).

Although students' beliefs about writing may guide how they engage in the writing process, their relationship with writing quality is less clear. The relationship between beliefs about content among undergraduate students varies depending on the writing task. For example, beliefs about the importance of ideas and content have been positively correlated with the HEIghten Critical Thinking and Written Communication assessment, which evaluates students' critical thinking, analytic, and synthesis skills (Ling et al., 2021). However, content beliefs shared negative correlations with the Accuplacer writing test that focuses on sentence construction and logic and standardized measures of writing fluency (MacArthur et al., 2016). Finally, content beliefs were unrelated to students' persuasive essay writing (MacArthur et al., 2016). The relationship between beliefs and writing achievement in English may be more complex for international students writing in their L2, as their beliefs about what constitutes quality writing in their L1 may not match the rhetorical and argumentative conventions of academic writing in English (Connor, 2004; Heng, 2018). For example, the critical thinking, analysis, evidence-based arguments, and citation conventions expected in American universities may be unfamiliar to international students due to cultural differences in instruction (Wu, 2015; Heng, 2018). Therefore, the mismatch between their prior learning experiences and

the conventions of academic writing in English may lead international students to hold strong beliefs about the content of writing that may be unhelpful in American universities. Indeed, whereas EFL students' beliefs about writing were positively correlated with self-efficacy, mastery goals, and performance-approach goals, their beliefs about writing were unrelated to the English writing scores (Zerey and Müjdeci, 2023).

In addition to self-efficacy for writing, goal orientation and beliefs about writing may be shaped by affective factors. Affect pertains to the emotional experiences and feelings associated with writing tasks, such as anxiety, frustration, enjoyment, and satisfaction (Pekrun, 2006). Students' affective responses to writing influence their choices and engagement and moderate their performance in writing tasks (Pekrun et al., 2002; Graham, 2018). Whereas positive emotions such as enjoyment and satisfaction can amplify students' effort and persistence in writing tasks, negative affect can interfere with students' thinking and engagement in writing (MacArthur et al., 2016; Graham, 2018; Ling et al., 2021). For example, high writing anxiety levels can result in avoidance behaviors, diminished effort, and subpar writing performance, whether writing in one's first language or L2 (Daly, 1978; Cheng, 2004; Limpo, 2018).

Further, students' academic experiences shape their enjoyment of and anxiety about writing, which in turn informs their self-efficacy for writing (Martinez et al., 2011). The relationships between affect for writing, other motivational factors, and writing achievement have been mixed for undergraduate students writing in their L2. For example, Sabti et al. (2019) found that writing anxiety was unrelated to self-efficacy and writing achievement goals among Iraqi EFL students. In contrast, Zerey and Müjdeci (2023) reported that affect correlated positively. In contrast, anxiety correlated negatively to Turkish EFL undergraduates' writing scores and their self-efficacy, adaptive goal orientations, and beliefs about writing. Similarly, Taiwanese EFL students' second-language writing anxiety shared negative correlations with their self-efficacy for writing in English and their English writing grades (Cheng, 2004). Similar patterns were reported for Chinese undergraduates studying English online. Increased anxiety levels reduced Chinese students' motivation to learn English and hampered their self-regulated English learning (Wang and Zhan, 2020). However, the relationship between English learners' affect and writing in English has primarily been studied in their home countries or EFL contexts. However, studying internationally may add another layer of complexity due to the added cultural expectations for writing in the United States. Thus, international students' affect for writing and its relation to writing in English is less well understood.

Current study and research questions

The current study examines the dimensionality of international students' self-efficacy, beliefs, goal orientation, and affect for writing and their contributions to performance in Academic English classes. In this study, international students completed surveys tapping their self-efficacy, motivational goals, beliefs, and affect for writing in English at the start and end of online, academic English writing courses. The courses' final grades were used to measure students' English writing achievement. Although prior research has explored the contributions of motivational factors to writing in English performance in their home countries (whether in United States schools or in EFL contexts), we had difficulty identifying literature examining the relationships among these factors among international students writing in English and studying in United States universities in an online context.

Further, there is limited consensus on the characterization of each motivational construct, which may reflect methodological, population, and contextual differences. First, studies have used principal component analysis (PCA; e.g., MacArthur et al., 2016) or exploratory factor analysis (EFA; Pintrich and Zusho, 2007; Ling et al., 2021) as means of reducing data and exploring self-efficacy, goal orientation, beliefs and affect for writing. Although both are powerful data reduction techniques, PCA is used to optimize the combination of variables into smaller subsets, or dimensions, whereas EFA is used to identify underlying constructs, or latent variables (Jain and Shandliya, 2013). Because the purpose of this paper was to replicate and extend findings from research examining the self-efficacy and beliefs constructs used for college-level writers (e.g., MacArthur et al., 2016), we first used PCA. However, it is unclear the extent to which PCA and EFA yield similar patterns for each motivational construct. Therefore, the current study seeks to explore the similarities and differences among the motivational constructs (self-efficacy, goal orientation, beliefs and affect for writing) revealed by EFA and PCA.

Furthermore, motivational constructs have been found to vary across populations and contexts. For example, Bruning et al. (2013) identified a 3-factor structure for self-efficacy among middle- and high-school students, whereas self-efficacy has been found to be unidimensional for United States college students (MacArthur et al., 2016; Ling et al., 2021). Studies involving largely domestic undergraduates in United States contexts have shown similar patterns for the motivational constructs for writing, both for students enrolled in developmental, or remedial, writing classes in a suburban community college (MacArthur et al., 2016), or a more diverse population of undergraduates enrolled in 4-year universities (Ling et al., 2021). It is also noteworthy that data collection for both studies took place before the COVID-19 pandemic when undergraduate education was primarily conducted in person. However, less is known about international students' motivation for writing in English, as they navigate writing in their L2 in an educational system that differs not only in the language of instruction but also in its norms and practices from their secondary education in their home countries. Additionally, the transition to emergency remote instruction, when many international students studied online from their home countries, may have impacted students' beliefs and attitudes toward their studies. Therefore, it was important for us to explore the components of the motivational constructs, their malleability, and their relationship to student performance. More specifically, this study focused on answering the following research questions:

1. In what ways do EFA and PCA reveal similarities and differences in the motivational constructs of self-efficacy, goal orientation, beliefs, and affect for writing among international students enrolled in online-academic English classes in a U.S. university?
2. To what extent does completing an Academic English course change international students' self-efficacy, goal orientation, beliefs, and affect for writing in English?
3. To what extent do self-efficacy, goal orientation, beliefs and affect for writing explain international students' performance in Academic English courses when instruction is provided online?

Methods

Study context and participants

This study occurred in a highly selective (less than 29% acceptance rate), large public research university in a suburban setting in the western United States. The campus is federally recognized as an Asian- and Hispanic-serving institution. Approximately 17% of undergraduate students are international, with 80 languages spoken and 87 countries represented within the undergraduate population.

All students enrolling in the university take the campus-developed analytic writing placement exam before their first term. The exam provides students with a prompt for writing an on-demand essay in 60 min. While students with scores above the threshold enroll in the lower-division composition courses, students below the threshold are counseled to take at least one of the Academic English courses. Academic English courses are offered at three different levels and are designed to prepare students for the lower-division composition courses required by all students. The first course covers academic language use and foundational academic writing skills such as summarizing and critiquing. In the second course, students organize and synthesize multiple sources and perspectives to develop an informed position on an academic topic. The third course provides students with practice in identifying, evaluating, analyzing, and presenting source information for credibility and relevance to an academic topic. The three Academic English courses have accompanying labs for further practice in academic writing.

We recruited eight instructors who were teaching 10 Academic English classes over a 10-week term in a quarter system (i.e., 10-week quarters rather than 15-week semesters). All international students in these classes were eligible for participation in this study. We collected surveys and grades for 98 students (44 female) enrolled in five classes (69 students enrolled in three level 2 classes and 29 students in two level 3 classes), taught synchronously online by five different instructors. One student was from the United States and was excluded from the analyses. Of the remaining 97 participants, 77 students took their courses internationally, 19 lived off-campus but in the United States, and one lived on campus. Most of the students were from China (84), with the remaining from Vietnam (4), Mexico (2), and one each from Cambodia, India, Japan, Kuwait, Myanmar, and Thailand, with one student responding with unrecognizable characters. Forty-seven students reported that this university was the first American school they had attended. Most students (94) were in their first year of studies, and three were in their second year. The study occurred in the spring of 2020 when all courses were taught remotely due to the pandemic.

Measures

The measures included in this study included a demographic questionnaire, a motivation and self-efficacy questionnaire, and student grades in the course. The motivation and self-efficacy questionnaire was given twice, once in week 2 of the 10-week course and 8 weeks later at the end of the course (week 10).

Demographic questionnaire

During the second week of the term, students completed a survey to provide information about their home country, primary language, the language of instruction in school, age when they began learning English, their year of study at the university, gender, and frequency of using the campus writing center, as well as whether they had prior schooling in the United States. When reporting the age when English instruction began, some participants reported school grades. To this end, we treated "preschool" as age 3.5, "kindergarten" as age 5, and "first grade" as age 6. The responses "elementary school" ($n = 1$) and "middle school" ($n = 1$) were recoded as missing due to the broad range of grades covered. Participant demographics are summarized in Table 1.

Motivation and self-efficacy questionnaire

A motivation and self-efficacy questionnaire was administered. This survey used a 5-point Likert scale (ranging from strongly disagree to strongly agree) and drew items from Bruning et al. (2013) and MacArthur et al. (2016). The self-efficacy scale contained 18 items and addressed students' efficacy for different aspects of the writing process, such as organizing their ideas, evaluating and revising their writing, and writing different genres or parts of a paper. The achievement goal orientation scale consisted of three subscales. The first subscale, avoidance, included 4 items. The second subscale, performance, included three items, and the third, mastery, included 4 items. The third scale, the beliefs scale, included 6 items addressing students' beliefs about the content and 6 items about writing conventions. The fourth scale contained 5 items that evaluated students' affect about writing. Two items, *I do not like writing*, and *I avoid writing as much as possible,* were reverse-coded. For each item, we re-coded the Likert options as numbers where +2 was the strongest positive score, 0 was neutral, and −2 was the strongest negative score. The score for each scale was the mean of its items, with +2 being the most positive and −2 being the most negative.

Outcome variables

Student achievement was operationalized in two ways. First, students' final grades in the writing course were recoded as a continuous variable using the university's letter grade conversion policy (i.e., A+ = 4.0, A = 4.0, A− = 3.7, B+ = 3.3, B = 3.0, B− = 2.7, C+ = 2.3, C = 2.0, C− = 1.7, D+ = 1.3, D = 1.0, D− = 0.7, $F = 0.0$). Because two instructors only provided students' pass/fail status, we could not convert their students' scores into the continuous variable. Second, we created a binary student achievement variable characterized as "pass" or "fail." For the second achievement variable, we created a score for all students who received letter grades using the university's minimum passing score of C as the cut point.

Procedures

During the second week of the term, the course instructors distributed an emailed recruitment for the study written by the second author. The recruitment included a hyperlink to the pretest survey that was administered using Qualtrics. The first screen of the survey was used to collect participants' written informed consent to participate in this study. After providing written, informed consent, participants

TABLE 1 Participant characteristics and course achievement.

Variable	*n* (Total *n* = 97)
Gender	
Female	44
Male	53
Year of study at the university	
First year	94
Second year	3
Primary language	
Chinese (Mandarin, Cantonese)	84
Vietnamese	4
Arabic	1
Burmese	1
Japanese	1
Khmer	1
Spanish	1
Thai	1
Other	1
Language of instruction prior to university	
English	30
Chinese	55
Chinese and English	7
Japanese and English	1
Vietnamese	1
Vietnamese and English	1
Age when English instruction started (*N*=79)	
Mean	7.11
Standard deviation	2.99
Range	3–16
Prior schooling in the United States	
Yes	47
No	50
Residence at time of study	
On campus	1
Off-campus, in the United States	19
International	77
Used the campus writing clinic before the course, M (SD)	0.27 (0.59)
Final grade, M (SD)	2.64 (1.04)
Passed course	
Passed	79
Failed	17

completed the demographic and motivational surveys. Eight weeks later, the motivational survey was administered once again through Qualtrics. After the courses ended, we retrieved final grades and pass/fail status from instructors.

Analyses

All analyses were run using jamovi 2.3 (Jamovi Project, 2023). We first ran descriptive analysis for all the motivation survey items, with mean scores ranging between −0.62 and 1.58, and standard deviations ranging between 0.63 and 1.24 (Please see Supplementary Table S1). The values for skewness ranged between −1.53 and 0.52, and the values for kurtosis ranged from −0.88 to 1.81, which are within the cut-off values of |3.0| and |8.0|, respectively (Kline, 2011). Because less than 5% of the data were missing, as one participant was missing two variables, we deleted the missing case listwise from subsequent analyses (Baraldi and Enders, 2010).

To address the first research question, we conducted both an exploratory factor analysis (EFA) and a principal components analysis (PCA) within each of the motivational scales (self-efficacy, goal orientation, beliefs, and affect) specified by MacArthur et al. (2016) and Ling et al. (2021). Because of our relatively small sample, we calculated EFA using the principal axis (PA) method with Oblimin rotations on the pretest scores (Watkins, 2018). EFA factors were extracted based on parallel analyses. We also calculated PCA using Varimax rotations on the pretest scores to identify components based on parallel analysis (Tabachnick and Fidell, 2007). For each EFA and PCA, Bartlett's test of sphericity <0.001 and the Kaiser-Meyer-Olkin measure of sampling adequacy >0.7, indicated that the assumptions for EFA and PCA were met (Watkins, 2018).

Next, we examined the extent to which online Academic English courses influence international students' motivation for writing by calculating a 7 (motivation: self-efficacy, performance, mastery, avoidance, content, conventions, and affect) X 2 (time: pretest vs. post test) X 5 (class) repeated-measures multivariate analysis of variance (MANOVA), with motivation and time as repeated measures. We treated class as a between-subjects measure due to the nested data. Levene's test indicated that the assumption of homogeneity of variance was not violated by any of the motivation variables. However, due to the nonsphericity of the motivation variables (Machauly's $W = 0.05$, $p < 0.001$), we used the Greenhouse–Geisser correction. We used Scheffe *post hoc* tests to further examine significant main effects (note that all other assumptions for the MANOVA were met). Because repeated-measures MANOVA is an omnibus test, we calculated a series of repeated-measures ANOVAs on the pretest and post-test scores of each factor, using class as the between-subjects variable to address the nested nature of the data.

Finally, after running a correlation matrix to explore the relationships among the variables, we examined the contributions of the motivation factors on our two student achievement outcomes using hierarchical linear modeling (HLM). Hierarchical linear modeling is well-suited to the nested structure of our dataset, with students (level-1) clustered within classrooms (level-2; Raudenbush and Bryk, 2002). The hierarchical structure implies that students' performance in their writing classes is influenced both by their individual characteristics and their class. After testing the assumptions of HLM, including linear relationships between each predictor variable and achievement outcomes, homogeneity of variance, and multivariate normality, we found that all assumptions were met.

For both models, level-1 variables were students' ages when their English instruction began, gender, whether this was the first U.S. school the student attended, and prior use of the campus writing

clinic, as well as the motivational variables at pretest (self-efficacy, performance orientation, mastery orientation, avoidance orientation, beliefs about content, beliefs about conventions, and affect for writing).

The first model was a logistic mixed model with a logit link for binary outcomes to predict the likelihood that a student passed the Academic English class. We report the fixed effects parameter estimates (β), odds ratio (OR), and the corresponding probability values (p). The modeling started with the null model (Model 0) to estimate the intraclass correlations (ICCs) and determine the proportion of variance accounted for by clustering within classes. We then fit Model 1 by adding all the level-1 student variables listed above.

For the second analysis, we used linear mixed model analysis to estimate students' final grades. Because of our small sample, we used restricted maximum likelihood to reduce the bias that may occur with maximum likelihood estimation for small samples (Kenward and Roger, 1997). We first calculated the null model to estimate the ICCs. Next, we fit Model 1 with the same level-1 student variables included in the previous analysis.

Results

Dimensions of the motivation for writing scales for international students enrolled in an online academic English course

Self-efficacy

The results of the EFA and PCA for the self-efficacy scale are summarized in Table 2. The EFA revealed a 2-factor model, explaining 42% of the variance, that showed a marginally acceptable fit, with $\chi^2 = 167$, $df = 118$, $p = 0.002$, RMSEA = 0.07, 90% CI = (0.04, 0.09), TLI = 0.89. The latent constructs of self-efficacy for writing processes and self-efficacy for self-regulation were moderately correlated ($r = 0.61$).

Although the PCA explained comparable (40%) variance, it was more consistent with the literature by extracting a single dimension for self-efficacy (MacArthur et al., 2016; Ling et al., 2021). The self-efficacy principal component had high reliability (Cronbach's $\alpha = 0.90$), and all 18 items had component loadings greater than 0.45.

Achievement goal orientation

Table 3 shows the results of the EFA and PCA for goal orientation. The findings of the EFA were consistent with the three-factor models of goal orientation reported in the literature (MacArthur et al., 2016; Ling et al., 2021). The three-factor model accounted for 65% of the variance. Although $\chi^2 = 33.3$, $df = 25$, $p = 0.124$, the other parameters indicated a good fit, RMSEA = 0.06, 90% CI = (0.00, 0.10), TLI = 0.97. Whereas performance and master orientations were moderately correlated ($r = 0.61$), neither were correlated with avoidance orientations ($r = -0.06$ and -0.10, respectively).

On the other hand, the PCA extracted two dimensions but similarly explained 64% of the variance. The seven items intended to measure performance goals and mastery orientations loaded onto a single component, explaining 40% of the variance. The four items intended to measure avoidance goals loaded onto the second component, explaining an additional 24% of the variance. The performance/mastery and avoidance components had high reliabilities with $\alpha = 0.89$ and $\alpha = 0.82$, respectively.

Beliefs

Table 4 shows that the PCA and EFA revealed similar patterns for students' beliefs about writing that matched the 2-factor models in the literature (MacArthur et al., 2016; Ling et al., 2021). The 2-factor model explained almost half (47%) the variance. Although $\chi^2 = 53.3$, $df = 43$, $p = 0.135$, the other parameters indicated a good fit, RMSEA = 0.05, 90% CI = (0.00, 0.09), TLI = 0.96. The two factors, beliefs about content and beliefs about conventions, were uncorrelated, $r = 0.18$.

The two components extracted by the PCA were very similar to the EFA's factors. These dimensions explained 56% of the variance. The six items intended to measure students' beliefs about writing content loaded onto a single component, explaining 32% of the variance. The six items intended to measure students' beliefs about the conventions of writing loaded onto the second component, explaining an additional 24% of the variance. The reliability was high for content beliefs ($\alpha = 0.88$) and acceptable for conventions beliefs ($\alpha = 0.76$).

Affect

The results of the EFA and the PCA for the affect scale are summarized in Table 5. The EFA yielded a 2-factor model of affect for writing, $\chi^2 = 0.525$, $df = 1$, $p = 0.469$, RMSEA = 0.00, 90% CI = (0.00, 0.24), TLI = 1.03. Together, the two factors, positive affect and negative affect, accounted for 63% of the variance and were moderately correlated, $r = 0.56$. In contrast, the PCA yielded a single component for affect, explaining 40% of the variance. The final affect component had high reliability (Cronbach's $\alpha = 0.89$).

Do online academic English courses affect international students' motivation for writing?

Although the factors revealed by the EFAs were largely consistent with the literature (MacArthur et al., 2016; Ling et al., 2021), the models extracted generally had mediocre fits at best. Although these findings are suggestive of the underlying motivational factors, the exact weighting of each item is unclear. The PCA findings also did not exactly align with the EFA findings, sometimes identifying a different number of components (likely due to the purpose of reducing the overall amount of variance, rather than identifying constructs).

For these reasons, we constructed motivational variables that reflected the factors in the previous literature by calculating the mean of their constituent variables. Specifically, we calculated a single variable for self-efficacy using the mean of all items in the self-efficacy scale. For goal orientation, performance orientation was the mean of completing assignments passing the class, getting good grades, and becoming a better writer. Mastery orientation was the mean of becoming a better writer, improving at organizing ideas and expressing ideas, and persuading others. Avoidance orientation was the mean of the reverse-coded variables (hiding their nervousness, hiding that they are a poor writer and having a hard time writing, and avoiding making mistakes), so that positive scores would indicate less avoidance. Beliefs about content and

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TABLE 2 Self-efficacy for writing.

	Principal Axis EFA with oblimin rotation		PCA with varimax rotation
	Writing process	Self-regulation	Self-efficacy
I can write an essay with a strong conclusion	0.805		0.595
I can organize my ideas into a plan that makes sense	0.768		0.71
I can write a good persuasive essay	0.699		0.776
I can write paragraphs with details to support the main ideas	0.693		0.708
I can find the right words to express my ideas	0.639		0.74
I can think of good ideas to include in my writing when I am planning	0.612		0.637
I can write a paragraph that has a clear topic sentence	0.502		0.621
I can write an interesting introduction that makes the reader want to read the paper	0.464		0.6
I can evaluate whether my paper is well written	0.428		0.485
I can write a summary of the important points from an article I read	0.387	0.339	0.681
I can plan time to get my writing done by the deadline		0.778	0.656
I can edit my papers to fix errors		0.659	0.543
I can keep writing even when it's difficult		0.611	0.581
I can focus on my writing for at least 1 h		0.605	0.534
I can revise my papers to make them better		0.561	0.745
I can evaluate whether I am making progress in learning to write		0.428	0.56
I can use a chart or graphic organizer to plan how to present my ideas		0.389	0.594
I can avoid distractions while I write		0.378	0.477
Eigenvalue	4.38	3.23	7.16
% of variance	24.4	18	39.8
Cronbach's α	0.88	0.84	0.9

conventions were the means of the variables shown in Table 4. When affect for writing was calculated by using the mean of all five variables, with disliking writing and avoiding writing being reverse coded so that positive scores would reflect more positive affect.

Table 6 summarizes students' mean ratings for each motivational construct at the start and end of the writing course. Overall, students' ratings across the motivation dimensions varied, F (3.22, 222.25) = 87.52, $p < 0.001$, $\eta^2_p = 0.56$. Scheffe *post hoc* tests revealed that overall, students' performance goals were stronger than mastery goals, t (69) = 6.08, $p < 0.001$. Mastery goals received higher scores than their endorsed beliefs about content, t (69) = 3.20, $p < 0.001$, which was stronger than their self-efficacy for writing, t (69) =6.20, p <. 001. Students showed greater self-efficacy than affect for writing, t (69) =8.80, $p < 0.001$. However, affect for writing, beliefs about conventions, and avoidance orientations were comparable. Although the change in overall motivation scores was not significant, F (1,69) =0.61, $p = 0.44$, the interaction between the motivation constructs and pretest-posttest was significant, F (3.27,13.10) =3.84, $p = 0.008$, indicating that change across the motivational factors varied across the term. A series of Bonferroni-adjusted repeated measures ANOVAs found that at the end of the course, students showed increased self-efficacy, F (1,75) = 7.82, $p < 0.001$, $\eta^2_p = 0.28$ and improved affect for writing, F (1,74) = 5.93, $p < 0.017$, $\eta^2_p = 0.07$. Students also showed a decrease in their performance orientation, F (1,74) = 7.43, $p < 0.008$, $\eta^2_p = 0.09$. No other effects were significant.

How do the motivational constructs contribute to international students' performance in academic English courses?

The relations among the motivational constructs at the start of the term and with course outcomes are presented in Table 7. Two key patterns of association emerged among the motivational dimensions. First, self-efficacy, mastery orientations, content beliefs, and affect shared small to moderate positive correlations, with correlations ranging between $r = 0.27$ and $r = 0.64$. These correlations are consistent with the literature, suggesting the connections among self-efficacy, mastery goal orientations, beliefs about the involvement of expressing and exploring ideas in writing, and positive affect about writing. Although performance and mastery orientations were highly correlated ($r = 0.70$), as the literature suggests, mastery orientation was correlated with affect ($r = 0.27$) while performance orientation was not ($r = 0.09$) The second key correlation was a moderate, negative association between avoidance goals in writing and beliefs about writing conventions ($r = -0.42$). Students guided by avoidance goals were more likely to hold beliefs about the importance of the conventions in writing. However, student performance and the motivation factors shared only one bivariate correlation, which was between performance orientation and final grades, $r = 0.29$, $p < 0.05$.

The logistic mixed model provides information on the likelihood of students passing the Academic English class (see Table 8). The null

TABLE 3 Goal orientation for writing.

	Principal Axis EFA with oblimin rotation: factors			PCA with varimax rotation: components	
	Performance	Mastery	Avoidance	Performance and mastery	Avoidance
I'm trying to complete all the assignments for the class	0.856			0.764	
I'm trying to get a good grade in the class	0.816			0.771	
I'm trying to pass this class	0.811			0.786	
I'm trying to become a better writer	0.535	0.413		0.876	
I'm trying to better organize my ideas		0.901		0.802	
I'm trying to improve how I express my ideas		0.887		0.837	
I'm trying to persuade others with my writing		0.705		0.618	
I'm trying to hide how nervous I am about writing			0.882		0.883
I'm trying to avoid making mistakes in front of my classmates			0.712		0.789
I'm trying to keep people from thinking I'm a poor writer			0.699		0.788
I'm trying to hide that I have a hard time writing			0.646		0.759
Eigenvalue	2.49	2.41	2.21	4.33	2.63
% of variance	22.7	21.9	20	39.4	23.9
Cronbach's α	0.89	0.86	0.82	0.89	0.82

model revealed that the ICC was 0.56, indicating that half the variance could be attributed to differences between the classes. Interpreting our data at the student level, only one motivation factor predicted whether students passed the Academic English class. Students with greater beliefs about content were associated with lower passing rates, $OR = 0.07$, $p = 0.034$. That is, students who held stronger beliefs about the role of expressing and exploring ideas in writing were less likely to pass the Academic English course.

The results of the hierarchical linear model predicting final grades in the Academic English courses are presented in Table 9. The ICC of the null model was 0.43, indicating that substantial variance (43%) in students' final grades could be attributed to differences between the classes. When student-level variables were included in the model, over half the variance (58%) in students' final grades was accounted for. Although student demographic variables did not account for students' final grades, only one motivational construct predicted students' final grades. Student self-efficacy at the start of the course was a unique, positive predictor of students' final grades ($B = 1.07$, $p = 0.003$), indicating that an increase of one point on the self-efficacy scale was associated with an increase of 1.07 on the final grade, or an increase of a full letter grade (e.g., B to A). Beliefs about content trended as a unique, negative predictor of students' final grades ($B = -0.5$, $p = 0.08$), suggesting a decrease in letter grades of almost two steps (e.g., A to B+) with each increased point on the contents belief scale.

Discussion

The current study sought to characterize international students' motivation for writing and its contribution to achievement in online academic English classes during the COVID-19 pandemic. More specifically, this study examined international students' self-efficacy, goal orientation, beliefs and affect for writing, their malleability, and their contributions to writing achievement in academic English classes.

Our analyses of the four motivational constructs among international students taking online writing courses highlight the importance of understanding the methodologies, population studied, and context when attempting to characterize self-efficacy, goal orientation, beliefs, and affect for writing. Overall, the models extracted by EFA tended to have mediocre fits at best, whereas PCA was more successful in reducing the data into components. Further, only one construct, beliefs about writing, yielded matching 2-factor models (beliefs about content and conventions) that were consistent with the literature (MacArthur et al., 2016; Ling et al., 2021). Otherwise, we found that EFA tended to yield more complex structures than PCA.

When considering self-efficacy, the PCA was consistent with the literature (MacArthur et al., 2016; Ling et al., 2021) by reducing the data to a single dimension. In contrast, the EFA's findings were similar to those of Pajares (2007), who reported a 2-factor model. However, the latent factors extracted with international undergraduates reflected different constructs than those revealed with K-12 students. Whereas

10.3389/fpsyg.2023.1232664

TABLE 4 Beliefs about writing – rotated component matrix.

	Principal axis EFA with oblimin rotation: factors		PCA with varimax rotation: components	
	Content	Conventions	Content	Conventions
Writing helps make my ideas clearer	0.879		0.873	
Writing helps me think about my topic in a new way	0.815		0.84	
I learn new things from writing	0.811		0.839	
Writing is one of the best ways to explore new ideas	0.7		0.763	
Revising helps me clarify my ideas	0.693		0.748	
Good writers discover new ideas while writing	0.602		0.682	
Good writers do not make errors in grammar		0.673		0.737
Good writers have to be able to write long complex sentences		0.65		0.719
Good writers need little revision because they get it right the first time		0.623		0.706
The main problem of poor writers is using incorrect grammar		0.586		0.681
Writing quickly is an important part of good writing		0.515		0.628
Revising is mostly about fixing errors in grammar and spelling		0.445		0.559
Eigenvalue	3.44	2.19	4.07	2.61
% of variance	28.7	18.3	33.9	21.8
Cronbach's α	0.88	0.76	0.88	0.76

the 2-factor model with K-12 students reflected students' confidence in their developing skills in creating content and mastery of conventions (Pajares, 2007), for international students, the two-factors reflected more mature writing, self-efficacy for skills directly tied to writing (e.g., ideation, writing different genres or parts of papers, and planning) and self-efficacy for regulating the writing process (e.g., staying on task, meeting deadlines, and using tools such as graphic organizers to support writing). Thus, for undergraduates studying online to improve their writing in their L2, self-efficacy for the writing processes may be distinct from self-efficacy for managing their studies. Because this study took place early in the COVID-19 pandemic, when online instruction was more novel and most (80%) of the students were in their home countries, we encourage more research to better understand self-efficacy and motivation for the more typical international student experience with face-to-face instruction on campus.

The two other motivational constructs also yielded divergent findings. For goal orientation, the EFA yielded results like the three-factor models reported in the literature among monolingual students (Dweck, 1986; Elliot and Church, 1997; MacArthur et al., 2016; Ling et al., 2021), and EFL undergraduates (e.g., Farsani et al., 2014; Chea and Shumow, 2017; Sabti et al., 2019). In contrast, the PCA yielded two components, with the first component including the same items that loaded onto the mastery and performance orientation factors of the EFA, and the second component matching the EFA's avoidance factor. Similarly, the affect for writing scale yielded divergent findings for EFA and PCA. Whereas the EFA revealed two factors (positive affect and negative affect), PCA revealed a single component that was consistent with the unitary construct reported in the literature (Ling et al., 2021). Taken together, these findings highlight the importance of considering the data reduction technique used. Although there was tremendous overlap in the sets of variables combined, EFA produced more complex models.

The correlations among the motivational dimensions were consistent with the literature. Self-efficacy, performance, and mastery orientations, beliefs about content, and affect shared moderate positive correlations. Like Ling et al. (2021), we found that affect for writing was correlated with mastery goal orientations, but not performance goals. Taken together, these correlations suggest that international students who are more confident in their writing skills tend to enjoy writing, focus on both mastering and attaining recognition for their writing and believe that good writing involves the exploration and development of ideas. Similar patterns of correlation have been reported with general populations of undergraduates (e.g., Ling et al., 2021), undergraduates in remedial writing programs (MacArthur et al., 2016), and students writing in their L2 in EFL contexts (Zerey and Müjdeci, 2023). The interrelationships among self-efficacy, goal orientation, beliefs about content, and affect have been thought to contribute to students' use of self-regulated strategies and persistence in writing, leading to more favorable academic outcomes (Phakiti et al., 2013).

TABLE 5 Affect for writing – rotated component matrix.

	Principal axis EFA with oblimin rotation: factors		PCA with varimax rotation: components
	Positive affect	Negative affect	Affect
The process of writing is satisfying for me	0.921		0.793
I think that writing is interesting	0.741		0.859
I usually enjoy writing	0.667		0.88
I do not like to write*		0.741	0.759
I try to avoid writing as much as possible*		0.63	0.519
Eigenvalue	1.98	1.17	2.99
% of variance	39.5	23.3	59.7
Cronbach's α	0.87	0.63	0.89

Please note, items marked with * have been reverse-coded.

TABLE 6 Means and standard deviations of student motivation scores at pretest and post test.

Motivation construct	Pretest	Post test
Self-efficacy:		
Mean (SD)	0.56 (0.51)	0.77 (0.48)
Cronbach's α	0.90	0.90
Goals – Performance		
Mean (SD)	1.52 (0.50)	1.40 (0.55)
Cronbach's α	0.89	0.86
Goals – Mastery		
Mean (SD)	1.26 (0.60)	1.19 (0.52)
Cronbach's α	0.86	0.82
Goals – Avoidance		
Mean (SD)	−0.10 (0.80)	−0.10 (0.88)
Cronbach's α	0.82	0.86
Beliefs – Content		
Mean (SD)	1.03 (0.67)	1.10 (0.55)
Cronbach's α	0.88	0.86
Beliefs – Conventions		
Mean (SD)	−0.24 (0.75)	−0.17 (0.84)
Cronbach's α	0.76	0.86
Affect		
Mean (SD)	0.05 (0.62)	0.18 (0.67)
Cronbach's α	0.82	0.81

Conversely, our study highlighted a low, negative correlation between avoidance orientation and beliefs about writing conventions. Please recall, items on the avoidance scale were reversed-coded, so that lower scores were associated more strongly with the maladaptive goal orientation of avoidance. Thus, this correlation suggests that international students who were most concerned about concealing their perceived struggles in writing were more likely to believe that good writing is defined by spelling and grammatical conventions. Considering that these international students were placed in developmental, Academic English courses to prepare them for the general freshman composition courses, students' desires to avoid appearing incompetent in writing in their L2 may reflect their need to acquire greater mastery of the writing conventions of English. Because we only had access to students' final grades, it is unclear whether students' beliefs about conventions reflect their mastery of the L2 writing conventions. Thus, future research might also examine writing samples to determine how international students' beliefs about writing align with their performance. This work may be longitudinal, so that one may determine if international students' beliefs about writing and avoidance goals change to reflect growing competence in their L2.

Our study indicated that some motivation dimensions, such as self-efficacy and enjoyment of writing, were malleable within the duration of a 10-week course. International students demonstrated increased self-efficacy and reported enjoying writing more by the end of the academic English courses, suggesting the potential for positive changes in motivation over time. Further, they reported lower performance orientations at the end of the course. The improved confidence and affect for writing at the end of the academic English courses are encouraging and serve to counter concerns that such classes may exacerbate low self-efficacy and anxiety and impede international students' academic success (Pappamihiel, 2001; Yeh and Inose, 2003; Moss et al., 2014).

Finally, our study confirmed that motivation does contribute to writing performance, but the relationships were not always as anticipated. The first finding, that self-efficacy at the start of the course predicted students' final grades, is unsurprising. Much of the literature reports self-efficacy to be a robust contributor to writing achievement for undergraduates in their L1 (Zimmerman and Bandura, 1994; Prat-Sala and Redford, 2012) and L2 (Phakiti et al., 2013; Chea and Shumow, 2017; Sabti et al., 2019). The second finding was more surprising, as content beliefs (beliefs that writing is about exploring and expressing ideas) contributed to slightly lower odds of passing the academic English writing classes. This paradox might lie in the cultural underpinnings of writing, which go beyond vocabulary and conventions and incorporate specific discourse norms. Writing as a cultural practice is susceptible to the influence of different discourse norms. Students who have always been high achievers might find it challenging to adapt to these new conventions while they continue to develop their L2 writing skills. This struggle could be more pronounced for students who perceive writing as a primary tool for

10.3389/fpsyg.2023.1232664

TABLE 7 Correlations among the motivational constructs at the start of the term with course performance.

	Pretest motivational constructs							Student outcomes	
	Self-efficacy (*N* = 93)	Goals – performance (*N* = 93)	Goals – mastery (*N* = 93)	Goals – avoidance (*N* = 93)	Content (*N* = 94)	Conventions (*N* = 94)	Affect (*N* = 93)	Final grade (*N* = 52)	Pass (*N* = 93)
Self -Efficacy	--								
Goals - Performance	0.29**	--							
Goals - Mastery	0.54***	0.70***	--						
Goals - Avoidance	0.12	0.04	0.06	--					
Beliefs - Content	0.50***	0.42***	0.64***	−0.02	--				
Beliefs -Conventions	−0.09	−0.10	0.01	−0.42***	0.18	--			
Affect	0.47***	0.09	0.27**	0.19	0.55***	−0.01	--		
Final Grade	0.19	0.29*	0.22	0.14	0.07	−0.03	0.01	--	
Pass	0.11	0.16	0.13	0.11	−0.04	−0.06	0.05	0.85***	--

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

TABLE 8 Logistic mixed model of the contributions of motivation factors at pretest to passing academic English classes.

Parameter	Model 0			Model 1		
	β (SE)	Odds ratio	*p*	β (SE)	Odds ratio	*p*
Fixed effects						
Intercept	1.65 (0.95)	5.21	0.10	2.41 (1.39)	11.12	0.08
Student Predictors						
Age English learned				0.03 (0.17)	1.03	0.85
Gender (female v. male)				1.21 (1.06)	3.36	0.25
First United States school				−0.63 (0.92)	0.53	0.49
Prior writing clinic use				1.12 (1.29)	3.05	0.39
Self-efficacy				0.15 (1.39)	1.16	0.91
Performance				2.07 (1.21)	7.90	0.09
Mastery				1.16 (1.17)	3.18	0.32
Avoidance				0.42 (0.85)	1.52	0.63
Beliefs – Content				−2.68 (1.43)*	0.07*	0.05*
Beliefs – Conventions				0.10 (0.79)	0.79	0.90
Affect				1.41 (1.38)	4.09	0.30
Random Effects						
Classroom (SD)	1.93			2.09		
ICC	0.56			0.67		
Total R^2				0.76		

exploring and expressing ideas (Durkin, 2008; Lee and Deakin, 2016; Heng, 2018) and who might be inadvertently adhering to their L1 rhetorical styles (Connor, 2004; Saffari et al., 2017; Wei et al., 2020).

One important limitation is that our findings are based on students' outcomes in the academic English courses rather than their performance on the individual writing assignments. Without access to individual writing assignments, we could not explore how international students engaged in the writing process and communicated their ideas, limiting our ability to determine if these rhetorical differences were responsible for this relationship. However,

TABLE 9 Hierarchical linear model of motivational factors at pretest predicting the final grades in academic English classes.

	Model 0		Model 1	
	β	SE	*β*	SE
Fixed Effects				
Intercept	2.57**	0.40	2.62**	0.39
Student Predictors				
Age English learned			−0.02	0.05
Gender (female v. male)			0.03	0.25
First American school (yes v. no)			−0.40	0.25
Prior use of the Writing Clinic			0.05	0.20
Self-efficacy (pretest)			1.07**	0.33**
Performance orientation (pretest)			0.52	0.29
Mastery orientation (pretest)			0.00	0.31
Avoidance orientation (pretest)			0.22	0.19
Beliefs - Content (pretest)			−0.52	0.28
Beliefs - Conventions (pretest)			0.30	0.20
Affect for writing (pretest)			−0.44	0.30
Random effects				
Classroom (SD)	0.77		0.74	
ICC	0.43		0.48	
Total R^2			0.58	

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

MacArthur et al. (2016) found that beliefs about content shared negative correlations with writing performance among undergraduates taking remedial writing classes. Thus, the negative contributions may suggest that students in general who value writing for expressing ideas may be more common among undergraduates still developing their academic writing skills in English. Nonetheless, our findings support the need for explicit instruction in the rhetorical norms and styles of argumentation of their L2 for international students, particularly those who heavily value writing for the exploration and expression of ideas. Future studies could explore the relationship between international students' beliefs about writing and their adoption of Western argumentation conventions.

The generalizability of these findings is also limited to some degree by the population and context of this study. That is, this study was conducted with international students taking these courses online during the COVID-19 pandemic. The population was made up of a majority (85.7%) students from China, which is not representative of the larger international student community. For example, students from China may differ from other international students in their self-efficacy for writing in English than students from countries with alphabetic written languages that may have more similarities to English. They may also hold different beliefs about what is important in writing than students from other countries, which may have impacted the findings. The COVID-19 pandemic may also have raised students' anxiety levels or impacted their self-efficacy for writing or participation in university writing courses online. Future research should expand this work to additional populations of international students.

In conclusion, motivation for writing is multidimensional and contributes to international students' success in academic English courses. With the rising number of international students attending English-speaking universities (Institute of International Education, 2022), universities have sought to help them develop the academic writing skills in English needed to succeed in their courses, increasingly through online course delivery (Kung, 2017). Remedial ESL or academic English courses may be an important way of supporting international students' experiences in higher education not only by promoting the academic writing skills critical for academic success but also by building their self-efficacy and enjoyment of writing in English. Yet international students' initial motivations and beliefs about writing may contribute to their success in these courses. Although their self-efficacy at the onset of the academic English courses was adaptive and contributed to students' success, holding strong beliefs about the value of writing for exploring and expressing ideas contributed to poorer performance. Thus, instructors may wish to be particularly attentive to international students' initial beliefs about writing, so they might adapt instruction to clarify misconceptions about effective academic writing in English. Our study underscores the need for a more nuanced understanding of the different motivational dimensions, especially in a diverse linguistic and cultural context, and suggests potential avenues for pedagogical interventions to foster international students' academic success.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with United States federal legislation and institutional requirements.

Author contributions

PC was involved in study design, analyzes and writing. ML was involved in study design and data collection. ME was involved in data analysis and writing the manuscript. MH was involved in data analysis and writing the manuscript. JL was involved in data cleaning and analysis. JWL was involved in study design and data collection. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1232664/full#supplementary-material

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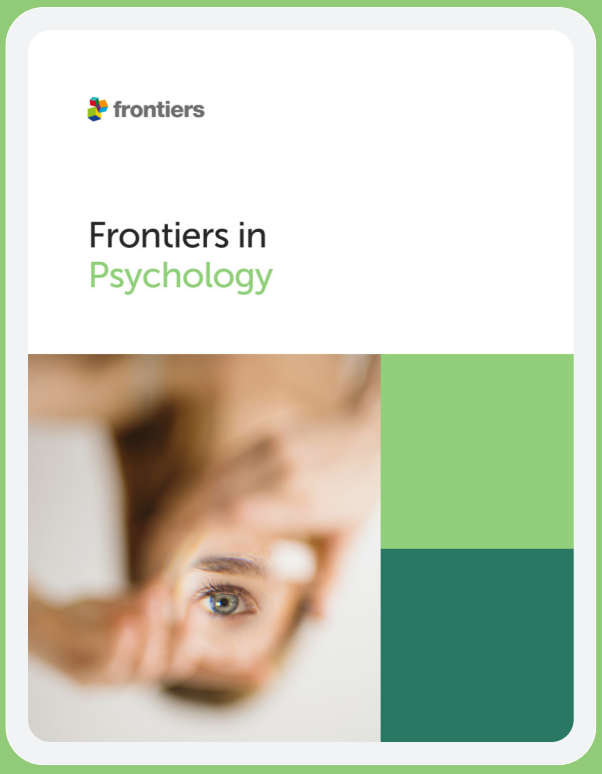

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