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Past, present and future contributions from the social cognitive theory (Albert Bandura)

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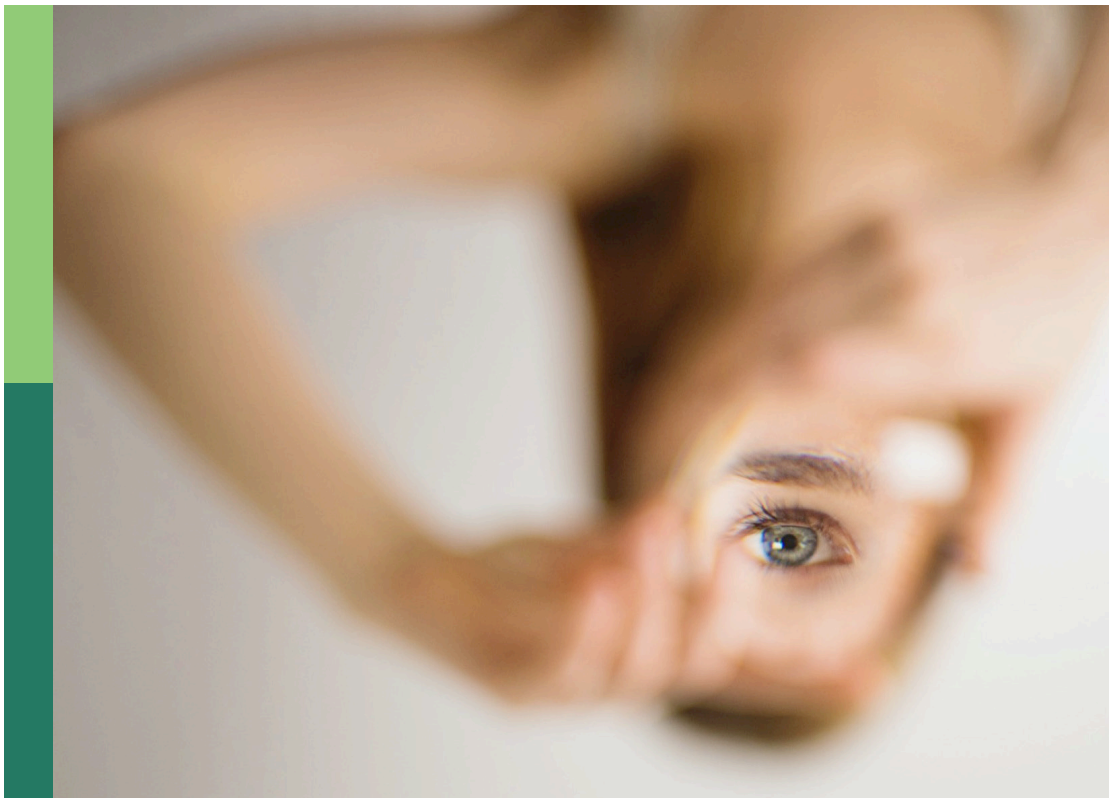

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Past, present and future contributions from the social cognitive theory (Albert Bandura)

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Editorial: Past, present and future contributions from the social cognitive theory (Albert Bandura)

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KEYWORDS

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Editorial on the Research Topic
Past, present and future contributions from the social cognitive theory (Albert Bandura)

Cognitive Social Learning theory (Bandura, 1986) tries to understand how the acquisition of knowledge, beliefs, attitudes, and ways of thinking of the person with respect to the social environment occurs. The premise underlying this theory is that learning is a cognitive process that cannot be separated from the context in which it occurs, be it family, school or of any other nature. Albert Bandura was a giant in the field, with work that influenced social, cognitive, developmental, educational, and clinical psychology. His death on July 21, 2021 left a void in the filed of psychology. He will definitely be greatly missed. This Research Topic has been developed to pay tribute to him, from the aforementioned disciplines.

A total of 9 articles and 68 authors have contributed to the objective of showing recent models and evidence, derived from Albert Bandura's original theoretical model. Two papers, carried out by the participating researchers, analyze the effect of a key construct in Bandura: the Self-Efficacy. The first work is focused on the effect of *Self-efficacy beliefs as a predictor of quality of life and burnout among university lecturers* (da Mota et al.). The second analyzes *How does teacher-perceived principal leadership affect teacher self-efficacy between different teaching experiences through collaboration in China* (Xie et al.).

Other works have presented evidence regarding the effect of motivation in the teaching-learning process. The first refers to the *Predictive model of the dropout intention of Chilean university students* (López-Angulo et al.); the second, entitled *You and Me Versus the Rest of the World: The Effects of Affiliative Motivation and Ingroup Partner Status on Social Tuning* (Skorinko et al.).

An article has addressed another essential aspect of his theory, referred to the moral impact of disengagement, as an explanatory mechanism of aggression and antisocial behavior. The work entitled *The effect of individual and classroom moral disengagement on antisocial behaviors in Colombian adolescents* (Gómez-Plata et al.) shows this phenomenon.

An experimental work is focused on *Self-Regulated Learning*, an essential construction derived from A. Bandura's theory. Shows the *Short and Long-Term Effects on Academic Performance of a School-Based Training in Self-Regulation Learning* (Tuero et al.).

Finally, two papers show a new, broader model of self-regulation, derived from the Theory of A. Bandura, presenting types of *internal and external regulation*, applicable to different psychological contexts, in the paper entitled *Advances on Self-Regulation Models: A New Research Agenda Through the SR vs ER Behavior Theory in Different Psychology Contexts* [de la Fuente et al. (a); de la Fuente et al. (b)]. Complementarily, an initial validation study of the Assessment Scales of the Regulation/non-regulation/dyregulation construct (personal and contextual) is presented, in the work titled *Self- vs. External-Regulation Behavior Scale TM in different psychological contexts: A validation study* (de la Fuente, Pachón-Basallo, et al.).

In conclusion, this Research Topic is also dedicated to the incredible person and psychologist Albert E. Bandura (1925-2021). Dr. Albert Bandura, was one of the most influential psychologists of all time. Bandura pioneered the field of social learning theory (now called social cognitive theory) with his landmark Bobo doll experiment. He defined the construct of self-efficacy and proposed an agentic theory of human behavior that challenged the central tenants of behaviorism. Born in Alberta, Canada, in 1925, Bandura earned his undergraduate degree from the University of British Columbia in Vancouver and his graduate degree from the University of Iowa. He joined the faculty at Stanford University in 1953, where he served as the David Staff Jordan Professor of Social Science in Psychology. Bandura was elected APA president in 1973 and encouraged our organization to pursue matters of public interest. Bandura's significant contributions to the field of psychology were recognized in 1980 with APA's Distinguished Scientific Contribution Award and in 2004 with our Award for Outstanding Lifetime Contribution to Psychology. He also received the Gold Medal Award for Distinguished Lifetime Contribution to Psychological Science from APF and the Lifetime Career Award from the International Union of Psychological Science. In 2016, he was awarded the National Medal of Science by President Barack Obama.

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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ORIGINAL RESEARCH
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Short and Long-Term Effects on Academic Performance of a School-Based Training in Self-Regulation Learning: A Three-Level Experimental Study

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An experimental study was designed to analyze the effect of school-based training in self-regulation learning strategies on academic performance (Mathematics, Sciences, Language, and English). Class-level variables (i.e., gender, the teacher's teaching experience, class size) were considered and the effects of the intervention were measured at the end of the intervention and 3 months later. A sample of 761 students from 3rd and 4th grades (356 in the control condition and 405 in the experimental condition), from 14 schools, participated in the study. Data were analyzed using three-level analysis with within-student measurements at level 1, between-students within-classes at level 2, and between-classes at level 3. Data showed a positive effect of the intervention on student performance, both at post-test (d = 0.25) and at follow-up (d = 0.33) considering the four school subjects together. However, the effect was significant just at follow-up when subjects were considered separately. Student performance was significantly related to the students' variables (i.e., gender, level of reading comprehension) and the context (teacher gender and class size). Finally, students' gender and level of reading comprehension, as well as the teacher's gender, were found to moderate the effect of the intervention on students' academic performance. Two conclusions were highlighted: first, data emphasize the importance of considering time while conducting intervention studies. Second, more teaching experience does not necessarily translate into improvements in the quality of students' instruction.

Keywords: self-regulated learning strategies, intervention, academic performance, follow-up effects, multilevel analysis

INTRODUCTION

Winne and Hadwin (2013) have identified three challenges associated with task execution. Students may face difficulties in (i) fully understanding the characteristics of the learning task at hand (this aspect is particularly relevant, because understanding the task is expected to guide the planning for its development and inform the selection of study strategies, monitoring, and adaptation of the

learning process); (ii) using the learning techniques or strategies recently acquired to accomplish the task; and (iii) transferring the learning strategies acquired in one context to other contexts. These are some of the reasons why there is a general agreement that self-regulated learning (SRL) plays an essential role not only in improving academic performance but also in the overall development of students throughout their lives, regardless of the context (Lüftenegger et al., 2012; Artuch-Grade et al., 2017; Venitz and Perels, 2018; Jansen et al., 2019; Martínez and Valiente, 2019; Chu et al., 2020; Theobald, 2021).

Previous research has generally indicated a positive relationship between the use of SRL strategies and improvements in attentional processes, planning and self-evaluation skills (Boekaerts and Corno, 2005; Cerezo et al., 2019), consistency and task persistence (Nota et al., 2004), perceived competence for schoolwork (Núñez et al., 2013), improvements in problem-solving processes (Verschaffael et al., 2010; Bol et al., 2015), school performance (Cleary and Platten, 2013), and academic success in general (Núñez et al., 2011). Narrowing the focus of the relationship between SRL and academic performance down to particular content domains, research has found positive effects of this relationship in mathematics (Fuchs et al., 2003; García et al., 2019), science (Guthrie et al., 2004), writing (Fidalgo et al., 2008; Rosário et al., 2017a,b, 2019), and reading (Spörer and Schünemann, 2014).

Self-regulated learning may be understood as an active, strategic, cyclical, and recurring process (Zimmerman, 2008) in which students are expected to set learning goals and manage behaviors, thoughts, and emotions, adapting the latter if necessary to attain the former (Pintrich, 2000; Zimmerman, 2011; Rosário et al., 2012). Thus, SRL implies the systematic development of cognitive, metacognitive, motivational, and behavioral processes, as well as the ability to adapt strategies to various contexts and attain the goals set (Pintrich, 2000; Efklides, 2011; Hederich-Martínez et al., 2016; Cerezo et al., 2017; Cho et al., 2017; Frazier et al., 2021). In an academic context, metacognition is a process closely related to SRL, referring to the ability to reflect, understand, and control one's own thoughts. Metacognition was defined by Flavell (1979) as knowledge concerning one's own cognitive processes and products, and is generally understood as involving knowledge, the monitoring, and the control of those processes (McCormick, 2003). However, self-regulation requires more than metacognitive knowledge and skill. Self-regulation involves an underlying sense of self-efficacy and personal agency and the motivational and behavioral processes to put these self-beliefs into effect. In fact, despite showing robust metacognitive knowledge, students may fail to activate and sustain their efforts and regulate sources of personal influence (e.g., managing emotions and environmental distractors) toward a self-set goal (Zimmerman and Moylan, 2009). The work of Winne and Perry (2000), which stresses that the optimized use of metacognitive strategies is critical to the effective regulation of study, is consistent with the latter proposition. For example, students who regularly check the strategies used to overcome distractors while studying (e.g., putting the phone in airplane mode to limit text messages and phone call interruptions during study time) are likely to attain their goals and improve performance.

Data from recent meta-analyses (e.g., Dignath et al., 2008; Donker et al., 2014; De Boer et al., 2018) show that the effect of self-regulatory skills on academic performance is statistically significant, with a moderate effect size, between 0.50 and 0.60. For example, a meta-analysis by Dignath et al. (2008) examined the effectiveness of self-regulatory training among elementary-school students. One of the topics used to select the studies for the meta-analysis was the type of strategies trained (i.e., cognitive, metacognitive, or motivational). For example, studies using metacognitive strategies addressed second-order cognitions aimed at controlling, monitoring, and evaluating learning and cognitive tasks. A detailed analysis of the findings regarding the use of metacognitive reflection strategies showed that interventions with the highest effect sizes equipped students with knowledge about strategies and provided them with opportunities to apply the learning strategies in class activities.

However, and despite the promising results found (Rosário et al., 2020), to the best of our knowledge, there are still some important unresolved questions. For example, there are conflicting data about the effects of interventions beyond the post-test (e.g., De Boer et al., 2018). The meta-analysis by De Boer et al. (2018) found that the positive effect of interventions was maintained and even increased in the post-test, but these authors warned that the results may have been related to singularities, such as particular learning domains, student variables, or the types of cognitive and metacognitive strategies trained. Another aspect that has shown mixed results is related to the age of the participants. Dignath et al. (2008) found that the effect of intervention programs was more effective for students in the early school grades, but the meta-analysis by Donker et al. (2014) reported no statistically significant differences related to student age. Moreover, a few studies on the relationship between training in SRL strategies and academic performance have examined the impact of this training on several subjects simultaneously, while assessing the same students. Also, the data are scarce on the way by which class variables can affect the relationship between SRL and academic performance either after an intervention (post-test) or in the longer term (follow-up).

So, drawing on the recommendations from previous meta-analyses, an experimental study was conducted (with control and experimental groups) in an authentic learning context on Spanish language (e.g., reading, writing, comprehension and composition of texts). This intervention (the Rainbow Program) was grounded in the theoretical framework of the social-cognitive learning model from Zimmerman (2011) and followed a metacognitive approach to train SRL strategies at the elementary-school level (8 and 9 years old). See information on this framework in the section "Procedure and Intervention Program."

A 12-session intervention program was delivered on a weekly basis to a large sample of elementary students from the third and fourth grades. Reasons for focusing the intervention on these two intermediate elementary-school grades were twofold. First, educational interventions addressing children enrolled in these grades are limited; the data from the current research are expected to provide information on the educational needs

of students at an early stage and therefore to help establish school-based interventions on SRL. Second, the effect size of the intervention may be related to the age of the students, and therefore the resulting data are expected to add to the literature. The current study collected data at three measurement time points: pre-test, post-test, and follow-up (3 months after the intervention). The third set of data was gathered because one of our objectives was to analyze the maintenance of the reported behavioral changes 3 months post-intervention. The large sample used allowed us to analyze the effect of the intervention on performance at a student level but also to examine the effect of class-level variables (i.e., teacher's gender, teacher's teaching experience, and class size). To our knowledge, although some studies have analyzed the effect of class-level variables (e.g., Stoeger et al., 2014; Lüftenegger et al., 2016), there is limited information about how these class-level variables conditioned the effects of an SRL intervention program on students' performance. The present study is also expected to contribute to deepening our understanding of the role played by class-level variables on the effectiveness of such interventions. To that end, data will be analyzed using a multilevel strategy (i.e., a three-level analysis with within-student measurements at level 1, between students within classes at level 2, and between classes at level 3).

In summary, a controlled study was run to examine the effect of training in SRL strategies on academic performance among students from the third and fourth grades. Data were collected prior to and at the end of the intervention, as well as 3 months post-intervention. Moreover, the effects of the intervention on performance were evaluated while considering the effects of class-level variables such as teacher's gender, teacher's teaching experience, and class size. The elementary-school classes were randomly assigned to the experimental condition (participants were delivered an SRL intervention) or to the control group (participants followed the usual school curriculum without any interventions). So, the effect of the intervention was measured regarding three aspects: (a) once the intervention had finished, (b) over the long term, and (c) in light of the effect of class-level variables. Data were analyzed using a multilevel strategy (three-level analysis with within-student measurements at level 1, between students within classes at level 2, and between classes at level 3).

The study addresses the following questions:

(1) Does the incorporation of the Rainbow Program into regular instruction significantly improve fourth- and fifth-grade students' academic achievement? Based on the results of the previous investigation (e.g., Dignath et al., 2008; Donker et al., 2014), it is hypothesized that, once the intervention is finished, students in the experimental group (Spanish curriculum + SRL training) will show higher performance in the four curricular areas than those in the control group (just Spanish curriculum). However, as suggested by the data from Jansen et al. (2019), only part of the effect of SRL intervention on achievement is expected to be mediated by the SRL activity; therefore, the effect size of the SRL intervention on performance is expected to be small or modest.

(2) Do the positive effects of the training last for 3 months after the intervention? In the meta-analysis by De Boer et al. (2018), most of the studies that included third- or fourth-year students showed that the gains in the post-test were maintained or increased in the follow-up. So, it is hypothesized that the effect size for the follow-up (3 months post-intervention) is similar or even slightly larger than the effect size for the post-test. The gains are expected to be maintained, or even increased, because the students have had the opportunity to practice the skills acquired through their involvement in the SRL activities developed in class for 3 months.

(3) To what extent the effects of the intervention are moderated by student variables and context variables? Prior data has shown that teacher characteristics (e.g., Wayne and Youngs, 2003) and class size (e.g., Krueger and Whitmore, 2001) show positive relationships with student performance, although data from recent studies indicate low consistency (e.g., Blömeke and Olsen, 2019). However, regardless of the mixed results found, none of the above studies examined the effects of these variables at the class level. With regard to student variables, the available data are also inconclusive. Whereas some studies indicate that high achievers benefited more than low achievers from intervention programs, others suggested a Matthew effect as a plausible explanation for the data (e.g., Sontag and Stoeger, 2015; Otto and Kistner, 2017). Therefore, the differences found for the three context variables (i.e., gender of the teacher, teaching experience, and class size) and for the three variables of the student (i.e., gender of the student, level of reading comprehension, and SRL strategies), alongside the limited data on the role played by these variables in the outputs of the intervention, do not permit the establishment of conditional hypotheses. Therefore, from an exploratory perspective, we aimed to examine the potential mediating roles of the personal variables (i.e., gender of the student, level of reading comprehension, SRL strategies) and the contextual variables (i.e., gender of the teacher, teaching experience, class size) on the effect of the intervention on students' academic performance.

MATERIALS AND METHODS

Participants

An initial sample of 915 students from the third (n = 486; 53.1%) and fourth (n = 429; 46.8%) grades participated in the study. These students were enrolled in 50 classes of 14 public (n = 607; 66.3%) and charter schools (n = 308; 33.6%) in the Principality of Asturias in the North of Spain. This sampling was non-probabilistic and incidental. The 50 classes enrolled were randomly assigned either to the experimental or control group. The mean number of students per class was 22.30 (SD = 4.24). Most of the teachers were female (75.2%), and with extensive teaching experience (M = 22.30; SD = 12.22). For various reasons (e.g., change of residence over the period

of the intervention, absence from class on the day of the assessment, special educational needs), of the 915 students, 154 did not participate in the study. Finally, 761 students aged between 8 and 11 years (M = 8.81; SD = 0.73) were included in the analyses (356 in the control condition and 405 in the experimental condition). No statistically significant differences were found for gender (49.6% girls; experimental group 49.9% girls; control group 49.4% girls). The majority of the families of these children were from medium-to-high socioeconomic backgrounds, living in urban areas.

Measures

Strategies for Self-Regulated Learning

Self-regulated learning strategies were assessed with the Inventory of Processes of Self-Regulation of Learning (IPAA; Rosário et al., 2007). The IPAA is based on the socio-cognitive model of Zimmerman (2000; 2008; 2011). It consists of nine items measuring the three phases of the process of SRL: planning (e.g., I make a plan before starting to work. I think about what I'm going to do and what I will need in order to do it), execution (e.g., During class and when I study at home, I think about specific parts of my behavior to change to achieve my objectives), and evaluation (e.g., I keep and study my corrected work to see where I went wrong and to understand what I have to do to improve). Item responses used a Likert-type format with five alternatives (1 = never, 5 = always). The IPAA has been adapted and used at different ages and school levels (elementary, high school, and college), showing adequate psychometric properties (e.g., Rosário et al., 2012 and Núñez et al., 2013, in elementary; Rosário et al., 2012, in high school; and Rosário et al., 2015 and Cerezo et al., 2019, in college). In the present study, the Cronbach's alpha is 0.80, indicating satisfactory reliability.

Reading Comprehension

The students' ability to understand texts was assessed using the Evaluation Battery for Reading Processes-Revised (PROLEC-R; Cuetos et al., 2007). This is a widely used test with robust levels of reliability and validity (e.g., Goswami et al., 2011). For the purposes of this study, we used the text comprehension subtest. This subtest is made up of four short texts of increasing difficulty and questions about them that are both direct and inferential.

Academic Performance

In the Spanish educational system, student performance is evaluated three times each school year. The assessment tests used in class are non-standardized knowledge evaluation tests, although they are similar for students of the same grade level. These content-domain tests include tasks of a distinct nature and complexity (e.g., problem-solving, investigative, or practical tasks). The regular teachers were asked to provide their students' scores for each of the four subjects (science, Spanish language, English language, and mathematics) at each of the three evaluation time points (pre-test, post-test, and follow-up). The rating used a 5-point scale (1 = minimum, 5 = maximum).

Design and Procedure

Design

A classroom-based randomized trial (CRT) was used to minimize contamination from the application of the treatment program in situations in which experimental students routinely interact (at the class level). It should be noted that the intervention program was embedded in school practices; consequently, it was infeasible to randomize individual students. Moreover, CRT is a natural design choice to respond to current research questions. Specifically, in this study, pre-existing groups of students (classes in our study), rather than individual students, were randomly assigned to either the intervention or control condition (standard treatment), and students regardless of condition were assessed for four dependent variables (i.e., science, Spanish language, English language, and mathematics) on three successive occasions [baseline, post-intervention, and follow-up (3 months after intervention)]. We examined baseline differences in text comprehension and SRL because students were not randomly assigned to classes and the effectiveness of the intervention may have been conditioned by their initial skills in text comprehension and SRL. The results showed no statistically significant differences in SRL strategies ($p = 0.373$) but statistically significant differences in text comprehension, although with a small effect size (d = 0.25). Therefore, both variables were included as covariates.

Training for Implementers

Two weeks prior to the beginning of the study, a training course of four 3-h sessions was delivered separately to the 41 participating teachers, regardless of treatment conditions. The course had two modules of 6 h each. The first presented and discussed the general SRL framework (e.g., social-cognitive theoretical framework, promotion of SRL learning in the classroom), while the second addressed the organization of the course (e.g., schedules, training on questioning to trigger student reflection and metacognitive reasoning), the assessment process, and the protocol for each session.

Treatment Integrity

The following procedures were used to assure the integrity of the implementation of the protocol. First, the teachers implementing sessions were provided with a rubric for each session that included the elements and activities for each session to help monitor the steps for each session. Each of the activities planned for the session was detailed in topics, and teachers were asked to check each one off when the activity was completed. Second, on a random basis, two research assistants observed 30% of the sessions using the same rubric used by teachers. These research assistants also wrote a short diary describing teachers' adherence to the protocol. Third, for the duration of the intervention, on a weekly basis, the principal investigator met with the research assistants to analyze project issues and adherence to protocol of each condition (e.g., analysis of record sheet data). Treatment fidelity was high for the program sessions. Teachers' reported adherence to the protocol was 93% (SD = 2.84, range 90–100). Data from the observations of the intervention sessions

indicated that the teachers completed 94% of the activities (*SD* = 3.23, range 87–98).

Procedure and Intervention Program

Theoretical Framework of the Rainbow Program

The Rainbow Program is rooted in the PLEJE Model of Rosário et al. (2017a,b), which is based on Zimmerman's (2000) SRL cyclical model. According to Zimmerman (2008), SRL develops over three cyclical phases that describe students' efforts to prepare the task, perform, and use outcomes to make subsequent adaptations. The forethought phase is anticipatory and comprises learning (e.g., task analysis, such as setting goals and strategic planning) and motivational processes (e.g., self-efficacy and intrinsic interest). These processes occur prior to students' engagement with the learning tasks and guide their efforts to self-regulate their learning. Prior to the learning task, students set plans regarding specific outcomes they expect to attain and choose the learning strategies likely to help them attain those goals. These processes depend on students' sources of self-motivation (e.g., self-efficacy). The performance phase or volitional phase describes processes that occur during learning and that affect students' focus and performance. There are two major categories involved in this phase while approaching a task: use of self-control methods likely to improve performance (e.g., self-instruction, environmental structuring) and self-observation methods (i.e., metacognitive monitoring and self-recording). The latter methods help students to track the use of learning processes and their efficacy and to create formal records of learning outcomes. The self-reflection phase describes students' reactions to learning outcomes resulting from their efforts to learn. This phase comprises two categories: self-judgments, which refers to students' comparisons of their performance with a standard (e.g., prior levels of performance) and self-reactions (i.e., self-satisfaction and adaptive/defensive decisions). Self-satisfaction involves students' cognitive and affective reactions to their self-judgments, while adaptive decisions comprise students' capacity to make further efforts to continue learning (e.g., maintaining the use of or modifying the strategy used) (Zimmerman, 2008). By contrast, students make defensive decisions to avoid learning experiences and future dissatisfactions (e.g., procrastination, task avoidance) (Rosário et al., 2009). This last phase of the process therefore informs the subsequent forethought phase that completes the self-regulatory cycle. SRL phases are intertwined and the length of the self-regulatory cycle for each student depends on the aspects (personal or environmental, for example) that intervene in the learning process (Bandura, 1986; Zimmerman, 2008).

Characteristics and Structure of the Program

The Rainbow Program uses the narrative of "Yellow's Trials and Tribulations," designed for children under the age of 10 (Rosário et al., 2007, 2017a,b), and consists of 12 50-min sessions delivered on a weekly basis (see Núñez et al., 2022). This narrative recounts the adventures of the colors of the rainbow while searching for Yellow, who has suddenly disappeared from the rainbow. During this adventure, the colors learn useful SRL strategies to help them overcome obstacles and attain their goals. Through reading and discussion of the story, and with the help of educators, students are encouraged to learn and transfer this knowledge to their daily activities (Rosário et al., 2017a,b).

We present an overview of the role played by three main components of metacognition – knowledge, monitoring, and control – in helping students enrolled in the program to improve their SRL processes. Metacognitive knowledge informs the subsequent elements of metacognition monitoring and control, while also being influenced by these two functions (Winne and Hadwin, 1998). Metacognitive monitoring addresses the progress acknowledged by students while learning. For example, while doing their homework, students are expected to be able to make an inference about the domain of their learning contents and therefore make adjustments to the learning strategies used to complete the homework. Metacognitive control is a form of cognitive control that is informed by metacognitive knowledge or monitoring. With regard to the control of homework tasks, students are expected to balance the time allocated to the importance or difficulty of the task, dedicating more time to complete exercises that are more complex, for example, or changing an SRL strategy when an earlier choice proved to be inefficient (e.g., to focus on the task at-hand and avoid distractors, students may turn off phone notifications or WhatsApp alerts while doing homework). In each session, grounded in discussions about the story plot and the characters' behaviors, students are encouraged to learn and use the three components of metacognition. For example, metacognitive knowledge is enhanced when students think about their ability to perform a particular task or about the set of SRL strategies they could use to perform that task. Moreover, discussions in class and the activities in the program help students to monitor their efforts to improve learning and the progress achieved but also to control whether their learning efforts are producing the desired learning outcomes.

The sessions proceeded as follows: (a) presentation of the session content; (b) reading from the narrative "Yellow's Trials and Tribulations," which, depending on the session, was performed by the teacher for the class, by one child for the class, individually in silence, or collectively with children taking turns to do the reading; (c) completion of a comprehension sheet about the reading with open, closed, direct, and inferential questions; (d) use of SRL strategies to complete short tasks; (e) checking of the homework assigned in the previous session and revision of the content delivered in the previous session; and (f) summary of the current session highlights and setting of homework.

Instructional Procedures: Control and Experimental Conditions

The intervention was carried out in the Spanish language class on a weekly basis using one of the four mandatory hours assigned to this subject in the curriculum. Students in the experimental group were provided with the contents of the national curriculum for Spanish (e.g., components of reading, writing, grammar, spelling, and vocabulary). These contents were delivered in 3 h each week, the fourth hour (the last Spanish class of the week) was focused on the activities of the Rainbow Program. Teachers were instructed to apply the SRL strategies discussed in the story tool to

the Spanish language content learned during the week. Students enrolled in the control group followed the Spanish curriculum contents for the 4 h each week. Teachers in the control group were instructed to follow the regular Spanish curriculum to meet third- and fourth-grade-level expectations. Thus, the experimental group (Spanish curriculum + SRL training) differed from the control group (Spanish curriculum only) in that, in addition to the usual instruction, the former received training in SRL activities for 1 h a week.

Data Analysis

Multivariate and univariate likelihood-based mixed-effects regression models (MRMs) was used in the analysis of data. The MRM modeling approach provides an appropriate general analytical framework to determine whether a change in response profiles over time is different between treatment groups and facilitates the comparison of treatment groups in particular time frames. We therefore conducted sensitivity analyses via pattern-mixture models and shared-parameter models in order to explore the impact of deviations from the MAR assumption on the conclusions. In the current analysis, time was treated as a quantitative variable (i.e., measured in months beginning at 0 months for the baseline assessment) rather than as a classification variable. We analyzed the dataset using MRM with maximum likelihood (ML) estimation as implemented in SAS PROC MIXED (SAS Institute Inc, 2018) and the most general mixed model using SAS PROC NLMIXED if the mechanism of missingness was not completely random (MCAR). In addition, we calculated Cohen's *d* as a measure of standardized effect size using the approach described by Vallejo et al. (2019) for growth curve models with attrition.

Initially, we modeled the effect of the intervention considering four different conditional growth models in competition; each statistical model expanded on a prior model in some logical way. In the first option (Model A), we analyzed data assuming that the 41 classes were assigned to the treatment groups and measured across three time points for four dependent variables. In this first option, the variable class was not included in the random part of the conditional growth model, so the analysis was conducted while ignoring clustering in the data at the classroom level. In the analyses of the second, third, and fourth options (Model B, Model C, and Model D), we analyzed data from 761 students nested in 41 arbitrarily selected classes from 15 middle schools, with the restriction that 20 or 21 classes were randomly assigned to each type of treatment and measured across time in four dependent variables. The three-level conditional Model B examined the effects of different characteristics of the participants at level 2, or the student level (i.e., students' gender, students' SRL, and students' reading comprehension). The three-level conditional Model C added four explanatory variables measured at level 3 or the class level (i.e., current intervention, teacher's gender, teacher's experience, and class size). Model D represents a significant simplification over Model C by removing two predictors. The three-level model described provides a way to empirically assess the influence of the class on the observations of the student. If the class effect is observed to be negligible, then analysis using the two-level model for longitudinal data is appropriate; otherwise, the results from the two-level model may be misleading.

After selecting the most parsimonious model, without ignoring any relationships between the outcome variables, we focused on testing the effects of the fitted model. As will be shown later, after controlling for the effects of level-2 and level-3 time-invariant predictors, the multivariate time effect and treatment-by-time interaction were statistically significant. Thus, the next step was to probe the data further to interpret the nature of the specific differences, especially those related to the interaction effects. To this end, we concentrated on least-squared means and pairwise comparisons of differences between the treatment groups at the evaluated time points.

RESULTS

Observed outcome means, standard deviations, and sample sizes across the four study time points are not provided for reasons of parsimony. These results are available from the first author on request. It is important to note that although the total number of subjects in this study was 761, the number of subjects with all measures at each of the evaluations fluctuated slightly. To test whether the missing data on each of the dependent variables were MCAR, we applied Little's test (Little, 1988). These data suggest that the MCAR model provides an adequate fit for the data of all dependent variables [$\chi^2(4) = 8.34$, $p > 0.05$ for observed measurement time points for science; $\chi^2(3) = 6.78$, $p > 0.05$ for Spanish language; $\chi^2(3) = 5.50$, $p > 0.05$ for English language; $\chi^2(2) = 2.69$, $p > 0.05$ for mathematics]. This was further confirmed by examining a plot of estimates as a function of the time of dropout.

Fitting Competing Models

Table 1 shows the results from the three types of multivariate MRM (i.e., Models A, B, C, and D). Model D was chosen as our "final model" after assessing model fit with likelihood-based AIC and BIC criteria. Empirical results presented by Vallejo et al. (2011) showed the appropriateness of ML for selecting the best mean structure using information criteria. We reached a similar conclusion when comparing the three models using likelihood ratio tests. The deviance statistic and number of estimated parameters in parentheses for Models A, B, C, and D were 10307.7 (38), 10245.3 (39), 10130.3 (63), and 10135.2 (55), respectively. The likelihood ratio test comparing Model B to Model A indicated that Model B was a significantly better fit to the data than Model A was [$\chi^2(1) = 62.4$, $p < 0.0001$]. When comparing Model C against Model B, the likelihood ratio test indicated that Model C provided a better fit [$\chi^2(24) = 115$, $p < 0.0001$], while comparing the three-level longitudinal Models D and C, we found a difference in deviance of 4.7 on 8 *df*, which is less than the associated 0.05 critical value of 15.51 ($df = 8$). Model D is a simplification of Model C in which the effects of students' SRL and teacher experience were removed; we therefore adopted Model D as our final model. These findings provide an argument for using a three-level analysis with within-student measurements at level 1, between-student measurements within

TABLE 1 | Results of fitting four multivariate mixed-effects regression model analyses.

	Model A		Model B		Model C		Model D	
Fixed effect	***F*-value**	**Pr > F**	***F*-value**	**Pr > F**	***F*-value**	**Pr > F**	***F*-value**	**Pr > F**
LB_Sciences	$F_{4,3520} = 106.0$	<0.0001***	$F_{4,3510} = 107.5$	<0.0001***	$F_{4,3515} = 107.7$	<0.0001***	$F_{4,3515} = 103.4$	<0.0001***
LB_Language	$F_{4,3524} = 85.4$	<0.0001***	$F_{4,3507} = 99.0$	<0.0001***	$F_{4,3502} = 97.9$	<0.0001***	$F_{4,3502} = 98.9$	<0.0001***
LB_English	$F_{4,3522} = 137.4$	<0.0001***	$F_{4,3508} = 134.4$	<0.0001***	$F_{4,3509} = 127.9$	<0.0001***	$F_{4,3502} = 131.4$	<0.0001***
LB_Math	$F_{4,3521} = 87.6$	<0.0001***	$F_{4,3512} = 82.9$	<0.0001***	$F_{4,3515} = 82.1$	<0.0001***	$F_{4,3516} = 82.7$	<0.0001***
RC	$F_{4,3521} = 2.9$	0.0215*	$F_{4,3513} = 2.0$	0.0870	$F_{4,3518} = 2.1$	0.0789	$F_{4,3517} = 2.1$	0.0824
SRL	$F_{4,3521} = 1.2$	0.3222	$F_{4,3517} = 1.2$	0.3331	$F_{4,3511} = 1.2$	0.3033		
Gender_S	$F_{4,3522} = 9.4$	<0.0001***	$F_{4,3564} = 9.2$	<0.0001***	$F_{4,3574} = 9.4$	<0.0001***	$F_{4,3471} = 9.0$	<0.0001***
Gender_T					$F_{4,339} = 7.0$	<0.0001***	$F_{4,334} = 7.6$	<0.0001***
Experien_T					$F_{4,309} = 0.2$	0.9537		
Size Class					$F_{4,443} = 6.4$	<0.0001***	$F_{4,445} = 6.6$	<0.0001***
Group					$F_{4,3218} = 3.1$	0.0146*	$F_{4,3266} = 3.2$	0.0117*
Group × RC					$F_{4,3505} = 6.6$	<0.0001***	$F_{4,3508} = 6.9$	<0.0001***
Time	$F_{4,5305} = 5.4$	0.0003***	$F_{4,5306} = 5.4$	0.0003***	$F_{4,5305} = 5.1$	0.0005***	$F_{4,5305} = 5.1$	0.0005***
Group × Time					$F_{4,5305} = 5.0$	0.0013**	$F_{4,5305} = 5.0$	0.0012**
Random effect	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**
Level-1 (within-subject variance)								
Residual	0.2728***	0.0053	0.2728***	0.0053	0.2665***	0.0052	0.2666***	0.0052
Level-2 (between students within classes variances)								
Intercept	0.0863***	0.0063	0.0***	0.0055	0.0684***	0.0054	0.0685***	0.0055
Level-3 (between-classes variances)								
Intercept			0.0188***	0.0053	0.0143***	0.0045	0.0144***	0.0045
Goodness-of-fit								
Deviance	10307.7		10245.3		10131.3		10135.1	
No. parameter	38.0		39.0		63.0		55.0	
AIC	10387.7		10323.3		10256.3		10245.1	
BIC	10559.7		10391.1		10365.8		10340.8	

LB_Sciences, baseline sciences performance; LB_Language, baseline Spanish language performance; LB_English, baseline English language performance; LB_ Math, baseline mathematics performance; SE, standard error. RC, students' reading comprehension; students' self-regulation. Gender_S, students' gender; Gender_T, teachers' gender; Experien_T, teachers' experience.
**p < 0.05; **p < 0.01; ***p < 0.001.*

classes at level 2, and between-classes measurements at level 3. In addition, because the classes were randomized to study conditions, one could argue that the unit of assignment must remain in the model regardless of significance.

Comparing the variance component estimates for level 2 and level 3 in Model D to those of the three-level unconditional growth model, we found a decline of 0.8516 and 0.0286, respectively. In other words, 92.6% of the between-student variation in outcomes measured at different time points was explained by the covariates at the student level, whereas 65.2% of the between-class variation in outcomes measured at different time points was explained by the covariates at the class level and cross-level interaction terms (i.e., treatment by linear trend and treatment by reading comprehension). Moreover, an additional 18.5% of within-subject variation in outcomes was explained by linear time.

Multivariate Mixed-Effects Regression Model Analyses

Inspection of **Table 1** reveals the following. First, students' gender showed a statistically significant effect on all dependent variables considered simultaneously [$F(4,3471) = 9.03$, $p < 0.001$]. Findings indicated that girls outperformed boys in overall academic achievement. In addition, the interaction term of students' reading comprehension × treatment groups showed significant effects on dependent variables [$F(4,3508) = 6.92$, $p < 0.001$], indicating that the intervention program was more beneficial to children with low reading comprehension skills than to children with high reading comprehension skills. Second, teacher's gender and class size had a statistically significant effect on all dependent variables considered simultaneously [$F(4,333) = 7.57$, $p < 0.0001$; $F(4,445) = 6.65$, $p < 0.001$]. Specifically, the academic achievement of students in the control group classes with male teachers was higher than that of students in classes with female teachers. In the experimental group, the results indicated the opposite trend; children in classes with female teachers showed slightly higher scores than children in classes with male teachers. The results also indicated that students in classes with fewer students performed better than their counterparts in larger classes. Third, averaged across treatment groups, there was a significant [$F(4,5305) = 5.05$, $p < 0.001$] increase in the mean response over time by simultaneously considering all dependent variables; to put it

TABLE 2 | Comparisons of group × time least-squares means by simultaneously considering all dependent variables.

Effect		Time	Estimate	SE	*df*	*t*-value	Pr > | *t*|	*d*
Group × Time	CG vs. EG	Post-test	−0.5541	0.161	1714	−3.44	0.0006***	0.25
Group × Time	CG vs. EG	Follow-up	−0.6974	0.161	1714	−4.42	<0.0001***	0.33

Group, control vs. experimental; Time, measurement time points; SE, standard error; df, degree of freedom.
*According to Cohen's guidelines, d values of 0.2, 0.5, and 0.8 are considered small, medium, and large effect sizes, respectively. *p < 0.05; **p < 0.01; ***p < 0.001.*

another way, on average, participants improved over time. Fourth, it is very important to note that, controlling for the effects of covariates, there was a significant difference between the treatment conditions over time in the set of the four dependent variables considered simultaneously [$F(4,5305) = 4.47$, $p < 0.01$]. Acknowledging that the interaction was significant (i.e., the pattern of change in the variables measured over time was not similar in both groups), we focused our attention on this finding. The differences of least square means in **Table 2** provide pairwise comparisons between the treatment groups over time. More specifically, the results showed that there were significant differences between the treatment and control group means, both at the end of treatment (i.e., second evaluation) and 3-month follow-up (i.e., third evaluation).

Univariate Mixed-Effects Regression Model Analyses for Each Dependent Variable

We conducted follow-up univariate MRM analyses to determine which dependent variables were responsible for the significant omnibus test of group-by-time interaction. **Table 3** includes results of the hypothesis tests for the outcome response measurement data.

The data in **Table 4** indicate that, except for student achievement in mathematics [$F(1,754) = 0.04$, $p > 0.05$], the null hypothesis of no differences between treatment conditions with respect to their average growth rates is rejected at a level of significance of no more than 1.5% for all outcome variables [$F(1,756) = 9.87$, $p < 0.01$; $F(1,748) = 10.65$, $p < 0.01$; $F(1,759) = 5.93$, $p < 0.05$]. In their entirety, these data indicate the efficacy of the intervention when considering the observation time point. Current data show that the time of implementation of the program is crucial to judging the efficacy of the intervention.

The next step aims to explain the group-by-time interaction in the response variables in a manner consistent with our research objectives. We estimated and compared linear combinations of means for this purpose using the LSMEANS statement in PROC MIXED. The least-squares means are estimates of the two groups evaluated at the end of treatment (i.e., second evaluation) and 3-month follow-up (i.e., third evaluation) for each dependent variable. These means are graphed in **Figure 1**.

As one would expect, there was a delay before the experimental treatment started to exhibit a beneficial effect in the school subjects (science, Spanish language, and English language). **Table 4** summarizes the results of the analysis. In this same table, following the approach by Vallejo et al. (2019), we report Cohen's *d* local effect sizes for group-by-time interaction effects as appropriate for multilevel modeling analysis. These values were calculated separately for the end of treatment (i.e., second evaluation) and the 3-month follow-up (i.e., third evaluation).

DISCUSSION

Knowledge about and training in strategies for SRL are likely to help improve the quality of learning and performance in various academic areas (De Bruijn-Smolders et al., 2016). Data from meta-analyses (e.g., De Boer et al., 2018) agree that the most effective intervention programs have a metacognitive and social-constructivist background and are delivered by researchers. However, the results of previous research are not consistent when it comes to long-term effects or which class-level variables (e.g., teacher's gender, teacher's experience, and class size) influence the efficacy of the interventions.

In general, data from our study show three results. First, a positive effect of the intervention on student performance, both at post-test ($d = 0.25$) and at follow-up ($d = 0.33$), when the four school subjects are considered together. However, the effect is only significant at follow-up (3 months after the end of the intervention) if the subjects are considered separately. Second, student performance is significantly related to the students' variables (i.e., gender, level of reading comprehension) and the context (teacher's gender and class size). Third, the student's gender, the student's level of reading comprehension, and the teacher's gender are moderators of the effect of the intervention on students' academic performance. We discuss these results in more detail below.

Post-test Effects

In our first hypothesis, considering the data reviewed, we proposed that, for the 3-month post-intervention, (1) the academic performance of the students in the experimental group would be statistically higher than that of the students in the control group; (2) those differences would be similar in the four subject areas examined; and (3) the size of the effect would be moderate (approximately between 0.40 and 0.50). Overall, data from the present study do not fully support this hypothesis.

As noted above, without differentiating between the different academic areas, the intervention showed a statistically significant effect on student performance (mean performance) at post-test, although with a small effect size ($d = 0.251$). However, if we consider each of the subjects individually, although students enrolled in the experimental group increased their performance scores in the four areas (while

TABLE 3 | Results of mixed-effects regression analysis of each of the four dependent variables.

	Fixed effects				Random effects				
Effect	df_N	df_D	***F*-value**	**Pr > F**	**VC**	**Estimate**	**SE**	***Z*-value**	**Pr > Z**
Natural Sciences									
LB	1	756	1602.39	<0.0001***	σ^2	0.1967	0.0101	19.44	<0.0001
Gender_S	1	747	0.12	0.7311	τ_{001}	0.1839	0.0158	11.66	<0.0001
RC	1	754	22.41	<0.0001	τ_{002}	0.0223	0.0085	2.64	0.0041**
Gender_T	1	43	2.15	0.1503					
Class size	1	63	4.28	0.0427*					
Group	1	764	3.49	0.0620					
Group × RC	1	756	8.21	0.0043**					
Time	1	756	2.37	0.1240					
Group × Time	1	756	9.87	0.0017**					
Spanish Language									
LB	1	733	1898.58	<0.0001	σ^2	0.1474	0.0076	19.34	<0.0001
Gender_S	1	737	5.23	0.0225*	τ_{001}	0.1187	0.0110	10.82	<0.0001
RC	1	744	24.95	<0.0001	τ_{002}	0.0168	0.0062	2.71	0.0034**
Gender_T	1	42	2.00	0.1643					
Class size	1	60	0.44	0.5108					
Group	1	762	0.23	0.6281					
Group × RC	1	748	0.02	0.8781					
Time	1	748	2.88	0.0899					
Group × Time	1	748	10.65	0.0012**					
English									
LB	1	759	1368.50	<0.0001	σ^2	0.2134	0.0110	19.47	<0.0001
Gender_S	1	747	0.12	0.7334	τ_{001}	0.2567	0.0200	12.85	<0.0001
RC	1	757	16.41	<0.0001	τ_{002}	0.0311	0.0117	2.66	0.0039**
Gender_T	1	41	0.04	0.8335					
Class size	1	60	3.23	0.0774					
Group	1	729	2.28	0.1315					
Group × RC	1	759	4.50	0.0341*					
Time	1	759	5.35	0.0210*					
Group × Time	1	759	5.93	0.0149*					
Mathematics									
LB	1	749	1416.73	<0.0001***	σ^2	0.1984	0.0102	19.42	<0.0001
Gender_S	1	736	1.27	0.2596	τ_{001}	0.1819	0.0158	11.54	<0.0001
RC	1	753	22.12	<0.0001	τ_{002}	0.0459	0.0137	3.35	0.0004***
Gender_T	1	45	0.27	0.6080					
Class size	1	58	0.06	0.8122					
Group	1	662	0.06	0.8080					
Group × RC	1	749	0.29	0.5876					
Time	1	755	16.97	<0.0001					
Group × Time	1	755	0.04	0.8448					

*LB, baseline academic performance; RC, students' reading comprehension; Gender_S, students' gender; Gender_T, teachers' gender; Group, control vs. experimental; Time, measurement moments; VC, variance component (σ^2, within-subject variance; τ_{001}, between students within classes variance; τ_{002}, between-classes variance). *p < 0.05; **p < 0.01; ***p < 0.001.*

the control group maintained their scores), the differences between the two groups did not reach statistical significance. Consequently, unlike the predictions based on the reviewed meta-analyses (e.g., Dignath et al., 2008) and despite the positive trend found [science (CG = +0.06, EG = +0.10); Spanish language (CG = +0.02, EG = +0.15); English language (CG = +0.03, EG = +0.12); mathematics (CG = −0.03, EG = +0.04)], the effect size for each of the subjects was not statistically significant. How might we explain this finding?

Several variables may help explain these findings. For example, the students' educational needs (regular vs. special needs) may be an important variable to explain the disparity of the effect sizes found in interventions and, in part, the results of our

TABLE 4 | Comparisons of group × time least-squares means for each dependent variable (subject) and theirs standardized effect size.

		Natural Science		Spanish		English		Mathematics	
Group	**Time**	**Estimate (SE)**	***d***	**Estimate (SE)**	***d***	**Estimate (SE)**	***d***	**Estimate (SE)**	***d***
CG vs. EG	Post-test	−0.052 (0.067)	0.08	−0.058 (0.057)	0.11	−0.078 (0.075)	0.11	0.091 (0.089)	0.12
CG vs. EG	Follow-up	−0.195** (0.067)	0.31	−0.187** (−057)	0.35	−0.194* (0.075)	0.28	0.085 (0.089)	0.11

CG, control group; EG, experimental group.
According to Cohen's guidelines, d values of 0.2, 0.5, and 0.8 are considered small, medium, and large effect sizes, respectively.
*$p < 0.05$; **$p < 0.01$.*

study. Generally, interventions with students with special needs, when compared with those of students without special needs, are more effective. For example, very large effect sizes have been reported in students with learning difficulties in writing (e.g., Mourad, 2009, $d = 2.55$) and with difficulties in mathematics (e.g., Pennequin et al., 2010, $d = 2.17$). Literature reported large effect sizes in studies on difficulties in reading (e.g., Mason, 2004, $d = 0.92$) and difficulties in writing (e.g., Graham et al., 2005, $d = 0.92$). In addition, to the best of our knowledge, only a few interventions with students with special needs have reported moderate effect sizes (e.g., Wright and Jacobs, 2003, $d = 0.68$). By contrast, there are many more studies with students without disabilities reporting null and minimal effect sizes (e.g., Allen and Hancock, 2008, $d = 0.15$; Meyer et al., 2010, $d = 0.08$; Souvingnier and Mokhlesgerami, 2006, $d = 0.14$; Van Keer and Vanderlinde, 2010, $d = 0.05$) or small effect sizes (Stoeger and Ziegler, 2008, $d = 0.36$; Tracy et al., 2009, $d = 0.34$) than those that have reported larger effect sizes (e.g., Michalsky et al., 2009, $d = 0.79$). The effect sizes of the current intervention at post-test are very small (science: $d = 0.08$; Spanish language: $d = 0.11$; English language: $d = 0.11$; mathematics: $d = 0.00$), but they are similar to those of the aforementioned research. It is possible that working on macro strategies (e.g., planning, monitoring, and evaluation) with students without specific needs is a strategy with a longer term payoff, particularly if the instructional environment allows them to practice and improve. This is what seems to have happened in our study when we analyze the post-test data.

Another potential explanation for the small effect of the SRL intervention on academic performance (in the post-test) could be the limited mediational effect of SRL, as suggested by the meta-analysis data of Jansen et al. (2019) or Núñez et al. (2022). SRL interventions are designed to improve knowledge of SRL strategies and perceived competence (Núñez et al., 2013; Cerezo et al., 2019), metacognition (Dignath et al., 2008), and student involvement in SRL activities (De Bruijn-Smolders et al., 2016), which is likely to lead to an improvement in performance (Dent and Koenka, 2016). However, data from the recent meta-analysis by Jansen et al. (2019) indicate that SRL partially mediates the relationship between SRL interventions and academic performance. Specifically, findings indicate that the "indirect effect of SRL interventions on achievement is small, and that a significant direct effect of SRL interventions on achievement remains after including SRL activity as a mediator" (Jansen et al., 2019, p. 14). Thus, recent findings indicate that SRL activity is a partial mediator of the effect of SRL interventions on achievement. Although this may seem puzzling, the effect of SRL interventions on performance are mediated by several variables beyond the SRL activity, both at the individual and class level (e.g., students' self-efficacy, students' academic procrastination, opportunities to use SRL in class to solve exercises, and type of assessment delivered).

Follow-Up Effects

Our second study hypothesis stated that (i) the effect of the intervention would be maintained or even increase 3 months after the post-test (follow-up) and (ii) the effect would be similar in the four academic areas. Our data partially confirm the hypothesis, although the effect size was smaller than expected. When we consider students' performance as a whole, without differentiating the subject areas, the effect of the intervention was significant and positive ($d = 0.325$), and even increased in the post-test [dif(follow-up-post-test) = 0.074]. However, when analyzing the effect of the intervention for each of the subjects separately, we can see statistically significant differences, with the experimental group scoring higher than the control in three of the four areas (science, Spanish language, and English language) although the effect size was small (science: $d = 0.31$; Spanish language: $d = 0.35$; English language: $d = 0.27$). We did not see significant effects from the intervention in mathematics. In general, our data are in line with findings from the meta-analysis by De Boer et al. (2018), as long as we limit the analysis to studies with students of a similar age (e.g., Tracy et al., 2009; Brunstein and Glaser, 2011; Carretti et al., 2014; Stoeger et al., 2014). De Boer et al. (2018) reported statistically non-significant differences between areas or domains with respect to the difference between the intervention effects at post-test and follow-up.

How can we explain current results for mathematics? Why did the mathematics results fail to improve 3 months post-intervention, following a trend similar to that of the other subjects? One possible explanation may be the distinct ways in which teachers understand the subject and organize activities in class. These distinct approaches to the subject are likely to influence students' SRL. For example, Wolters and Pintrich (1998) found that teachers' beliefs about the nature of their subject influenced instructional practices. Extant literature has shown that mathematics is often perceived by teachers as a very defined, sequential, and not very dynamic subject, whereas languages (e.g., English, Spanish) or social studies are considered to be much more open and dynamic (Dent and Koenka, 2016). This finding may help explain the highly structured choice of mathematical tasks (with very clear procedural content, concrete answers, and precise evaluation criteria) to be delivered in

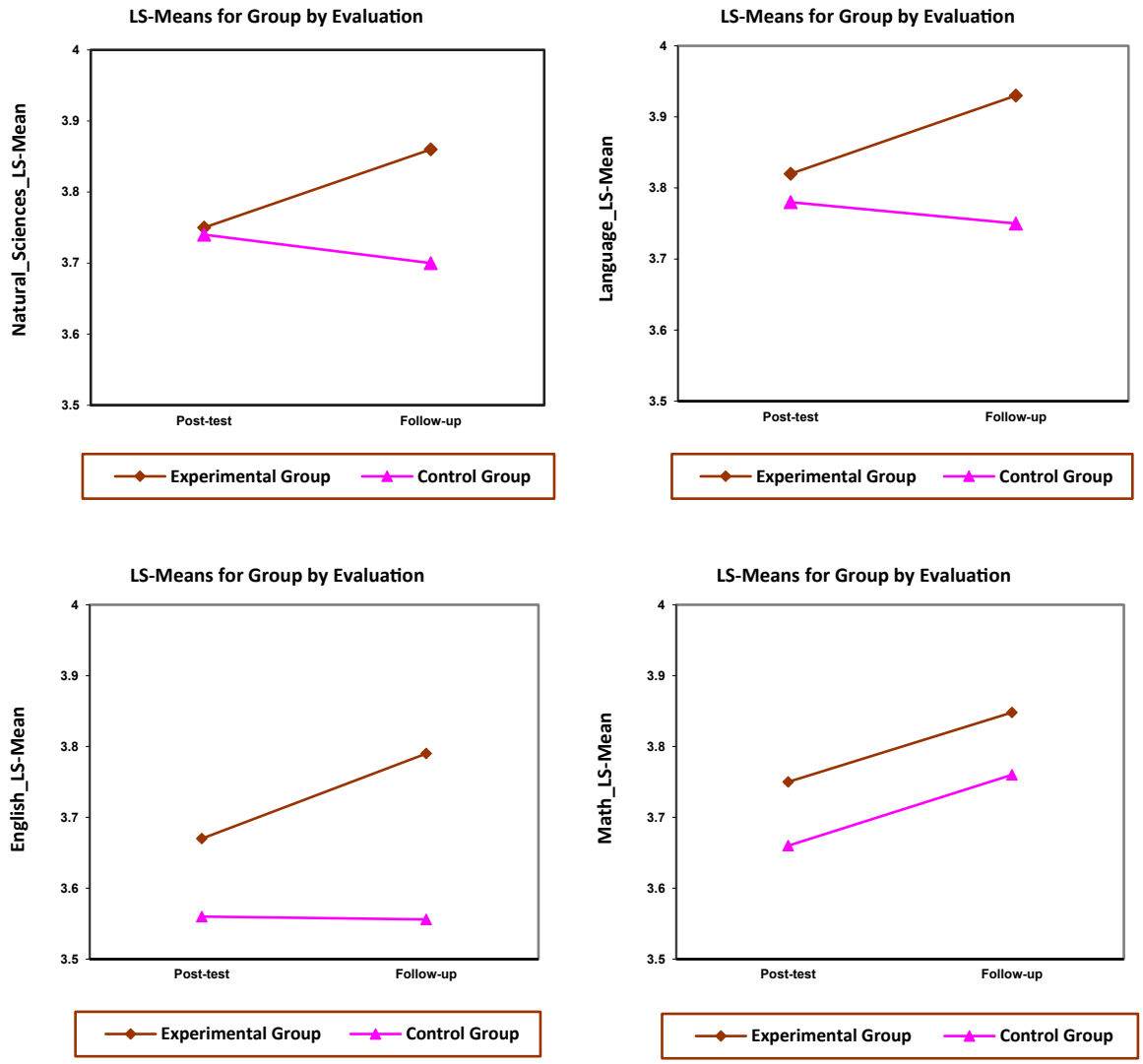

FIGURE 1 | Interactions plots: least-squares means over time by groups for each type of dependent variable (i.e., Sciences, Spanish language, English language, and Mathematics).

class (Lodewyk et al., 2009). This sequence holds within the characteristics of an SRL approach (e.g., design a plan, establish sub-goals, use monitoring strategies, project a foreseeable result), which may prevent the development of students' autonomy and personal agency. In sum, instructional processes developed in mathematics classes, understood as sequential and static, can limit the use of SRL activities in class and, therefore, weaken their association with achievement (Lodewyk et al., 2009). By contrast, the use of less structured tasks in class, typical of subjects such as Spanish language or English language, require the use of metacognitive processes to further define and structure the activities and achieve success in completing them. In this way, the use of this type of task in class is likely to encourage students to use metacognitive and SRL strategies (Lodewyk et al., 2009). This line of reasoning is consistent with data from the meta-analysis by Dent and Koenka (2016), who found a stronger and significant association between metacognitive processes and performance in social studies than in mathematics.

The second aspect of interest is related to the effect size of the SRL intervention. Unfortunately, we did not gather data on the class dynamics; these data would have helped understand whether the instructional scenarios developed in the 3 months post-intervention promoted or prevented the use of metacognitive resources and SRL strategies in class. As suggested by Paris and Paris (2001), for SRL interventions to achieve the expected educational impact, it would be necessary to intervene in the variables of the instructional context (e.g., type of feedback and type of assessment delivered). Therefore, regardless of subject, for SRL interventions to be truly successful (to have a large effect on learning and performance), the metacognitive and SRL strategies conveyed would likely need to be intertwined with daily classroom activities. In this way, teachers and students

would have the opportunity to practice, apply, and extend their metacognitive knowledge but also their metacognitive monitoring and control, improving students' performance as a result. As Paris and Paris (2001, p. 96) have noted, "SRL may be regarded not as the goal of students' learning but as the outcome of their pursuits to adapt to their unique environmental demands in a coherent manner." In sum, teachers are expected to promote opportunities in class for students to use metacognition and SRL processes and help them grow and develop positively at school.

Potential Moderators of the Effectiveness of Self-Regulated Learning Strategy Interventions

Student Characteristics

In our study, we included student gender alongside levels of initial reading comprehension and SRL strategies (pre-test) as covariates. The data from the analyses indicate that student gender and initial reading comprehension level were significantly related to student performance: the size of the effect of gender was small (d = 0.23), and the size of the effect of reading comprehension was marginal (d = 0.11). More specifically, girls showed significantly better school results than boys, as did students with higher levels of reading comprehension compared to those with lower levels. However, the use of SRL strategies did not show a significant effect on performance.

Nevertheless, we had a dual interest: studying the interaction of these variables with the intervention and examining how they might moderate the effect of the intervention on performance (both overall and individually). The data show a significant moderating effect of reading comprehension (d = 0.20) and a marginal moderating effect of student gender (d = 0.11). We found no notable interaction between the levels of SRL strategies and the intervention.

The interaction of reading comprehension and the intervention showed that students with lower levels of (pre-test) reading comprehension benefited more from the intervention than did students with higher levels. This is consistent with the findings of some studies (e.g., Stoeger and Ziegler, 2010) but not with those of others (e.g., Morgan et al., 2011; Sontag and Stoeger, 2015; Otto and Kistner, 2017). Otto and Kistner (2017) suggested that their results, consistent with the Matthew effect and in contrast to what might be expected (that greater gains would be made by those starting from lower levels) (De Corte et al., 2011), may have been due, at least in part, to the short duration of the intervention (five sessions of effective work). They also suggested that longer interventions might allow students with a lower level to have sufficient time to maximize their gains even more than their counterparts with higher initial levels. The results of our 12-session study are consistent with the hypothesis put forward by Otto and Kistner (2017), but researchers may wish to examine the hypothesis further.

Otto and Kistner also suggested that their results might have been due to the content of their training program. In the current study, the students were trained in macro strategies within a socio-cognitive framework (planning, monitoring, and evaluation) applied to general tasks in the learning process and to the specific context of text comprehension. It is possible that students with lower reading comprehension were in more need of this type of training, which did not require high cognitive abilities for them to benefit from it.

Student gender, without differentiating between the four subjects, was shown to be statistically significantly related to student performance (small effect; d = 0.23), and to exhibit a marginal interaction with the intervention (irrelevant effect; d = 0.11). Running the model for each subject shows that student gender had a small effect with performance in Spanish language (p = 0.022). Moreover, gender was not found to be a moderating variable for any of the four subjects.

Overall, the current data do not show an effect of student gender on performance. Moreover, changes in academic performance associated with the intervention are basically parallel (the effect of the intervention was similar for performance in the post-test and follow-up).

Context Characteristics

Teacher's gender, teacher's experience, and class size were included in the model as variables at the class level. The data indicate that teacher's gender and the class size influenced student performance (d = 0.14 and d = 0.15, respectively) but that teaching experience did not. More specifically, we learned that although the effect size was small in both cases, students had better (average) results when they learned with male teachers and when they were enrolled in small classes. However, when the school subjects were considered separately, we did not find a significant effect of teacher's gender on performance in any of the subjects, but class size showed a small effect in science and a marginal effect in English language. These results, in short, seem to suggest that none of the three variables (i.e., teacher's gender, teaching experience, and class size) significantly explains the differences in student performance, particularly when subjects are considered separately.

Analyzing the effect of the interaction of these three variables with the intervention, we found that results were significantly better when students were taught by female teachers. In addition, neither the amount of teaching experience nor the size of the class was shown to be related to the effects of the intervention. In other words, the effect of the intervention on student performance was independent of the teacher's experience and the class size, although it was enhanced when the teacher was female.

With regard to teacher characteristics, current data is consistent with data from international studies with fourth graders investigating similar subjects (e.g., Luschei and Chudgar, 2011; Blömeke and Olsen, 2019). For example, Luschei and Chudgar (2011) examined data from the 25 countries that participated in TIMSS – 2003 . They analyzed the relationships between teacher characteristics (experience, education, readiness to teach, and gender), student background, and fourth-grade students' mathematics and science performance. Their results indicated that the impact of teacher characteristics on student performance is limited. More recently, Blömeke and Olsen (2019) used the TIMSS – 2001 database to examine the academic achievement in mathematics and science of fourth-grade students from the United Kingdom, Norway, South Korea, Thailand, and

Tunisia. The findings from this study were consistent with those of Luschei and Chudgar (2011), indicating that the relationship between teacher characteristics and student achievement is weak.

In summary, the current results are in line with data from the large-scale studies mentioned above. Contrary to our initial expectations, teacher experience does not play a relevant role in the explanation of the variability in students' performance.

CONCLUSION

Our results indicate that the intervention is effective in relation to the two measuring time points (post-test and follow-up) and the four academic subjects taken together. When subjects were considered separately, statistically significant differences between experimental and control groups were found in three of the four subjects examined (mathematics being the exception). However, the absence of effect in mathematics may be due to the characteristics of the tasks and the instructional process of the discipline itself (Dent and Koenka, 2016), but also possibly due to the improvement experienced by the control group (beyond what was expected). Future research may wish to examine these possibilities.

The results of our study emphasize the importance of considering time in intervention studies. Researchers may wish to consider including this variable in future work. For example, they may wish to examine the relationship between intervention characteristics and the time needed to observe significant or notable changes (Núñez et al., 2013). In this regard, intervention studies could consider the inclusion of additional measures besides pre-test and post-test (e.g., Rosário et al., 2019). Moreover, the current results indicate that teaching experience is not necessarily related to progressive improvements in the quality of students' instruction. Indeed, Blömeke and Olsen (2019) examined teaching experience and teaching quality as individual variables and found that only quality of teaching significantly predicts student performance. Therefore, those responsible for educational policy might wish to consider developing initial and continuing training strategies for teachers (see Egert et al., 2020), allowing teachers to improve their teaching quality while taking advantage of their experience as teachers (Michalsky and Schechter, 2013; Rosário et al., 2013; De Smul et al., 2018; Iwai, 2019; Egert et al., 2020; Frazier et al., 2021; Högemann et al., 2021; Karabenick et al., 2021; Kitsantas et al., 2021). The study by Iwai (2019) provides a good example of the implementation of such a proposal. The author analyzed the effects of training in metacognitive and self-regulation strategies for preservice teachers. Specifically, these future elementary-school teachers were trained to plan, implement, and analyze metacognitive strategies for reading and writing activities. The results showed that after one semester of training, the preservice teachers were able to select and optimally use appropriate metacognitive strategies based on the needs of their students and on the objectives for the lesson (these preservice teachers increased their awareness, knowledge, and skills to use metacognitive strategies). Likewise, they were able to critically analyze their own use of metacognitive strategies.

The data from our study and any educational implications derived therefrom should be interpreted with caution due to important limitations both in the design used and in the SRL evaluation procedure. With regard to the former, despite the large number of students and classes for each of the conditions, the interpretation of the results would benefit from the inclusion of a third group (placebo). To further ground our inferences about the increase in performance by students who received regular instruction within an SRL framework compared to those who received only regular instruction, it would have been valuable to have had evidence of a progressive increase in SRL activities and use of SRL skills accompanying the improvement in performance. For example, Rosário et al. (2017a,b) carried out a study (a longitudinal classroom-randomized controlled design using a multilevel modeling analysis) to examine the impact of extra writing opportunities (i.e., writing journals) on the quality of the writing compositions of 182 fourth-grade students. During the 12 weeks of the intervention, students in the control and experimental conditions wrote a weekly journal. The data indicated that the differences in the quality of the written compositions at the end of the 12th week were modulated by the use of SRL strategies over time. Moreover, the relationship between time (i.e., 12 weeks) and students' writing performance was found to be quadratic, rather than non-linear; the writing quality of the compositions increased more rapidly and intensively in the first 3 weeks, with the curve presenting a progressive but only slight growth in the subsequent weeks. Finally, while analyzing the latter limitation, we acknowledge the use of self-reporting to measure SRL. Self-reports are not exempt from limitations (regarding reliability and validity) and may not be adequate for measuring a construct of a processual nature, such as SRL (Karabenick and Zusho, 2015; Panadero et al., 2017). Future research may wish to consider using more than one source of information to collect data (Rovers et al., 2019; Järvela et al., 2021).

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 Comité de Ética de la Investigación en Ciencias Sociales y Humanas de la Universidad de Oviedo. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

ET, JN, and FA conceived the original idea and supervised and coordinated the project and data collection. TM, JM, and PR

developed the theoretical framework and design of the study. GV and MF performed the data analysis and findings. All authors discussed the results and contributed to the final manuscript.

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REVIEW
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Advances on Self-Regulation Models: A New Research Agenda Through the SR vs ER Behavior Theory in Different Psychology Contexts

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The aim of this paper is to demonstrate how Bandura's Social Cognitive Theory (1986) influenced the development of several complementary models of the construct of Self-Regulation. Building on the foundation of Self-Determination Theory, SDT (2000), and Zimmerman's Self-Regulation Theory, SR (2001), with their assumptions, contributions, goddesses, and limitations, we come to the Self- vs. External Regulatory Theory, SR-ER (2021). Finally, we integrate recent evidence demonstrating the explanatory adequacy of the SR vs. ER model for different psychological constructions in different settings related to education, health, clinical practice and social work. Complementary, a new theoretical and empirical research agenda is presented, to continue testing the adequacy of SR vs. ER assumptions, and to better understand the behavioral variability of the different constructs studied.

Keywords: Albert Bandura, social cognitive theory, self-determination, self-regulation, self- vs. external regulation

PREFACE

This article is dedicated to Prof. Albert E. Bandura (1925-2021), outstanding human being and one of the most influential psychologists of all time. Bandura's ground-breaking Bobo doll experiment gave rise to the field of social learning theory, later renamed social cognitive theory. The construct of self-efficacy was identified and described by Bandura. He challenged the core assertions of behaviorism and put forward his agentic theory of human behavior. A recent APA tribute (2021) to Albert Bandura summarizes highlights of his career: "Bandura was elected APA president in 1973 and encouraged our organization to pursue matters of public interest. Bandura's significant contributions to the field of psychology were recognized in 1980 with APA's Distinguished Scientific Contribution Award and in 2004 with our Award for Outstanding Lifetime Contribution to Psychology. He also received the Gold Medal Award for Distinguished Lifetime Contribution to Psychological Science from APF and the Lifetime Career Award from the International Union of Psychological Science. In 2016, he was awarded the National Medal

of Science by President Barack Obama. Albert Bandura was a giant in the field, with work that influenced social, cognitive, developmental, educational, and clinical psychology. . . . Bandura's contribution is irreplaceable; without it, the current view of human educational and social processes would be impossible. His writings have always marked a before and after in our understanding of psychoeducational processes".

INTRODUCTION

Every researcher knows that there is nothing more practical than a good theory—though not every theory can be equally applicable in practice (Berkman and Wilson, 2021). Bandura's Social Cognitive Theory (Bandura, 1986, 1991, 1999, 2004a,b, 2005, 2006) addresses the process by which a person acquires knowledge, beliefs, attitudes and ways of thinking in regard to the social environment. The foundation of this theory is that learning is an agentic, cognitive process that exists and is understood within a context of family, school, work or other (Bandura, 2006). This theoretical model established several explanatory mechanisms or types of learning -essentially human- such as learning through vicarious mechanisms or through self-regulatory mechanisms, thereby questioning and expanding the prevailing vision of the day, that of learning by classical and operant conditioning.

The aim of this manuscript is to comparatively analyze three existing theoretical models in educational psychology, all of which have adopted the construct of self-regulated behavior as a core element, but have established different explanatory mechanisms to explain its role in processes of human development and learning processes. Therefore, starting from a definition of the construct itself, the different theoretical positions will be analyzed (including goodnesses and limitations), to conclude with a prospective research proposal.

SELF-REGULATION BEHAVIOR

The construct of Self-Regulation (SR) is a personality-related construction (Mithaug, 1993; Boekaerts et al., 1999; Hoyle, 2010) that describes a person's ability to plan, monitor, and evaluate their own behavior (Brown, 1998; Vohs and Baumeister, 2016). Pervin (1988) study defined the classical understanding of this psychological construction. The initial conceptualization of self-regulation, situated at the molecular level of psychological analysis (de la Fuente et al., 2019a), adopts three principles:

1) SR is a variable pertaining to the subject and determined by other subject variables or factors, such as personality and metacognitive factors (Hoyle, 2010; Valikhani et al., 2020; Vega et al., 2020).
2) Contextual factors are considered indirectly, as having a more tangential role in explaining variability or defining the level of a person's behavioral regulation, whether referring to general behavior or specific, education- or health-related behavior.
3) People are assumed to have a higher or lower level of self-regulation, without attempting to define SR categories.

The plentiful previous research has documented numerous relationships with SR: personal adjustment factors are positively related (Wrosch et al., 2003); in personality factors, Conscientiousness is positively related and Neuroticism relates negatively (Guido et al., 2015; de la Fuente et al., 2020a); and SR is positively related to well-adjusted behavior in academic achievement (Blair and Raver, 2015; Bernardo et al., 2019).

SELF-REGULATION IN BANDURA'S THEORY

In Bandura's social cognitive theory (Bandura, 1986), there are interactions between *personal* factors (e.g., cognitions, feelings, skills), *behavioral* factors (e.g., strategy use, help-seeking actions), and *environmental* factors (e.g., classrooms, homes, work environments), through the concept of triadic reciprocal causality, all of which affect the individual's functioning (Usher and Schunk, 2018). The personal variable of self-efficacy (self-referential beliefs about the probability of adequate performance) results from these reciprocal influences. Prior research has demonstrated that behaviors like choice of tasks, persistence, effort, and achievement are influenced by self-efficacy beliefs (Schunk and DiBenedetto, 2016). Self-efficacy in turn is modified by students' behaviors. Students observe their progress toward learning goals as they work on their tasks. For example, assignments completed is one of many progress indicators that reinforce students' sense of capability for performing, and so increase their self-efficacy for further learning (Schunk and DiBenedetto, 2016).

Research has verified these reciprocal influences between self-efficacy and environmental variables in students with *learning disabilities*, who often have *low self-efficacy for learning* (Licht and Kistner, 1986). These individuals may react to their environment based on environment-related attributes instead of their own behavioral attributes. The learner's behaviors and the learner's environment can influence each other. The environment is influencing behavior when students pay attention to the visual without giving it much thought. Student behaviors, meanwhile, can also modify the instructional environment.

According to social cognitive theory, the individual pursues a sense of *agency,* that is, the purpose and skills to intervene and take action (Bandura, 1987, 1991), accompanied by the belief that they can exert substantial control over important aspects of their life. Self-regulation and self-efficacy are pathways to experiencing a greater sense of *agency* or *agentic perspective* (Bandura, 2001). Use of self-regulatory skills increases a students' feelings of efficacy about learning and performing well; this in turn leads to increased motivation, effort, persistence, and learning. Students' perception that they are learning enhances their agency beliefs.

THREE COMPLEMENTARY MODELS OF SELF-REGULATION DERIVED FROM BANDURA'S THEORY

Different theoretical models have emerged from research rooted in Bandura's Social Cognitive Theory (1986). Addressing the

TABLE 1 | Summary chart of the theoretical approaches toward *Self-Regulation* analyzed in this paper.

Theory	Year	Discipline	Object of study	Concepts/Paradigm	Motivation types	Applications	Limitations
1. Social Cognitive Theory	1997	Social psychology	Person, context	Self-efficacy, Self-regulation	Intrinsic, extrinsic	Social, educational, clinical	Micro-level analysis
2. Self-Determination Theory (SDT)	1985	Developmental psych/learning	Person, context	SR (Autonomy) vs. ER (Heteronomy)	Introjected motiv /a-motivation/external motivation	Wellbeing/ psychopathology autonomy-competence	Human development process, external regulation = external dys-motivation
3. Self-Regulated Learning Theory (SRL)	2001	Psychology of learning	Person, context	Self-Regulated Learning (SRL)	SR motivation	Learning process	Molar-level processes
4. SRL vs. ERL Theory (SRL vs. ERL)	2017	Instructional psychology	Person x context	SR vs. ER Learning Processes	SRL vs. ERL motivation, regulatory	Teaching and Learning Process	Molar-level processes
5. SR vs. ER Theory (SR vs. ER)	2021	Multiple spheres of psychology	Person x context	SR vs. ER in different contexts	SR x ER Factors	Different contexts	Micro- and molecular level process analysis

concept of Self-Regulation (SR) either directly or indirectly, three models rise from different fields of Psychology. Summarized and presented below, they are the object of analysis in this paper (see **Table 1**).

SELF-DETERMINATION THEORY: ENCOURAGING THE DEVELOPMENT OF AUTONOMY

The first model, *Self-Determination Theory (SDT)* (Deci and Ryan, 1985a,b, 2008; Ryan and Deci, 2000b, 2006, 2020a,b) is a heuristic model of human development in interaction with the environment. SDT serves to explain how human motivation is largely determined by the needs for self-determination and autonomy. The impact of this theory in research and applied practice has been unquestionable, especially in the educational sphere of special educational needs. A Google Scholar search on *self-determination* and *self-regulation* yields a total of 63,000 documents (18-Oct-2021). This proposed theoretical framework has an indirect link to Albert Bandura's model because it gives shape to an interactive, combined conception of the mechanisms of motivation and human regulation. It concurs with Bandura's model in assuming that behavior and its development can be determined both internally and externally; furthermore, it establishes the sequential process for externally regulated behavior to become internalized. Consequently, both share the construct of self-regulation as a core explanatory element, and give importance to external factors as a regulatory mechanism.

Assumptions

SDT is a theoretical model of the molecular-molar order (de la Fuente et al., 2019a). Its focus is to explain human development and wellbeing using an explanatory philosophical paradigm that adopts the concepts of autonomous development, as opposed to heteronomous and anomic development ("autonomy" retains its primary etymological meaning of self-governance, or rule by self-control). *Heteronomy*, as the direct opposite, refers to "regulation from outside the phenomenal self, by forces experienced as alien or pressuring, be they inner impulses or demands, or external contingencies of reward and punishment" (Deci and Ryan, 1985a, p. 1562). In reaction to the external, behaviorist paradigm of twenty years ago, Self-Determination Theory is based on three essential concepts (Deci and Ryan, 1994; Deci et al., 1996; Ryan and Deci, 2017a,b, 2020a,b): (1) *Autonomy* involves initiative and ownership of one's actions. Experiences that correspond to a person's interest and value support autonomy, while external control, either by rewards or punishment, undermines autonomy. (2) *Competence* corresponds to a sense of mastery and of being able to succeed and grow. Competence is best promoted by optimal challenges, positive feedback, and growth opportunities, offered within well-structured settings. (3) *Relatedness* involves feelings of belonging and connection and is promoted by the expression of caring and respect.

This model is widely accepted and is backed by a large volume of empirical evidence (Deci and Ryan, 1985a,b,c, 2000; Deci et al., 1994, 1996; Ryan and Deci, 2017a,b, 2020a,b; Howard et al., 2022). A recent meta-analysis reported that ego-involved motives were positively related not only to persistence and performance goals, but also to indicators of well-being. By contrast, motivation driven by a desire to obtain rewards or avoid punishment was associated with decreased well-being, and there was no association with performance or persistence. Amotivation, for its part, was related to poor outcomes (Hagger and Hamilton, 2020).

Motivational and Regulatory Style

Self-Determination theory has elevated the role of the student in responding to their own motivations. It conceptualizes development on the basis of personal needs, and motivation as a progressive internalizing process from external influences to internal ones, where the person constructively defines their own personal needs and motivations. The theory is based on the following assumptions: (Ryan and Deci, 2000b, p.1; see Fig. 1):

(1) There are multiple *types of motivation* with their own unique characteristic phenomenology and dynamics. The concepts of amotivation, intrinsic motivation and extrinsic motivation are taken from this theory (Ryan and Deci, 2017a,b). Types of motivation can be ordered on a self-determination

continuum (Howard et al., 2017; Ryan and Deci, 2017a,b, 2020a,b), where intrinsic motivation lies on the end of high self-determination, and amotivation at the opposite end, where self-determination is absent. Partially self-determined states, such as introjection, lie between the two extremes.

(2) *Regulation styles* result from the view of *self-determination of motivation* (Howard et al., 2017), and also range from extrinsic to intrinsic. *Extrinsic regulation* stems from externally imposed rewards and punishments and is typically experienced as controlled, non-autonomous motivation. When extrinsic motivation has become partly internalized, we refer to *introjected regulation,* or regulation by internal rewards of self-esteem for success and by avoidance of anxiety, shame, or guilt for failure. In academic activities, introjected regulation often involves the ego (Deci et al., 1982); self-esteem is contingent on outcomes, resulting in "internally controlled" regulation.

(3) Attributions of outcomes and the corresponding *perceived causality* are established according to type of motivation. A meta-analytic, structural equation model revealed total effects of autonomy orientation on behavior, comprising direct and indirect effects through autonomous motivation. There was also a positive direct effect of control orientation on behavior, and a negative indirect effect through controlled motivation (Hagger and Hamilton, 2020). This motivational model has also been transferred to other fields such as health (Ntoumanis et al., 2020; Vallerand, 2021).

Limitations

Limitations of these concepts have been recognized, in that they do not reflect a conceptual continuum, nor are they presented as complementary (not mutually exclusive). Moreover, the role of type of context as an influence in motivational processes has not been sufficiently accounted for.

(1) The authors themselves acknowledge this in their model, which emerges from the Psychology of Human Development, with extrapolations for improved learning and teaching (Ryan and Deci, 2000b). We find ample evidence and dissemination of this model in the study of special educational needs of students, including assessment and intervention (Almukhambetova and Hernández-Torrano, 2020). However, the model does not specify discrete processes of regulation of learning, nor the specific strategies of regulating motivation before, during and after the execution of a given task, as is reflected in the model by Zimmerman and Schunk (2001).

(2) The model's concept of external regulation focuses on control or application of external contingencies (a behavioral perspective) (Ryan and Deci, 2000b), and not on the possible external promotion or facilitation of the student's self-regulation. There is plentiful evidence that *external regulation*—understood in opposition to internal motivation or introjected motivation—produces poorer motivation in the behavior in question (Adams et al., 2017; Shum et al., 2021), even in the case of the COVID-19 pandemic (Morbée et al., 2021). However, research has also shown that people can operate with mixed motivational systems (de la Fuente, 2004), or changing back and forth from external to internal, according to the context (de la Fuente, 2004).

(3) The theoretical model does not incorporate a person's *regulation state or style,* which lies on a plausible continuum between self-regulated, deregulated (non-regulated), and dysregulated motivation (de la Fuente, 2017; Pachón-Basallo et al., 2021). There is no acknowledgment that a person may exhibit dysregulated behavior or motivation. However, clinical, healthcare and educational practice abound with reports showing this type of regulation to be real and pathological (Ryan et al., 2012).

(4) Also lacking is the possibility that the context may externally induce nonregulation. In fact, this aspect is yet to be defined in the theoretical model (Ryan and Deci, 2020a,b). Nor is this aspect established in the external inducement of dysregulation. Evidence has documented the existence of dysregulating contexts, in the personal and contextual realm (Pachón-Basallo et al., 2021).

Conclusion

SDT seeks to explain and predict self-determination processes in human beings—and has done so with abundant evidence and consistency. In different teaching-learning contexts, however, such processes: (1) are insufficiently associated with specific self-regulation mechanisms that are essential to explaining autonomy and self-management behaviors in humans (Bandura, 1986; Zimmerman and Schunk, 2001); (2) underestimate the possibility that *external regulation can* actually promote *self-regulation;* in other words, external regulation is considered only in its dysregulatory version (de la Fuente, 2017); nor do they consider that a person may be intrinsically motivated or self-regulated, without needing an externalization or internalization process to become so; (3) minimize the *value of the context* in promoting self-regulation, that is, an *external regulatory value,* not understood in opposition to internal regulation nor as external control (dysregulatory), but as a promoter and aid to self-regulation (externally regulatory).

SELF-REGULATED LEARNING THEORY: SELF-REGULATED LEARNING

The theory of Self-Regulated Learning, developed by Zimmerman and Schunk (2001, 2011), offers detailed information about specific psychological processes that occur during academic/scholastic learning in reference to regulating one's own behavior. Plentiful evidence has been produced in support of this theoretical model, as well as its implications for intervening in student motivation (molecular analysis of learning). Though not addressed directly, certain principles of molar (or interaction with the context) analysis are suggested in this model. To complete this model, the processes it addresses must be incorporated within the larger, molar processes of teaching and learning. In this way, other possible types of regulation would be included along with self-regulation (Zimmerman and Labuhn, 2012).

Assumptions

The heuristic proposed by this theory offers an orderly, systematic view of students' cognitive and motivational processes during learning (Zimmerman, 2000). Referring specifically to motivation, it offers a discrete understanding (microanalysis) of motivational and meta-motivational processes throughout the circular, recurring sequence of the learning process (Cleary et al., 2012; Reindl et al., 2020). This heuristic model, given its explanatory potential, has been expanded to other fields of human learning (White and Bembenutty, 2014), such as skill training, assessment, and intervention in health (Hennessy et al., 2020) and in sports (Balk and Englert, 2020; Taylor et al., 2020; Wolff et al., 2021).

Zimmerman (2000) expanded Bandura's vision using a three-phase cyclical model that incorporates the individual's actions before and after task performance. This allows us to see more clearly how personal, behavioral, and social/environmental factors dynamically interact. Self-regulation is thus conceived along the three phases of forethought, performance, and self-reflection:

1) Prior to performance, the *forethought phase* is when learners set goals and select strategies for meeting them. The physical and social context is also addressed in the learner's forethought phase. Materials needed for task execution are acquired, and arrangements may be made to work with others. Time management is addressed, including decisions about when, where and how to work, and the overall time to be spent on the task and its components. Learners may actively motivate themselves to work on the task. For example, they may feel self-efficacy in being capable of success, and they may remind themselves that the task is valuable or important.
2) In the performance phase, learners work on the task; they self-instructions, and observe the results of their effort along the way. They consider how well their strategies are working, and whether they are making progress toward their goal.
3) Self-reflection takes place when the task is completed, although learners may also take time out for reflection during performance. Self-reflection is the learner's evaluation of how successful they have been. They made conclude that they need a change of strategy, or to arrange better conditions for working. In light of their outcomes, they may make attributions, that is, identify what they perceive to be causes. Attributions answer the question of why one was successful or not successful. These attributions and evaluations may prompt them to keep using the same strategy or to change it.

Students with learning disabilities, by way of illustration, often have difficulty in all three phases (Schunk and DiBenedetto, 2020a). Their forethought phase may be limited, without taking the time needed to plan out goals and strategies, and they may start the task with low self-efficacy of being able to successfully carry it out. In the performance phase, they may lack focused attention on the task, not overseeing their own work or considering their progress. In self-reflection, they may not properly evaluate their performance, and they may make non-motivating attributions. If they had trouble in doing the task, for example, they may attribute this to their own lack of ability instead of less-than-adequate effort.

Motivational and Regulatory Process

A central contribution of this model to the area of motivation is that it delimits the *self-regulation* variable at each motivational phase in cyclical learning, taking a metacognitive view, that is, becoming conscious of these processes and regulating them. This knowledge of meta-motivation or motivation regulation has been applied to many fields (Zimmerman, 2008; Monem, 2010; Panadero, 2017). At each phase of learning, the model proposes motivational behaviors that regulate the learning process:

1) *At the start of the learning activity.* The model establishes that it is possible to help students understand their own motivations and learning needs and establish learning goals, as well as plan their motivational and meta-motivational events: self-efficacy expectations (Bandura, 1987), academic behavioral confidence (Sander and de la Fuente, 2020a,b), personal improvement and achievement goals (Pintrich, 2000), and achievement emotions in anticipation of success or failure (Pekrun et al., 2014).
2) *While carrying out the learning activity.* This model has facilitated recent research for ascertaining specific behaviors of *motivation* (decisions, positive and negative emotions), and the degree of *meta-motivational control:* motivational strategies and self-instructions (Powers et al., 2020), strategies for coping with emotions (de la Fuente et al., 2017b), motivational decisions (self-reinforcement vs. self-punishment), perfectionism vs. procrastination (Garzón-Umerenkova et al., 2018).
3) *At the end of the activity.* The model establishes how self-assessment behaviors (Schunk, 1996; Zimmerman et al., 2011) and self-administration of emotions determine the final motivational state of engagement vs. burnout (de la Fuente et al., 2020e). The authors of the model establish that an adaptive evaluation supposes the recognition of errors but also a greater focus on successes. A maladaptive appraisal carries with it the self-dispensing of negative emotions. Also have causal or attributional explanations of success and failure adjusted to adjusted stability, internality, and controllability factors (Weiner, 1993).

This has represented a considerable advance in the study of regulatory processes in motivation, since it has identified concepts belonging to the meta-motivational realm, such as motivational and affective strategies, including coping strategies, which were not previously considered as belonging to models of self-regulated, academic learning, where the initial focus was on cognitive and meta-cognitive processes.

Contributions

Research on the construct of *Self-Regulated Learning (SRL)* that is based on Social Cognitive Theory (Bandura, 2006) has been yielding plentiful empirical evidence in relation to different variables and disciplines (Bembenutty et al., 2013):

1) In the sphere of *Self-Regulated Learning* (SRL), the relationship between SRL and Self-Efficacy has been amply demonstrated. For example, we have seen the roles of self-regulation and self-efficacy in students with learning disabilities (Schunk and DiBenedetto, 2021). SRL has also demonstrated its efficacy in the aspect of university students' work at home (Bembenutty and Hayes, 2016) and in delaying gratification (Bembenutty and Karabenick, 2004).

A large part of the research has focused on explaining and applying the SRL model to specific contexts of learning (Panadero, 2017), such as mathematics (Zimmerman et al., 2011), language arts and composition in students with behavioral maladjustment (Moohr et al., 2021), and in the sciences (Peters and Kitsantas, 2010). One essential contribution has come from the study of motivational processes and their self-regulated nature (Cleary and Zimmerman, 2004; Zimmerman and Kitsantas, 2005; Pintrich and Schunk, 2006; Wolters et al., 2011). There has also been plentiful research on the role and effect of self-regulation at university, especially in relation to assigned work (Ramdass and Zimmerman, 2011). In complementary fashion, research has also addressed improved teaching and learning through classroom practices of training in self-regulation (Zimmerman and Martinez-Pons, 1986, 1990; Zimmerman, 2008; Moos and Ringdal, 2012; Bembenutty et al., 2015; White and DiBenedetto, 2015; Zimmerman et al., 2015, 2017; White and Bembenutty, 2016; White, 2017; Schunk and DiBenedetto, 2020a,b, 2021).

2) As for *SR* and the realm of Health and Healthcare, the *Self-Regulation* construct (SR) has shown very consistent relationships with clinical and health issues. In Clinical Psychology specifically, recent research has shown self-regulation to be a cross-diagnostic variable of great importance. Its importance has also been reported from the perspective of Health Psychology (Bandura, 2004a,b, 2005). Specific examples include alcohol use and risk behaviors in adolescents (Crandall et al., 2018) and the role of SR in sports (Wolff et al., 2021).

Limitations

This model is therefore very adequate, parsimonious and powerful for assessment and intervention to train and improve motivational and meta-motivational processes, because it allows students to become aware of and put order in their cognitive-motivational processes. There is abundant evidence of intervention programs (Martínez-Vicente and de la Fuente, 2004) and the goodnesses of their application. However, the model is limited in several aspects:

1) Its explanatory domain focuses on molecular processes of learning. For this reason, it is especially adequate for training teachers and students in how to improve discrete, specific learning processes (Lombaerts et al., 2009). Specific meta-cognitive, meta-motivational and meta-emotional behavioral training is an example of the power of this model.
2) While the model can be considered to fall within the sphere of the psychology of learning, in the university context (Cassidy, 2011), it does not address in sufficient depth the role played by instructional processes, or by teaching in formal contexts. This approach would be characteristic of the domain of instructional psychology.
3) The concept of self-regulated learning does not take into account the specific concepts of deregulation (non-regulation) or dysregulation, as necessary types for explaining other, inadequate modalities of academic learning.
4) The SRL model is very focused on self-regulated, cyclical processes at the molecular level. It does not consider, however, the connection to self-regulation (SR) as a presage, personality variable in self-regulated learning (SRL), or the connection to aspects at the molar level, i.e., external regulatory processes from the context, as in regulatory teaching (de la Fuente, 2017). These limitations have prompted the development of the following theory, presented below.

SR VS. ER THEORY: SELF. VS. EXTERNAL-REGULATION BEHAVIOR IN DIFFERENT CONTEXTS

The General Model developed from *SR* vs. *ER Theory* (de la Fuente et al., 2020e) takes a molar-level approach to motivational analysis (de la Fuente et al., 2019a). It is an extrapolation of the Theory of Self-Regulated vs. Externally Regulated Learning, SRL vs. ERL (de la Fuente et al., 2013a,b, 2015, 2017a,b, 2019a,b, 2020a,b,c,d,e,f,g; de la Fuente, 2017), into different behavioral contexts. In the case of SRL vs. ERL, this analysis is contextualized within the processes of scholastic teaching and learning. With respect to their own learning, students may adopt self-regulation (as in Zimmerman's model), non-regulation, or dysregulation. The students' context (in interaction with the students' personal regulation type) may be externally regulating, externally non-regulating, or externally dysregulating. Motivational processes may then be contextualized within this new theoretical framework.

Assumptions

SR vs. ER Theory (de la Fuente et al., 2020e) seeks to explain the combination of external and internal conditions that predispose adequate behavior and motivation, in response to situations in different contexts. In summary, it proposes the following:

1) An individual's competence level in *Self-Regulation* may be classified as one of three options [3 = high (self-regulation or proactive self-regulation), 2 = medium (cessation of regulation or reactive regulation); 1 = low (dysregulation or dysfunctional regulation)]. Prior research shows that the level of self-regulation that a student exercises is an indicator of their competence in self-regulation, as a personal characteristic. It also correlates to competence and adequate use of meta-motivation, meta-emotion, and meta-behavior skills (de la Fuente et al., 2015, 2017a,b). Consequently, it would also be a good indicator of *self-regulated learning* (de la Fuente et al., 2017a,b). Numeric values are assigned across the range from a higher level of personal regulation, level 3,

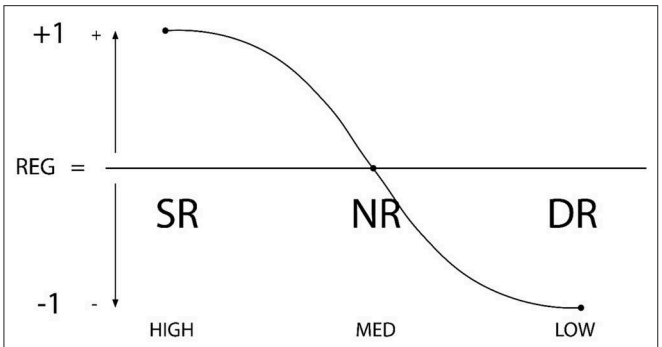

FIGURE 1 | Graphic representation of regulation types: SR, Self-regulation; NR, Non-regulation; DR, Dys-Regulation. The X axis represents the degree of regulation (high-medium-low), while the Y axis shows directionality (+1, 0, −1).

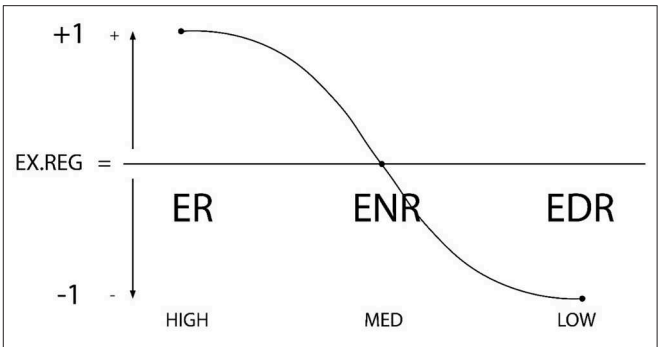

FIGURE 2 | Graphic representation of external regulation types: ER, External Regulation; ENR, External Non-regulation; EDR, External Dys-Regulation. The X axis represents the degree of external regulation (high-medium-low), while the Y axis shows the directionality of the external regulation (+1, 0, −1).

which is the most proactive self-regulation; to a medium or non-regulatory level 2, which is not proactive; to the lowest level of self-regulation (1), or the practice of dysregulation (procrastination behavior, etc.). See **Figure 1**.

2) Interpersonal contexts offer *external regulation* that can also be classified across three levels [3 = high (highly externally regulatory context); 2 = medium (or external de-regulatory or non-regulating context); 1 = low (dysregulating context or external dysfunctional context). This contextual level of external regulation identifies whether the context encourages or discourages use of oversight competencies like meta-motivation, meta-emotion and meta-behavior (de la Fuente et al., 2019a,b, 2020a,b,c,d,e,f,g). Consequently, high levels in this construct indicate an *effective* or *regulatory context*. Numeric values represent a range, from a context that more effectively facilitates personal regulation, Level 3, the most proactive in promoting self-regulation; to a medium or deregulatory Level (2), offering no external support for regulation; to the lowest level of external regulation, Level 1, or external dysregulation (e.g., the teaching process triggers stress, negative achievement emotions, surface learning approaches). See **Figure 2**.
3) By combining these two factors we may calculate an *interactive regulation index,* between 1 and 3, that is, the average of the two regulation types, with 5 possible results (de la Fuente et al., 2019a,b, 2020a,b,c,d,e,f,g). The proposed five-combination heuristic makes it possible to analyze the most common scenarios in the interactive regulation of learning behaviors. For example, if a student is low in self-regulation (1 point), and external regulation from the context is medium (2 points), the resulting *regulation average* will be 1.5 points (2 + 1 = 3/2 = 1.5 point average); likewise, if the student has a medium level of self-regulation (2 points), but the context is low in regulation (1 point), the same regulation average is produced (2 + 1 = 3/2 = 1.5 point average). Another example might be a student who is high in self-regulation (3 points), but their context is low in regulation (1 point); the regulation average will be 2 points (3 + 1 = 4/2 = 2 points). Regulation averages can thus be ordered across a *regulation range* where the person-context interaction progresses from least favorable to most favorable: from a minimum average of 1 point (1-point personal self-regulation and 1-point external regulation), to a maximum of 3 points (3-point self-regulation and 3-point external regulation). The possible regulation averages can then be ranked in order from 1 to 5, across the regulation range (regulation average of 1 = rank 1; regulation average of 1.5 = rank 2; regulation average of 2 = rank 3; regulation average of 2.5 = rank 4; regulation average of 3 = rank 5). See **Table 2**.

Motivational and Self-Regulation Concepts

Recent research has provided evidence of the value of this heuristic for determining the level of different motivational-affective variables in university students, as variables dependent on the student's level of self-regulation and the teacher's external regulation. Recent research reports have shown that the combination of the two factors (SR vs. ER) determine the more cognitive-strategic factors of motivation in university learning, that is, the student's learning approach. Thus, Rank 5 involves the highest level of deep approach (deep motivation and deep strategy), while Rank 1 represents a higher level of surface learning (surface motivation and surface strategy) (de la Fuente et al., 2017a, 2020c). In the same way, motivational-affective factors are also determined by these combination levels.

The heuristic levels presented in this study have proven to be a determining factor in many aspects, such as types of achievement emotions (de la Fuente et al., 2020a); perceived level of stress factors and symptoms in the teaching/learning process (de la Fuente et al., 2020b); coping strategies used to manage this stress (de la Fuente et al., 2020c); and attitudinal factors of motivation, such as academic behavioral confidence and procrastination (de la Fuente et al., 2020d). In all cases, Combination Rank 1 proves to be the most harmful: more negative emotions; higher levels of academic stress in factors and symptoms; more emotion-focused coping strategies, to the detriment of problem-focused strategies; lower academic

TABLE 2 | Combinations of model parameters hypothesized by SR vs. ER Theory (de la Fuente, 2017, 2021a,b).

Combinations of levels				*Regulation tendency*	Stress	Stress
SR level (range)	**ER level (range)**	**Avg.**	**Rank**		**Protection**	**Risk**
3 (3.85–5.00) H	3 (2.84–5.00) H	3	5	High-High: High-Regulation	High protection	Low risk
2 (3.10–3.84) M	3 (2.84–5.00) H	2.5	4	Medium-High: Regulation	M-H protection	M-L risk
3 (3.85–5.00) H	2 (2.35–2.83) M	2.5	4	High-Medium: Regulation	M-H protection	M-L risk
2 (3.10–3.84) M	2 (2.35–2.83) M	2	3	Medium: Non-Regulation	Medium protection	M risk
2 (3.10–3.84) M	1 (1.00–2.34) L	1.5	2	Medium-Low: Dysregulation	M-L protection	M-H risk
1 (1.00–3.09) L	2 (2.35–2.83) M	1.5	2	Low-Medium: Dysregulation	M-L protection	M-H risk
1 (1.00–3.09) L	1 (1.00–2.34) L	1	1	Low-Low: High Dysregulation	Low protection	High risk

L, Low; M, Medium; H, High. Effects analyzed in this investigation. See previous research reports to analyze differences (de la Fuente et al., 2019a,b, p. 12; de la de la Fuente et al., 2020a,b,c,d,e,f,g, p. 5).

behavioral confidence; and greater procrastination. By contrast, Combination Rank 5 proves to be the most desirable: more positive emotions; lower levels of academic stress factors and symptoms; more problem-focused coping strategies, without renouncing certain positive emotions; more academic behavioral confidence and less procrastination.

Limitations

This theoretical model also has certain limitations that must be addressed. On one hand, although levels of self-regulation (1 = low; 2 = medium; 3 = high) and external regulation (1 = low; 2 = medium; 3 = high) are both highly consistent constructs, assessed by two consolidated instruments, (1) the Short Self-Regulation Questionnaire (Pichardo et al., 2014) and (2) the *Interactive Assessment of the Teaching and Learning Process, IATLP* (de la Fuente et al., 2012), measurement of variables should be improved. In fact, new instruments of SR vs. ER Theory (de la Fuente, 2022; see **Appendix I**) have been developed for application in the spheres of education, clinical practice and ICT use, and are able to more accurately assess the constructs of self-regulation, non-regulation and dysregulation, as conceived in the present theory. Recent research findings are encouraging.

A RESEARCH AGENDA FOR SR VS. ER THEORY: PRACTICAL APPLICABILITY IN DIFFERENT PSYCHOLOGICAL CONTEXTS

This manuscript has presented specific strategies for improving student self-regulation: (1) increasing introjected motivation and self-regulation, from the model of *Self-Determination Theory,* (2) increasing the student's level of self-regulation, adopting many principles from the *Zimmerman* cyclic model; (3) making changes in the type of personal, internal regulation that is affecting students' motivation (whether regulatory, deregulatory, or dysregulatory), following certain principles from the Self- vs. External- Regulation model; (4) increasing the teacher's level of external regulation in the classroom; (5) making changes in the type of external regulation that is affecting students' motivation (whether self-regulatory, de-regulatory, or dys-regulatory). Albert Bandura's *Social Cognitive Theory,* in conjunction with the two subsequent models, has been foundational to *SR* vs. *ER Theory* (de la Fuente, 2017).

This more recent theory faces numerous challenges. On one hand, there is the need for evidence that the assessment instrument is consistently associated with self-regulation in different languages and different populations (de la Fuente, 2022; see Annex I). Analyses performed to date have shown consistency and validity (Pachón-Basallo et al., 2021). On the other hand, it is very important to verify that this heuristic—on molecular and molar levels—is applicable and accounts for the variability in different behavioral constructs, in the main fields of Psychology and Psychiatry (Romer et al., 2021). This psychological model will allow a crossed and interactive analysis of the different personal self-regulation profiles of people, in interaction with the external regulatory characteristics of the contexts in which they operate. This is a general task of psychology, as a science and as a profession. historically excessively focused on explaining and making predictions only from the individual characteristics of the subjects. Our own previous research has documented the effect of levels of self-regulation and external regulation on different types of variables and contexts (see **Table 3**):

1) In the sphere of *Educational Psychology,* recent research has contributed evidence of the different effects of combined levels of Self- vs. External- Regulation (SR-ER) in education. Specifically, a combined effect has been observed in learning approaches (de la Fuente et al., 2017a, 2019a; de la Fuente et al., 2020a,f), academic emotions (de la Fuente et al., 2019a,b) academic confidence and procrastination (Sander and de la Fuente, 2020a,b; de la Fuente et al., 2021c), coping strategies for academic stress (de la Fuente et al., 2017a); levels of engagement-burnout (de la Fuente et al., 2020e), positivity, resilience (de la Fuente et al., 2021d), stress factors and symptoms (de la Fuente et al., 2021a). These results were initially obtained by combining measurements from the Self-Regulation Scale (Pichardo et al., 2014; Garzón-Umerenkova et al., 2017) and the IATLP Scales (de la Fuente and Martínez-Vicente, 2008) and later using the *Self- vs. External- Regulation of Learning Inventory* (de la Fuente, 2022).

TABLE 3 | Summarized research agenda for *Self-* vs. *External-Regulation Theory* (*SR* vs. *ER Theory)*, applied to different fields of the study of behavior in different contexts.

Self-regulation	Non-regulation	Dys-regulation	Construct	Research
1. Educational psychology area (Self- vs. External-Regulated Learning Theory; SRL vs. ERL Theory)				
Individual variables				
Self-regulation	Non-Regulation /Fatigue	Dys-regulation	Self-Regulation Behavior	de la Fuente, 2017; de la Fuente et al., 2021c
Self-regulated learning	Non-regulated learning	Dys-regulated Learning	Self-regulated learning	de la Fuente, 2017; de la Fuente et al., 2017a,b;
Self-control of study	Depletion toward study	Dys-control of Study	Self-control of study	Amate-Romera and de la Fuente, 2021
Problem focused coping	Emotion focused (+)	Emotion focused (−)	Academic coping strategies	de la Fuente et al., 2020d
Self-regulation (non procrastination)	Passive procrastination	Active procrastination	Procrastination	Garzón-Umerenkova et al., 2018; de la Fuente et al., 2020a
Self-motivation	Self non-motivation	Self-dysmotivation	Self-handicapping	Núñez et al., 2020
Non-anxiety	Mixed	Test-anxiety	Test anxiety	de la Fuente et al., 2017a; Amate-Romera and de la Fuente, 2021
Deep approaches	Mixed	Surface approaches	Learning approaches	de la Fuente et al., 2008, 2017a, 2020a,f
Engagement	Mixed	Burnout	Engagement-Burnout	de la Fuente et al., 2021d
Resilience high	Resilience medium	Resilience low	Resilience	
Achievement emotions (+)	Mixed achiev. emotions (=)	Achievement emotions (-)	Achievement emotions	de la Fuente et al., 2017a, 2020b
Competitive	Hard-working, impatience	Hostility/impatience	Action-emotion style	de la Fuente et al., 2016, 2017a
No stress	Distress	High Stress	Academic Stress	de la Fuente et al., 2020c
Confidence	No confidence	Dys-confidence	Academic Confidence	de la Fuente et al., 2017a, 2021a; Sander and de la Fuente, 2020a,b
High	Medium	Low	Learning achievement	de la Fuente et al., 2017a, 2020f
Strengths	Medium	Weaknesses	Character strengths	de la Fuente et al., in review
Ext. Regulation	**Ext. Non-regulation**	**Ext. Dys-regulation**	**Construct**	**Research**
Contextual variables				
External regulatory teaching	External non-regulatory teaching	External dys-regulatory teaching	Regulatory teaching	de la Fuente et al., 2017a,b, 2021a
Low (low factors)	Medium (medium factors)	High (high factors)	Contextual stress factors	de la Fuente et al., 2021a
Parental involvement	Parental non involvement	Parental dys- involvement	Parental involvement	Sander et al., 2021
Authoritative style	Permissive style (laisser-faire)	Authoritarian style	Family style	Balaguer et al., 2021
Self-regulation	**Non-regulation**	**Dys-regulation**	**Construct**	**Research**
2. Health psychology area (Self- vs. External-Regulated Health Behavior Theory; SRH vs. ERH Theory)				
Individual variables				
Self-regulation health	Non-regulation health/fatigue	Dys-regulation health	Self-regulation health	de la Fuente, 2017; de la Fuente et al., 2021e
Problem focused (+) coping	Emotion focused (+)	Emotion focused (−)	Coping strategies	de la Fuente et al., 2020e,g
Engagement	Mixed level medium	Burnout	Engagement-burnout	de la Fuente et al., 2020e, 2021d
Acceptance of norms	Non-acceptance of norms	Reactance to norms	Psychological reactance	Pachón-Basallo et al., 2021
Resilience	Non-resilience	Weakness	Resilience	de la Fuente et al., 2017b
Positivity	Mixed	Negativity	Positivity-negativity	de la Fuente et al., 2021d
Flourishing	Non-flourishing		Flourishing	Garzón-Umerenkova et al., 2020
Well-being (high)	Mixed (medium)	Discomfort (low)	Well-being	Becerra and Campitelli, 2013; López-Madrigal et al., 2021; de la Fuente et al., in review
Strengths	Medium	Weaknesses	Character strengths	de la Fuente et al., in review, ……
High adaptability	Medium adaptability	Dys-adaptability (low)	Adaptability	

(Continued)

TABLE 3 | Continued

External regulation	External non-regulation	External dys-regulation	Construct	Research
2. Health psychology area (Self- vs. External-Regulated Health Behavior Theory; SRH vs. ERH Theory)				
Contextual variables				
External regulation of health	External non-regulation of health	External dys-regulation of health	Regulatory health context	de la Fuente et al., in review
Low (low factors)	Medium (medium factors)	High (high factors)	Contextual stress factors	de la Fuente et al., 2021b
Authoritative style	Laisser faire	Authoritarian style	Family	
Self-regulation	**Non-regulation**	**Dys-regulation**	**Construct**	**Research**
3. Clinical psychology area (Self- vs. External-Regulated Behavior Theory; SR vs. ER Theory)				
Individual variables				
Self-regulation	Non-regulation /fatigue	Dys-regulation	Self-regulation behavior	de la Fuente, 2017; de la Fuente et al., 2021e
Self-control of behavior	Depletion	Dys-control of behavior	Self-control of behavior	
Conscientiousness	Extraversion, openness	Agreeableness, neuroticism	Personality	Sander and de la Fuente, 2020a,b; de la Fuente et al., 2021f
Engagement	Mixed	Burnout	Engagement-burnout	de la Fuente et al., 2021d
Acceptance norms	Non- acceptance norms	Reactance norms	Psychological reactance	de la Fuente et al., 2021a
Resilience	Non-resilience	Weakness	Resilience	de la Fuente et al., 2017b
Positivity	Mixed	Negativity	Positivity-negativity	de la Fuente et al., 2021d
Self-knowledge	Self-criticism		Depression	Kopala-Sibley and Zuroff, 2020
Perfectionistic strivings	Medium	Perfectionistic concerns	Perfectionism	Frost and Marten, 1990; Stöber, 1998; Madigan, 2019; de la Fuente et al., 2020e
Low emotional reactivity	Medium emotional reactivity	High emotional reactivity	Emotional reactivity	Becerra and Campitelli, 2013
Executive functions	De- executive function	Dys-executive function	Executive functions	de la Fuente et al., in review
Character strengths (high)	(medium)	(low)	Character strengths	Seligman and Peterson, 2004
Well-being (high)	Mixed (medium)	Discomfort (low)	Psychological well-being	Becerra and Campitelli, 2013; de la Fuente et al., in review
Self-regulation of ict use	Non-regulation ict /fatigue	Dys-regulation ict	Self-regulation ict	de la Fuente, 2017; Romer et al., 2021
Self-assessment	Self-avoidance	Self-rumination	Self-assessment	
High adaptability	Medium adaptability	Dys-adaptability (low)	Adaptability	
External regulation	**External non-regulation**	**External dys-regulation**	**Construct**	**Research**
Contextual variables				
External regulation of ict use	External non- regulation of ICTS		External Dys-Regulation of ICTs	Regulation of ICT use
Low (low factors)	Medium (medium factors)	High (high factors)	Contextual Stress Factors	de la Fuente et al., 2021a
Self-regulation	**Non-regulation**	**Dys-regulation**	**Construct**	**Research**
4. Social Psychology Area (Self- vs. External-Regulated Social Behavior Theory; SR vs. ER Social Theory)				
Individual variables				
Social self-regulation	Social non-regulation /fatigue	Social dys-regulation	Social self-regulation	de la Fuente, 2017
Competitive	Hard-working, impatience	Hostility/impatience	Action-emotion style	de la Fuente et al., 2016, 2017a
Well-being (high)	Mixed (medium)	Discomfort (low)	Psychological well-being	Becerra and Campitelli, 2013
Engagement	Mixed	Burnout	Engagement-burnout	
Assertiveness	Non-regulation	Aggressivity / inhibition	Social abilities	
Strengths	Medium	Weaknesses	Character strengths	de la Fuente et al., in review
External regulation	**External non-regulation**	**External dys-regulation**	**Construct**	**Research**
Contextual variables				
External social regulation	External social non-regulation	External social dys-regulation	Social regulation	de la Fuente et al., in review

(Continued)

TABLE 3 | Continued

External regulation	External non-regulation	External dys-regulation	Construct	Research
External regulation External non-regulation External dys-regulation Construct Research				
Low (low factors)	Medium (medium factors)	High (high factors)	Contextual stress factors	de la Fuente et al., 2021a
External organizational regulation	External organizational non-regulation	External organizational dys-regulation	Organizational regulation	de la Fuente, 2017
Authoritative style	Laisser faire style	Authoritarian style	Family	de la Fuente et al., 2021b
Self-regulation	**Non-regulation**	**Dys-regulation**	**Construct**	**Research**
5. Traffic psychology area (self- vs. External- regulation of traffic behavior theory; sr vs. Er traffic theory)				
Individual variables				
Self-regulation	Non-regulation /fatigue	Dys-regulation	Self-regulated behavior	de la Fuente, 2017, 2021a,b; de la Fuente et al., 2021a,b,c,d,e,f
Self-control of behavior	Depletion	Dys-control of behavior	Self-control of behavior	
Competitive	Hard-working, impatience	Hostility/impatience	Action-emotion style	de la Fuente et al., 2016, 2017a
Strengths	Medium	Weaknesses	Character strengths	de la Fuente et al., in review
External regulation	**External non-regulation**	**External dys-regulation**	**Construct**	**Research**
Contextual variables				
Low (low factors)	Medium (medium factors)	High (high factors)	Contextual stress factors	de la Fuente et al., 2021a
Self-regulation	**Non-regulation**	**Dys-regulation**	**Construct**	**Research**
6. Moral psychology area (self- vs. External- regulation of moral behavior theory; moral sr vs. Er theory)				
Individual variables				
Self-regulation	Non-regulation /fatigue	Dys-regulation	Self-regulation behavior	de la Fuente, 2017; de la Fuente et al., 2021e
Self-control behavior	Depletion behavior	Dys-control behavior	Self-control	Behavior
Strengths	Medium	Weaknesses	Character strengths	Villacís et al., 2021
High	Medium	Low	Spirituality	
External regulation	**External non-regulation**	**External dys-regulation**	**Construct**	**Research**
Contextual variables				
Low (low factors)	Medium (medium factors)	High (high factors)	Stress factors	de la Fuente et al., 2021a

2) In the sphere of *Developmental Psychology*, this theoretical model enables us to understand the different processes of human development that depend on or are associated with levels of behavioral regulation at each stage of development, the role of regulatory characteristics of the context, and how these interact. Recent evidence has established this relationship by more deeply exploring the role of a regulatory or dysregulatory family context and its effect on learning and achievement (Balaguer et al., 2021), as well as the sometimes dysregulatory role of the social/family context in young-adult university students, in maturational disorders typical of executive dysfunction and emotional dysregulation (de la Fuente et al., 2022).
3) In the sphere of *Clinical and Health Psychology*, there is also evidence of the degree to which the SR-ER combination can predict variables like procrastination and health (Pachón-Basallo et al., 2021). The scale used in this case is the *Self- vs. External- Regulation of Learning Scale* (de la Fuente et al., 2020c). SR vs. ER theory has also been applied to analysis and behavioral prevention in the COVID-19 pandemic (de la Fuente et al., 2021e). In the same line as our results, there is documented evidence in relation to the important regulatory role of parents via modeling and the design of the behavioral context (Callejas et al., 2021). Nonetheless, the effects of these cross-diagnostic variables (SR vs. ER) is yet to be analyzed in other areas of the field of psychology:
4) In the area of *Social and Organizational Psychology*, these assumptions must be tested. The relationship should be established between the proposed SR vs. ER heuristic and specific variables of the social and organizational spheres, such as organizational engagement-burnout, psychological wellbeing in organizations, and levels of performance supported by the organizations themselves.
5) In the area of *Traffic Psychology*, the ability of the proposed heuristic to explain the behavioral variability of drivers and accident rates should be analyzed. It seems plausible to expect this explanatory ability, given that the "road trip metaphor" (de la Fuente, 2004, based on Pintrich, 1991) is what gave rise to the SR vs. ER theory. The effect of the heuristic combination in determining the level of the behavioral variables associated with driving must be demonstrated.
6) In the field of *Moral Psychology*, there is also a need to establish the connections between the SR vs. ER heuristic and issues inherent to this field, such as character strengths, spirituality, and others (Villacís et al., 2021). It is necessary to advance in the study of moral behavior (Nucci, 2014), based on the knowledge of the regulatory, personal and contextual factors, in interaction. For this,

this heuristic and its instruments are a new opportunity to approach.

CONCLUSION

Although limited in that most evidence to date has been produced with university-age youths and in an academic context, the consistency of the relationships found encourages us to continue in this line of research. Further evidence in these different fields of Psychology will allow us to affirm with greater assurance the plausibility of the SR vs. ER postulates, especially in differentiating it from the previous theories presented. The results from empirical data that we continue to collect will allow us to conclude the applicability of these postulates to the fields of Educational Psychology, Clinical and Health Psychology, Social Psychology, Traffic Psychology and Moral Psychology.

More than ever, it is time to acknowledge and thank Prof. Albert Bandura for his proposition of the self-regulatory mechanism in human beings. His model fascinated us and has inspired us to take it thus far. These results, in good measure, also belong to him. Thank you, Professor Bandura! RIP.

AUTHOR CONTRIBUTIONS

JF: initial conceptualization and initial writing. JM-V support for R&D projects. FS, PS, SF, AK, EB, and DK: final reviewer and writing process. All authors contributed to the article and approved the submitted version.

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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.2022.861493/full#supplementary-material

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Corrigendum: Advances on self-regulation models: A new research agenda through the SR vs ER behavior theory in different psychology contexts

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In the published article, an author name was incorrectly written as "Angélica Karagiannopoulou." The correct spelling is "Evangelia Karagiannopoulou." All other relevant parts of the article have been updated to reflect this amendment.

Additionally, in the published article, the reference for "de la Fuente et al., 2022" was incorrectly written as "de la Fuente, J., Martínez-Vicente, J. M., Santos, F. H., Sander, P., Fadda, S., Karagiannopoulou, A., Boruchovitch, E., and Kauffman, D. F. (2022) Advances on self-regulation models: A new research agenda through the SR vs ER behavior theory in different psychology contexts. *Front. Psychol.* 13:861493. doi: 10.3389/fpsyg.2022.861493."

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The authors apologize for these errors and state that they do not change the scientific conclusions of the article in any way. The original article has been updated.

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Self-efficacy beliefs as a predictor of quality of life and burnout among university lecturers

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In this article, we explore Brazilian lecturers' self-efficacy beliefs as a predictor of quality of life and burnout drawing on the concept and theoretical framework of self-efficacy presented by Albert Bandura, the originator of Social Cognitive Theory. The questionnaires adopted for the research included the Brazilian Lecturer Self-Efficacy Scale (BLSES), the Maslach Burnout Inventory (MBI-ES) and the World Health Organization Quality of Life Assessment (WHOQOL-Bref). The participants were 1,709 lecturers from 78 universities in Brazil, most of whom had a doctoral degree. We analyzed the data using descriptive and inferential statistics, performing structural equation modeling (SEM) and cluster analysis using IBM SPSS and Amos. We hypothesized that lecturer self-efficacy would be a positive predictor of quality of life and this, in turn, would be a negative predictor of burnout itself. SEM model fit indices fell within acceptable levels, with the overall model lending support to the stated hypothesis. In addition, lecturer self-efficacy was also a predictor of personal accomplishment in the MBI-ES. Regarding the cluster analysis, participants fell into five groups based on self-efficacy, quality of life and burnout questionnaire scores, each with associated personal, professional and academic characteristics. By way of discussion, we address reflections arising from findings to university life and working conditions, training needs and the need to establish career planning supported by studies that investigate the phenomenon of teaching in higher education in an integrated manner.

KEYWORDS

lecturer self-efficacy, burnout, quality of life, structural equation modeling, cluster analysis

Introduction

Lecturers are high qualified, highly trained professionals with varying roles and responsibilities within different universities. In recent years, university teaching has undergone many structural changes in many different countries around the world. In Brazil, university lecturers undertake a diverse range of activities including teaching,

research, extension tasks and management. These happen in combination with a decrease in academic, administrative and financial support due to changing economic policies over time. Research has also demonstrated the existence of a gender gap in senior and administrative positions, with men appearing to have greater opportunities for career advancement over women (Astegiano et al., 2019). In addition, a substantial body of research now indicates that the overload generated by excessive workload demands and poor workplace environments can generate stress and negatively affect relationships within the profession, leading to mental difficulties including burnout (Borsoi and Pereira, 2013; Santos et al., 2016; Faria et al., 2021; Oliveira et al., 2021).

Burnout, in particular, is understood as a response to "...chronic interpersonal stressors on the job (exhibiting) overwhelming exhaustion, feelings of cynicism and detachment from the job, and a sense of ineffectiveness and lack of accomplishment" (Maslach and Leiter, 2016, p. 103). More recently, burnout has been recognized as a broader spectrum of at least five inter-related conditions (Leiter and Maslach, 2016): burnout itself (high on exhaustion and depersonalization, low in personal accomplishment), engagement (low on exhaustion and depersonalization, and high in personal accomplishment), overextension (high on exhaustion only), disengagement (high on depersonalization only), and ineffectiveness (low on personal accomplishment only).

Burnout has become an important subject in recent years, largely because of its association with decreasing productivity, attrition, absenteeism, emotional detachment, and loss of interest in work (Tikkanen et al., 2021). The consequences of burnout have implications for higher education with the potential to impact on student learning and achievement as well as the health and wellbeing of lecturers. Due to the challenging higher education context, lecturers are particularly vulnerable to burnout, being affected by bureaucracy, publishing pressures, securing funding, changes in teaching practice, personal interactions with others, and the instability of contracts (Lima Filha and Morais, 2018). Alves et al. (2019), for example, found that more than one third of a sample of lecturer participants in their research in Brazil exhibited symptoms of burnout, and in the United States, this figure was as high as 40% (Enders et al., 2015). Burnout is also related to a reduction in perceived quality of work and has a significant negative impact on lecturers' quality of life and satisfaction with health (Enders et al., 2015; Alves et al., 2019).

Quality of life is defined as an "individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (The WHOQOL Group, 1995, p. 1405). Quality of life perceptions are also influenced by context and working conditions. Although lecturer quality of life is not a particularly well researched topic in Brazil, available results are unanimous in pointing out the negative impacts that teaching in higher education can have (Oliveira et al., 2021), with one study in particular reporting staff spending up to 90% of their time at work with work-related anxiety, stress and exhaustion (Cecílio and Reis, 2016).

Self-efficacy beliefs and social cognitive theory

Self-efficacy beliefs are central to Social Cognitive Theory (Bandura, 1997) due to their effects on human functioning, and cognitive, affective, motivational and selective processes. People create and develop judgments of ability that assist them in setting goals and the partial control they can exert over their environment, as research across a range of cultural contexts demonstrated (Bandura, 1977, 1997). In the educational field, self-efficacy has gained prominence in teaching and learning from primary education to graduate studies, including the work and career development of teachers and lecturers.

Lecturer self-efficacy is defined as "the judgments that lecturers make about their ability to teach, research, complete extension tasks and carry out management activities at a level of quality appropriate to their institution's needs" (Matos et al., 2020, p. 3). Because people decide to act according to perceptions of their own abilities, self-efficacy beliefs influence goal setting, the selection of favorable environments, the efforts made to achieve goals, and even the levels of physiological activation encountered in stressful situations (Bandura, 2012). Consequently, self-efficacy can directly affect a lecturer's performance and well-being at work. Research conducted over past decades has demonstrated that lecturer self-efficacy impacts upon different psychological processes, including motivation (Bailey, 1999), positive and negative affect (Burton et al., 2005), job satisfaction (Mottet et al., 2004; Ismayilova and Klassen, 2019), self-esteem (Evans and Tress, 2009), and emotional intelligence (Ali et al., 2017), among others.

In higher education, self-efficacy has been associated with lecturer burnout by many researchers, with a role as protective of health (Evers et al., 2002; Skaalvik and Skaalvik, 2010; Savas et al., 2014; García Padilla et al., 2017; Smetackova, 2017; Cao et al., 2018; Llorca-Pellicer et al., 2021). The negative relationship between self-efficacy and burnout is to be theoretically expected since burnout can be understood as a consequence of an inability to deal with contextual demands and workload stress. As strong self-efficacy beliefs empower individuals to deal with their work-related conditions, lecturers with a stronger sense of self-efficacy than others may feel more fulfilled and more satisfied with their work, and present with lower levels of exhaustion and depersonalization (Morris et al., 2017).

Self-efficacy may also have a high predictive value in positive factors associated with lecturer well-being, since self-efficacy can help lecturers to stay motivated and satisfied

(Zee and Koomen, 2016). Faced with a lack of research evidence, however, the relationship between lecturer self-efficacy and quality of life is not entirely clear, presenting a knowledge gap which we begin to address here. In schools, however, teacher self-efficacy has been shown to have a positive and significant association with quality of life in Iran (Shirazi et al., 2008). It has also been shown that teacher's coping self-efficacy in school mediates the relationship between violence-related stress and quality of life (Won and Chang, 2020).

Bandura (1997) states that if lecturers can control the way they react to stressful situations, then they are probably more capable of dealing with them more effectively. Thus, lectures who believe they can manage difficult or challenging work-related events are less likely to be distressed by them. On the other hand, those who believe otherwise might experience higher levels of concern. Teachers with higher self-efficacy scores tend to develop proactive behaviors for facing professional challenges and emotional stress (Yin et al., 2020). Self-efficacy is also positively associated with higher well-being (Song, 2021). Considering work-related studies across a range of fields, self-efficacy has been associated with other adverse aspects of well-being and performance in addition to burnout (Judge and Bono, 2001).

As Bandura (1997) points out, work assumes a central role in the lives of lecturers, acting as a source of personal identity, self-worth and social relationships. We predict that lecturers with higher levels of self-efficacy beliefs should therefore have a better perception of their quality of life, since their self-efficacy beliefs should influence their ability to cope with the contextual demands of work, decreasing the impact of negativity on their health and well-being (see also Skaalvik and Skaalvik, 2010; Sariçam and Sakiz, 2014; Zee and Koomen, 2016; Kim and Burić, 2019). If lecturer self-efficacy acts as a predictor of quality of life and protective against burnout, supporting lecturers more effectively should be a priority for universities as self-efficacy enhancement would also be investing in staff development and well-being. Perceptions of quality of life also involve an appraisal of personal and contextual variables which different individuals deal with every day, including gender, personal relationships, and leisure time activities, which also affect appraisals of self-efficacy and burnout (Cao et al., 2018; Matos et al., 2021). These assumptions and the variables outlined sit at the core of our work and which we explore through structural equation modeling (SEM) and cluster analysis. Two research questions focus attention and guide progress:

(1) Does lecturer self-efficacy predict quality of life and burnout?
(2) Are lecturer self-efficacy, quality of life and burnout related to the personal and professional background variables of lecturers in ways that can be meaningfully identified and clustered?

Materials and methods

Research design

We addressed the research questions employing a correlational, cross-sectional design involving the use of an online questionnaire survey method.

Sampling and participants

We adopted a non-probabilistic and convenience sampling approach in which the participants were self-selecting and voluntary. The only inclusion criterion for participants was to be actively working as a higher education lecturer in the Brazilian public and/or private sector. After obtaining ethical approval from the lead institution, we carried out the data collection online. Doing so, we disseminated a survey link by e-mail to the human resources departments of all 199 universities listed in the 2017 census of Brazilian higher education, asking them to forward the invitation to participate on to lecturers themselves. We also adopted the strategy of sending the link directly to lecturer email addresses where these were available on university websites.

By accessing the survey link, participants were directed to a consent form on Google Forms. Upon completion, they were then directed to the data collection instruments that were made available on the OnlinePesquisa platform. Data collection took place anonymously between October 2019 and January 2020.

The participants recruited to the study were 1,709 lecturers in 78 public (96.1%) and private (3.9%) universities in 26 states across all regions and the Federal District (**Table 1**). Data obtained from the 2017 census of higher education indicated that the sample was drawn from 124,291 Brazilian lecturing positions overall. In terms of background characteristics, men and women were almost equally represented (51.9% female). Most participants were also white (78.3%), married (72.9%), qualified to doctoral level (89.4%) and between 30 and 49 years of age (63.9%).

Instruments

The data collection instruments included the Brazilian Lecturer Self-Efficacy Scale (BLSES), the Maslach Burnout Inventory (MBI-ES), and the World Health Organization Quality of Life Assessment (WHOQOL-Bref). We also collected additional demographic information using a questionnaire separately as indicated (**Table 1**).

The Brazilian Lecturer Self-Efficacy Scale (BLSES) specifically developed for use in this research (Matos et al., 2020) is a 30-item questionnaire adopting a 5-point Likert scale. The 30 items are arranged into four factors: self-efficacy for

TABLE 1 Frequencies and percentages of participant characteristics (N = 1,709).

	Frequency	Percentage
Gender		
Male	817	47.8
Female	887	51.9
Not identified	5	0.3
Age in years		
20–29	42	2.5
30–39	531	31.1
40–49	560	32.8
50–59	418	24.5
60–70	143	8.4
More than 70	15	0.9
Marital status		
Married	1,263	73.9
Single	257	15.0
Other	189	11.1
Ethnicity		
White	1,138	66.6
Black	275	16.1
Other	296	17.3
Years in higher education		
Less than 1	28	1.6
1–5	239	14.0
6–10	426	24.9
11–15	323	18.9
16–20	272	15.9
More than 20	421	24.6
Highest qualification		
Doctorate	1527	89.4
Master's	176	10.3
MBA	4	0.2
Bachelor's	2	0.1
Field of highest qualification		
Health science	361	21.1
Social science	299	17.5
Physical science	296	17.3
Engineering	212	12.4
Humanities	205	12.0
Life science	169	9.9
Arts and linguistic	98	5.7
Agri-food science	68	4.0

teaching activities (α = 0.86), self-efficacy for research activities (α = 0.87), self-efficacy for extension activities (α = 0.86), and self-efficacy for university management activities (α = 0.85), each reflecting the main duties of lecturers in Brazil. Participants were required to rate their degree of concordance with each of the 30-item statements including, for example, "Manage the classroom during group activities with adequate feedback for all" (teaching), "Acting as a peer reviewer and complying with the deadlines established by the editorial team" (research), "Involve the external community in university extension activities" (extension), and "Perform administrative activities in parallel with teaching, research and extension activities" (management). A confirmatory factor analysis of the BLSES adopted here is presented as follows: $\chi^2(394) = 1291.72$, TLI = 0.91, CFI = 0.92, RMSEA = 0.052.

To evaluate burnout among participants we used the Maslach Burnout Inventory – Educators' Survey[1] (MBI-ES) (Maslach and Jackson, 1986). This questionnaire is composed of 22 items arranged in three dimensions: emotional exhaustion (α = 0.92), depersonalization (α = 0.72) and personal accomplishment (α = 0.82). Items are rated using a 7-point Likert scale and include "I feel emotionally drained from my work" (emotional exhaustion), "I do not really care what happens to some students" (depersonalization), and "I have accomplished many worthwhile things in this job" (personal accomplishment). A confirmatory factor analysis of the MBI adopted here is presented as follows: $\chi^2(195) = 1515.91$, TLI = 0.91, CFI = 0.93, RMSEA = 0.063.

We also used the Brazilian version of World Health Organization Quality of Life Survey-Bref (WHOQOL-Bref) (Power and Kuyken, 1998; Fleck et al., 2000). This consists of 26 items rated using a 5-point Likert scale evaluating quality of life in four domains: physical (α = 0.84), psychological (α = 0.82), social relationships (α = 0.74), and environment (α = 0.77). Examples include "To what extent do you feel that physical pain prevents you from doing what you need to do?" (physical), "How much do you enjoy life?" (psychological), "How satisfied are you with your personal relationships?" (social), and "How satisfied are you with your transport?" (environment). A confirmatory factor analysis of the WHOQOL-Bref adopted here is presented as follows: $\chi^2(236) = 1678.54$, TLI = 0.90, CFI = 0.92, RMSEA = 0.060.

Data analysis

The validity and reliability of the questionnaires were evaluated conventionally using factor analysis after which the data collected was analyzed using both descriptive and inferential statistics (Field, 2013). We used SEM to explore the relationships between lecturer self-efficacy beliefs, quality of life and burnout and address the first research question (IBM AMOS 26.0; Neves, 2018). We conducted a series of exploratory analyses using Maximum Likelihood Estimation to test competing models and analyze different settings to determine the best fit adopting the following fit indices and

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preferred threshold values: $\chi^2/df < 0.500$, the comparative fit index (CFI) > 0.900, the Tucker–Lewis index (TLI) > 0.900, and the root mean square error of approximation (RMSEA) < 0.800 (Byrne, 2013).

To address the second research question and after the standardization of variables to *z*-scores (Everitt et al., 2011), we explored the data using cluster analysis (Ward's method), a statistical technique that allows participants to be grouped based on their responses to the range of variables considered (IBM SPSS 25.0; Cohen, 1988; Field, 2013; Akoglu, 2018; Sharp et al., 2021). We also used chi-square to investigate associations between personal and professional variables and cluster membership (Akoglu, 2018).

TABLE 2 Model fit statistics.

	Models	
	Initial model	**Final model**
χ^2	7132.62	5825.93
df	1519	1513
χ^2/df	4.70 ($p < 0.001$)	3.85 ($p < 0.001$)
TLI	0.86	0.89
AGFI	0.84	0.87
CFI	0.87	0.90
SMRM	0.49	0.46
RMSEA	0.047	0.041
RMSEA 90% CI (PCLOSE)	0.045–0.048 ($p < 0.001$)	0.040–0.042 ($p = 1.00$)

Results

Structural equation modeling results

We adopted SEM to investigate the relationships between lecturer self-efficacy, quality of life and burnout. We tested a working hypothesis that lecturer self-efficacy would predict quality of life and that quality of life would, in turn, predict burnout. Based on previous literature, we also hypothesized a direct relationship between lecturer self-efficacy and the different dimensions of burnout itself.

We chose to represent the constructs of lecturer self-efficacy and quality of life by single latent factors of a second order because they offer the advantage of constructing more parsimonious models to test (Parker et al., 2012). With regard to the burnout questionnaire (MBI-ES), however, it was decided to maintain its first-order factors since there are indications in the literature that these dimensions should not be combined (Skaalvik and Skaalvik, 2010). We also assumed that all MBI-ES factors would be correlated. We then conducted a series of exploratory analyses using Maximum Likelihood Estimation to test competing models to analyze different configurations to determine best fit. As **Table 2** shows, and for the first model tested, we obtained fit indices of $\chi^2(1519) = 4.697$, TLI = 0.86, CFI = 0.87 and RMSEA = 0.047.

Following Byrne (2013), we then reviewed the model aimed at identifying high residual covariances between items and the theoretical relevance of specifying these covariances in the model. After modifying by specifying eight modification indices, we obtained the following values: $\chi^2(1511) = 3.848$, TLI = 0.894, CFI = 0.900 and RMSEA = 0.041. Next, we investigated regression values establishing as a criterion the removal of regression coefficients that were not significant for the model. After removing these, including a direct links between self-efficacy and the emotional exhaustion ($r = 0.02$) the depersonalization dimension of burnout ($r = -0.09$) dimension of burnout, the model presented the following final values: $\chi^2(1513) = 3.851$, TLI = 0.89, CFI = 0.90, RMSEA = 0.041. Full details of the final model are presented in **Figure 1**.

A chi-square test used to determine the differences between the first and the final models was significant ($\chi^2 = 16932.81$; df = 6; $p < 0.001$).

Following Hayes (2009) we also bootstrapped the outcome to determine the significance of the direct and indirect mediation effects of quality of life models between self-efficacy and personal accomplishment, depersonalization and emotional exhaustion of the MBI-ES. The results indicate that all indirect effects were significant (**Table 3**).

Considering the complexity of involving three different questionnaires in arriving at a final model, we accept the model as a first exploration of the relationship between the constructs under analysis. The model demonstrates that, for this sample, lecturer self-efficacy is a positive predictor of quality of life ($r = 0.46$) which, in turn, negatively predicts burnout. Moreover, lecturer self-efficacy is also a predictor of the personal accomplishment factor of the MBI-ES scale ($r = 0.26$). Lecturer self-efficacy explains 22% of the variance in the participants' perception of quality of life. The model also explains 53% of the variance in emotional exhaustion, 17% of the variance in depersonalization, and 23% of the variance in personal accomplishment.

Cluster analysis results

We performed a cluster analysis using Ward's method resulting in the identification of five main groups of participants. Further analysis was then performed at the level of individual factors which showed significant differences in all and with moderate to large effects: teaching $F(4,1704) = 406.53$, $p < 0.001$, $\eta^2 = 0.49$; research $F(4,1704) = 193.62$, $p < 0.001$, $\eta^2 = 0.31$; extension $F(4,1704) = 195.17$, $p < 0.001$, $\eta^2 = 0.31$; management $F(4,1704) = 377.78$, $p < 0.001$, $\eta^2 = 0.47$; emotional exhaustion $F(4,1704) = 467.41$, $p < 0.001$, $\eta^2 = 0.52$; depersonalization $F(4,1704) = 100.91$, $p < 0.001$, $\eta^2 = 0.02$;

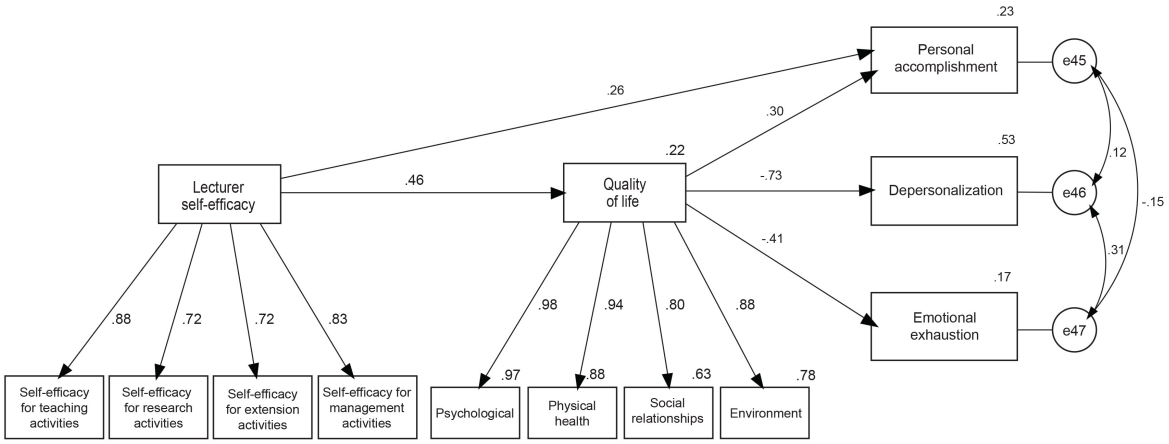

FIGURE 1
Structural model of lecturer self-efficacy, quality of life and burnout. Standardized values reported. All values significant at $p < 0.001$.

TABLE 3 Standardized effect from mediation analysis – final model (bootstrapping with 5.000 samples; Bias-corrected 95% CIs).

Hypothesis	Direct effect	Indirect effect	BC 95% CI (LL-UL)*
Self-efficacy > Quality of life > Personal accomplishment	0.26***	0.14***	(0.11 to 0.17)
Self-efficacy > Quality of life > Depersonalization	0.00	−0.19***	(−0.22 to −0.16)
Self-efficacy > Quality of life > Emotional exhaustion	0.00	−0.34***	(−0.37 to −0.30)

***$p < 0.001$. *Means LL, lower limit; UL, upper limit.

personal accomplishment $F(4,1704) = 114.21$, $p < 0.001$, $\eta^2 = 0.21$; the physical domain $F(4,1704) = 358.32$, $p < 0.001$, $\eta^2 = 0.46$; the psychological domain $F(4,1704) = 376.57$, $p < 0.001$, $\eta^2 = 0.47$; the social relationship domain $F(4,1704) = 441.69$, $p < 0.001$, $\eta^2 = 0.51$; and the environmental domain $F(4,1704) = 226.47$, $p < 0.001$, $\eta^2 = 0.35$. Although all groups differed slightly with regard to self-efficacy for teaching, research, extension and management activities, and in the social relationship domain of the WHOQOL-Bref, this difference was not significant, especially between Clusters 2 and 4 in the other dimensions. The cluster analysis is summarized as shown (Figure 2).

As observed in Figure 2, and as also hypothesized, Clusters 1, 2, and 5 associate higher scores of self-efficacy with lower scores of emotional exhaustion and depersonalization, and higher scores of personal accomplishment and all four factors of quality of life. In Clusters 3 and 4 some of the values are divergent, mainly in emotional exhaustion and depersonalization (MBI-ES) and social relationships (WHOQOL- Bref). Table 4 shows the means and standard deviations of each group in all factors of the three questionnaires.

Analyzing further (Table 5), Cluster 1, which we name here the Highly Efficacious/High Quality of Life and Accomplishment cluster, participants have high levels of self-efficacy and quality of life, with a high perception of personal accomplishment and low levels of exhaustion and depersonalization. With slightly more male than female participants (55.1%), these are participants who believe they cope well with the demands of the profession (76.5%) and feel more job satisfaction (96.6%). They are more active (76.1%), sleep well (75.2%), have few of the health symptoms listed when compared alongside the other clusters, and have a better perception of their own state of health (91.6% good or better).

Cluster 2, named here the Highly Efficacious/Moderate Quality of Life and Accomplishment cluster, is characterized by participants having high levels of self-efficacy with lower quality of life and personal accomplishment, and higher levels of exhaustion and depersonalization compared to Cluster 1. These were mostly male participants (71.2%) who reported a worsening sleep quality (only 56.2% claim sleeping well) and a greater number of adverse health-related symptoms (54.8% report anxiety), but still have a positive perception of their overall state of health (good or better 69.5%). Fewer participants believe they cope with the demands of the profession well (55.2%).

In Cluster 3, named the Moderately Efficacious/Exhausted cluster, participants presented average self-efficacy levels. Compared to Cluster 2, they show a large increase in emotional exhaustion and depersonalization in addition to loss of quality of life. Participants here, with well over half female (59.5%), perceived themselves as capable of performing the activities

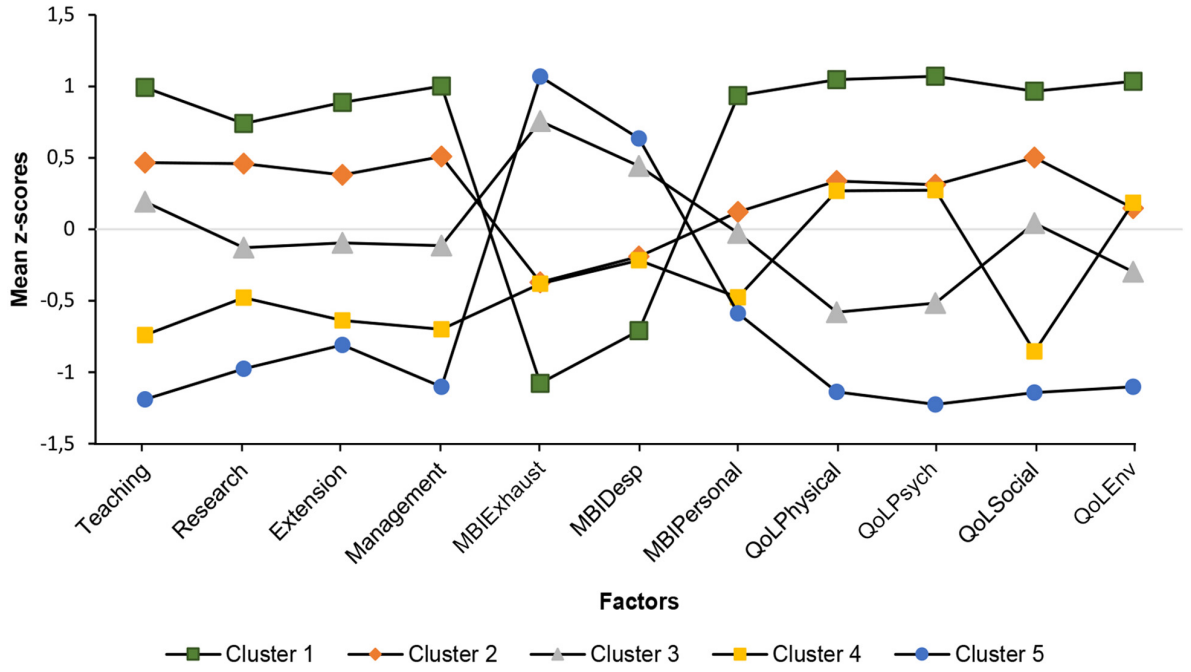

FIGURE 2
Answer pattern of the clusters by factors.

of teaching, research and extension effectively, but feel limited by physical fatigue and the demands arising from work. Only a small number reported actually coping well (25.6%). These participants present a reduction in the perception in the quality of their health (40.8% good or better), in satisfaction with work (66.6%), and present an increase in the number of adverse health-related symptoms in comparison with Clusters 1 and 2 (75.6% report anxiety).

Cluster 4, named the Low Efficacy/Low Social Relationships cluster, presents values close to those of Cluster 2 in several areas but differs in having lower self-efficacy across all four dimensions. Unlike Cluster 3, Cluster 4 is characterized by an improved perception of quality of life, with lower emotional exhaustion and depersonalization and poorer social relationships. Female and male participants are represented in almost equal numbers (50.2% male). Most perceive themselves to be healthy (68.9% good or better) and are satisfied with their profession (82.3%).

Cluster 5, named the Low Efficacy/Low Quality of Life cluster, presents participants with lower levels of self-efficacy in all four dimensions, as well as reduced personal accomplishment and perception of quality of life, combined with higher levels of exhaustion and depersonalization. This group is largely female in composition (60.4%), claiming not to have developed strategies to cope well with professional demands (only 13.1% think that they have). Most participants consider their general state of health as only satisfactory (66.4%), report performing fewer physical activities (56.8%) and exhibit poor quality of sleep (82.5%). They also have a greater number of adverse health-related symptoms compared to the other clusters (82.5% report anxiety). Very few also feel satisfied with the profession (13.1%).

Discussion

In this work we explored Brazilian lecturers' self-efficacy beliefs as a predictor of quality of life and burnout using SEM, and grouped participants based on self-efficacy, quality of life and burnout scores, associating these variables with personal and academic characteristics using cluster analysis.

Relationships between self-efficacy, quality of life and burnout

Drawn from within Bandura's Social Cognitive Theory, and the assumption that lecturer motivation and beliefs influence their well-being and contextual evaluation of the workplace, lecturer self-efficacy was indeed a positive predictor of quality of life, supporting the initial working hypothesis. Thus, lecturers who reported higher levels of self-efficacy perceived themselves with better quality of life. Our findings also indicate that lecturer self-efficacy is a direct positive predictor of personal accomplishment in burnout, a dimension that aggregates motivational factors, satisfaction and positive evaluation of

TABLE 4 Cluster mean scores by factors.

Cluster	Participants	Teaching	Research	Extension	Mgment[a]	Exhaustion	Depers[b]	PersAcc[c]	Physical	Psych[d]	Social	Env[e]
		Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)
Cluster 1	238	4.36 (0.38)	4.36 (0.56)	4.16 (0.55)	4.22 (0.80)	1.96 (0.62)	1.32 (0.49)	6.18 (0.59)	84.06 (10.95)	82.34 (9.20)	78.08 (12.96)	79.53 (9.60)
Cluster 2	527	4.02 (0.46)	4.14 (0.59)	3.69 (0.80)	3.84 (0.60)	2.99 (1.10)	1.89 (0.83)	5.29 (1.06)	71.16 (13.62)	70.33 (11.63)	69.49 (13.09)	66.75 (11.47)
Cluster 3	422	3.73 (0.44)	3.67 (0.67)	3.25 (0.78)	3.35 (0.54)	4.63 (1.08)	2.58 1.26)	5.12 (0.80)	54.50 (14.36)	56.62 (12.72)	60.98 (11.48)	60.33 (12.19)
Cluster 4	293	3.24 (0.50)	3.40 (0.73)	2.74 (0.78)	2.90 (0.53)	2.97 (0.86)	1.86 (0.04)	4.63 (1.24)	69.94 (13.20)	69.72 (12.72)	44.34 (12.75)	67.29 (11.72)
Cluster 5	229	2.95 (0.53)	3.00 (0.75)	2.58 (0.83)	2.59 (0.63)	5.08 (1.00)	2.79 (0.09)	4.51 (1.04)	44.37 (13.65)	44.85 (13.76)	39.01 (15.51)	48.76 (12.77)
Eta Squared		0.49	0.31	0.31	0.47	0.52	0.19	0.21	0.46	0.47	0.51	0.35

[a]Management (BI.SES); [b]depersonalization (MBI); [c]personal accomplishment (MBI); [d]psychological (WHOQL-Bref); [e]environmental (WHOQL-Bref).

work, corroborating the results of others (Briones et al., 2010; Bentea, 2017; Molero Jurado et al., 2018). Since higher levels of self-efficacy contribute to a positive mental state of engagement at work, self-efficacious individuals are therefore more likely to experience a greater number of successful work-related outcomes (Spontón et al., 2018). These findings are in accordance with those involving teachers in schools which have also found positive relationships between professional context, engagement and job satisfaction (Skaalvik and Skaalvik, 2010; Costa, 2012; Ventura et al., 2015; Chan et al., 2020; Matos et al., 2021). This raises the possibility of developing interventions that promote lecturer self-efficacy and, consequently, a more positive perception of quality of life thereby reducing the likelihood of suffering burnout (Fong et al., 2019).

Self-efficacy in the work environment can affect the way people perceive stress, anxiety and physical health. People with higher levels of self-efficacy, when exposed to unpleasant or exhausting situations, may experience less stress as they perceive themselves as more capable of dealing with the challenges imposed by the context (Bandura, 1997). As burnout is related to workplace demand, we anticipated a negative association between self-efficacy and burnout. However, we did not find the direct relationship witnessed elsewhere (Skaalvik and Skaalvik, 2010; Cao et al., 2018). Instead, we found a significant negative relationship between lecturer self-efficacy and emotional exhaustion and depersonalization mediated by quality of life. Thus, quality of life impacts negatively on burnout syndrome while positively affected by self-efficacy. Bandura (1997, p. 464) argues, however, that "occupational stress is not just an employee problem. Certain organizational conditions can undermine employees' beliefs in their occupational capabilities." Higher education working conditions are also important, pointing to the university environment as highly exhausting and demanding. This needs to be discussed and addressed and will be further explored in the next sections (Bandura, 1997; Alves, 2017; Cardoso Júnior et al., 2018; Alves et al., 2019; Hall et al., 2019).

Recent studies have related teacher self-efficacy with their mental health, with implications on their behavior and attitudes toward work (Von Muenchhausen et al., 2021). Therefore, lecturer self-efficacy could be understood as a valuable personal resource that influences on the adoption of positive coping skills, proactive behavior and positive emotions as whole. In this sense, researchers have demonstrated that it is possible to develop training processes for lecturers with the purpose of increasing their self-efficacy beliefs through the use of the sources of information (Postareff et al., 2007; Fong et al., 2019). Thus, the main importance of these results may lie in developing intervention processes that promote lecturer self-efficacy, with a positive perception of quality of life, which could reduce the possibility of suffering with burnout. In addition to findings of studies that point the importance of lecturer self-efficacy beliefs on student learning, the results

TABLE 5 Pattern of group responses according to the frequency of personal variables.

Variable	Cluster 1 (%)	Cluster 2 (%)	Cluster 3 (%)	Cluster 4 (%)	Cluster 5 (%)	χ^2 (df)	Cramer's *V*
Gender Female	44.9	47.0	59.5	49.8	60.4		0.12 ($p < 0.001$)
Male	55.1	53.0	40.5	50.2	39.6	33.81(8)	
Do you wake up rested? Yes	75.2	56.5	22.5	51.5	17.5	277.90(4)	0.40 ($p < 0.001$)
Do you believe that your professional life interferes with your relationship with your partner? Yes	41.6	60.2	82.0	66.4	86.5	157.48(4)	0.31 ($p < 0.001$)
Do you believe that your professional life interferes with your leisure activities? Yes	52.5	71.5	91.2	78.5	95.6	188.51(4)	0.33 ($p < 0.001$)
Inability to relax Yes	14.7	41.0	71.3	43.7	78.6	292.04(4)	0.41 ($p < 0.001$)
Loss of interest in work Yes	7.1	27.3	54.0	29.0	69.9	278.53(4)	0.40 ($p < 0.001$)
Anxiety Yes	31.9	54.8	77.5	55.6	82.5	189.48(4)	0.33 ($p < 0.001$)
Low self-esteem Yes	3.8	20.1	47.4	22.5	64.2	292.97(4)	0.41 ($p < 0.001$)
Discouragement Yes	23.1	45.7	75.8	52.2	87.8	290.66(4)	0.41 ($p < 0.001$)
Depression Yes	2.1	11.6	27.7	10.6	42.4	183.90(4)	0.33 ($p < 0.001$)
Lack of concentration Yes	17.6	30.7	55.9	33.8	73.4	220.20(4)	0.36 ($p < 0.001$)
Lack of energy Yes	22.3	47.8	77.3	49.5	86.9	296.23(4)	0.42 ($p < 0.001$)
How would you assess your health at the moment?							
Bad	0.0	1.9	5.2	0.7	16.2	497.62(12)	0.31 ($p < 0.001$)
Regular	8.4	28.7	54.0	30.4	66.4		
Good	59.2	60.2	38.4	54.9	17.0		
Great	32.4	9.3	2.4	14.0	0.4		
Do you feel professionally satisfied as a lecturer? Yes	96.6	88.6	66.6	82.3	43.7	267.47(4)	0.40 ($p < 0.001$)
Do you believe you cope well with all the competing demands present in the life of lecturer? Yes	76.5	55.2	25.6	29.4	13.1	299.82(4)	0.42 ($p < 0.001$)

show that these beliefs are pivotal for lecturers themselves (Matos et al., 2021).

In addition to developing strategies for increasing self-efficacy, it is essential that universities also develop strategies to help improve the work environment, dealing with excessive demands that act as the precursors of emotional exhaustion (Hall et al., 2019). Considering the international situation facing universities post-pandemic, and the changes required to build "new normals," it might be suggested that addressing self-efficacy and collective efficacy provides at least one new pathway over the coming years.

Cluster analysis results

Cluster analysis contributed to understanding variations in self-efficacy beliefs among participants, with participants brought together into five groups characterized by decreasing values of self-efficacy across each of its four dimensions. These differences were not straightforward when also considering burnout and quality of life together.

Lecturer self-efficacy

There is no linear and causal relationship between experiencing events and understanding them as a means of strengthening or weakening personal beliefs. They depend on the selection and cognitive interpretation individuals make of them. Therefore, it is natural that in the university environment individuals who experience the same working conditions react to them in different ways, thereby choosing to act or react differently. The cluster analysis shows that according to their levels of self-efficacy beliefs there were differences in how work was perceived, with, for example, participants with higher levels of self-efficacy feeling more satisfied with the profession overall.

It is also essential that working conditions are aligned with individual and professional needs. This becomes clear when analyzing the variations observed in Cluster 3. Although participants in this cluster present moderate scores of self-efficacy, the high values of emotional exhaustion and low perception of quality of life point to a group more likely to lose interest in work, suffer lack of energy and perceive the professional environment as less satisfactory. Bandura (1997) states that positive perceptions about one's own abilities favor persistence in challenging contexts. However, overconfidence can also be characterized as excessive and maladaptive in an academic environment, thereby creating its own problems (Pajares, 1996), and potentially harmful to health and quality of life. As Bandura (2003) warns, the challenge is to preserve the functional value of resilient self-efficacy while identifying practices that are beyond the point of utility, including the self-efficacy beliefs associated with workaholism (Del Líbano et al., 2012). It is therefore necessary that lecturers are also able to assess their personal capabilities and set optimistic but not unrealistic goals and purposes for their careers (Burke et al., 2006; Ng et al., 2007; Del Líbano et al., 2012).

Health impairment is a possible explanation for what occurs with participants in Cluster 5 (Del Líbano et al., 2012). Participants with lower self-efficacy may perceive their environment as more threatening, and, consequently, perceive themselves as less able to intervene within it. Over time, this lack of agency could lead to exhaustion and illness. Pressured by demands, exhausted and discouraged, adopting the strategy of adhering to the rules set may become the norm. Cluster 5 participants with high levels of emotional exhaustion and below average depersonalization could, with low levels of self-efficacy, suffer eventually from burnout because the exhaustion is negatively related to self-efficacy in future academic success (Salanova et al., 2005).

The current university context facing many lecturers today favors an excess of working hours, activities and diversification of roles (Calvert et al., 2011, p. 33). This is not something natural, but historically and socially built through the adoption of public and economic policies. As rightly pointed out by (Cherniss, 1993, p. 139):

Bandura recognizes that there are environments that are so unresponsive, unjust, and punitive that strong self-efficacy by itself is not sufficient for positive adaptation (. . .) Those who perceive themselves to be more efficacious will engage in social activism; and, if their efforts to change the environment meet with repeated failure, they will eventually look for better environments in which to work. But those who are low in self-efficacy will tend to react to unresponsive environments with apathy, resignation, and cynicism. Thus, strong self-efficacy ultimately promotes environmental change as well as individual adaptation. (Cherniss, 1993, p. 139).

According to the results of the cluster analysis, there is a reciprocal relationship established between beliefs, environment and the way people choose to act. Lecturer self-efficacy is not a 'one-size-fits' all concept. Higher education today is challenging and could be perceived as threatening. Understanding lecturer self-efficacy is therefore pivotal to affecting change.

Burnout

As mentioned in the introduction, Leiter and Maslach (2016) propose a five-profile classification of burnout. Adopting this here, those participants assigned to Cluster 1 appear most closely associated with the engaged profile since it presents high levels of personal accomplishment and low levels of emotional exhaustion and depersonalization. Participants in Cluster 3 exhibited high levels of emotional exhaustion, without major reductions in the score of personal accomplishment and, therefore, we associated this with the over-extended profile. Cluster 5 most closely resembles Leiter and Maslach's true burnout profile, since participants here present with high levels of exhaustion and reduced personal accomplishment. Clusters 2 and 4 do not readily match any of Leiter and Maslach's profile

categories, but the authors themselves do point to the possible existence of other as yet unidentified groups.

Despite suffering restrictions because of the work context, we assume that the participants in Clusters 1 and 2 manage to achieve the professional goals most important to them, including publishing in quality journals, securing funding, and successfully helping tutor their undergraduate and graduate students appropriately. These successful experiences could be sources of lecturer self-efficacy and help protect these lecturers from the adverse effects of workload demand (Bandura, 1997). Even when participants do not present high scores in burnout factors, an excess in even one can have negative effects on quality of life and professional performance. Participants in Cluster 3, for example, present with high levels of emotional exhaustion. Even though they do not present a full burnout profile *per se*, they still feel less satisfied with their profession and present a greater loss of interest in their work which could impact their work performance. The fact that almost a quarter of the lecturers in this cluster may be exhausted is worrying since studies point out that emotional exhaustion is a precursor of burnout (Lima and Lima-Filho, 2009). Identifying lecturers with high scores in this dimension could inform decision making to help promote change. As mentioned before, different lecturers may have different perceptions of professional context depending on their levels of self-efficacy. This is evident in Cluster 5. Participants here may suffer more from environmental restrictions, possibly putting them at risk of ill health (Cao et al., 2018).

Social relationships and quality of life

The results of the cluster analysis show that participant perceptions of quality of life, as well as their self-efficacy beliefs, are not uniform, with distinct groups presenting variations in questionnaire scores. In most clusters there is a certain congruence between outcomes, with participants who have high scores in one domain having similar responses in others (e.g., Cluster 1). By contrast, the extremely low scores of the social relationships domain observed in Cluster 4 stand out when compared to other domains in the same cluster. This might be related to environments of high competitiveness established in universities, since, for example, the lack of funding encourages competition for financial resources, the publication of articles, and other such demands. This competition could generate a perception of isolation in lecturers, who may find it difficult to integrate and find collaboration with others in their departments. In addition, intense working hours can also interfere with the social relationships of lecturers outside academia (Andrade and Cardoso, 2012; Ferreira et al., 2015). Social relationships are a central feature of all institutions that intend to improve the quality of life of their lecturers since building social relationships in universities is associated with lower rates of illness and higher levels of self-efficacy (Hemmings, 2015).

Strategies for coping with professional demands

As pointed out earlier, lecturers evaluate their self-efficacy beliefs against the demands presented in context alongside the personal resources and strategies they believe they have to cope with these demands (Bandura, 2012). Exploring the perspective that individuals with higher self-efficacy adopt better strategies to adapt to their own situations, 76.5% of the participants in Cluster 1 responded positively to the question "Do you believe you cope well with all the competing demands presented in lecturer life?" compared to 13.1% in Cluster 5. Lecturers with higher levels of self-efficacy also understand how to deal better with professional demand. Hall et al. (2019) also showed that lecturers with higher levels of self-efficacy were less prone to procrastination and had lower levels of emotional exhaustion. This indicates the importance of lecturers building personal mechanisms of self-regulation that help them manage environmental demand as well as manage their reaction toward it. It is important that institutions invest in strengthening lecturer self-efficacy beliefs as well as the development of lecturer self-regulatory skills. It is also noteworthy that often the interpersonal skills and self-regulatory skills of lecturers are more important for professional success than the skills directly related to the professional activities performed (Bandura, 1997).

Gender

We highlight here that Clusters 3 and 5, which presented the lowest scores of quality of life and high scores in emotional exhaustion, contained larger numbers of women than men. These findings are consistent with other research that explores the relationship between gender, burnout and quality of life (Borges and Lauxen, 2016; Alves, 2017). One possible explanation for the observed difference in profiles between men and women lies in gender inequality and productivity gaps at work (Astegiano et al., 2019), difficulties in balancing work and personal lives (Crabtree et al., 2020), and the segregation of women in academia (Boechat, 2020). Overall, it is possible that even among highly qualified women with successful academic careers in lecturing to suffer from doubts regarding their personal capabilities. It is also possible that the women responding were more self-critical or honest than men in completing the questionnaires.

Structural changes are important for altering contextual conditions that ensure gender equality in universities, allowing women to have the same opportunities available to them as their male colleagues. As a way of achieving this, institutions could investigate the lecturer self-efficacy beliefs of their female lecturers and implement training processes focusing on enhancement. Mentoring by more experienced colleagues and female role models who might promote successful work-related experiences and strategies provide one example (Hemmings and Kay, 2009). However, even if the strengthening of self-efficacy beliefs is essential, this alone may not be enough. Effective and

long-lasting change requires the commitment of universities with initiatives to also change institutional culture.

Limitations

Here, we used Bandura's theoretical framework of Social Cognitive Theory to derive hypotheses about the direction of relationships on the predictive model between lecturer self-efficacy, quality of life and burnout. As a quantitative study, all of the questionnaires used were self-report instruments and therefore subject to interpretational issues and social desirability bias. Both the SEM and cluster analysis are subject to data handling which involve an element of subjectivity in decision-making and interpretation. No causal inferences should be inferred. Thus, further studies might involve qualitative, mixed-methods and experimental designs, particularly those involving multiple sources of data.

It is also noteworthy that in this study only quality of life was examined as a potentially mediating variable. Here we verified that quality of life partially mediates the relationship between lecturer self-efficacy and burnout, without identifying if other variables could be equally responsible for this relationship. Future research could expand the number of mediators analyzed, including personal and professional variables such as gender, academic background and career stage. As we only had as participant lecturers from Brazil, the results should not be over-generalized out of context and into other occupations and cultures.

Concerning the cluster analysis and the number of clusters retained, this is determined by carefully interpreting the data-generated solutions themselves and arriving at a 'best-fit' considering all of the many factors involved. Introducing an element of subjectivity to a point, the results presented here should not be considered definitive and representative of other higher education situations (Everitt et al., 2011). Despite that, the results can be used to help direct future research in the field with a view to replication or the establishment of other solutions and outcomes. The field could also benefit from longitudinal research examining the cluster stability over time.

Finally, one other possible limitation of the study included the timing of data collection which occurred at the end of an academic semester in Brazil, and a busy time for lecturers. It is possible that questionnaire completion may have been affected as a result. We recommend that future studies use a more longitudinal approach to investigate self-efficacy beliefs in order to understand how lecturers behave over time, and to consider the specific demands of context for each academic period of the year.

Conclusion

Addressing the research questions raised at the outset, findings arising from the SEM and cluster analysis of questionnaire data from 1,709 lecturers in 78 universities across Brazil indicate that lecturer self-efficacy positively predicts the perception of quality of life and personal accomplishment. In addition, perceptions of quality of life negatively predicts burnout. Lecturer self-efficacy, quality of life and burnout are also closely associated with the personal and professional background variables of lecturers in ways that can be meaningfully identified and clustered. These relationships have hitherto received scant attention (Perera et al., 2019; Matos et al., 2021).

The implications of findings point to the importance of universities working to promote a collaborative and supportive environment for their employees. Thus, we emphasize the importance of institutional initiatives to promote a healthier university, which welcomes and promotes quality of life and wellbeing to create a sustainable environment with the potential to improve teaching, research opportunity, extension activities and management processes, and prevent burnout. In this way, self-efficacy development and quality of life would no longer rely on individual initiative but would become a commitment of universities to their wider academic communities as a whole (Faria et al., 2021). This is especially important if we consider the little-known consequences of the COVID-19 pandemic and a return to "new normal" ways of working. Institutions and their academic communities should reflect seriously upon what they want to be, and how they want to live and learn together in the coming years.

The challenges facing lecturers in Brazil are many, including the disinvestment in public higher education institutions and the collapse of public funding agencies (Amaral, 2019). All of these can influence the job satisfaction and self-efficacy beliefs of lecturing staff. However, public and university policies are not immutable. They can be changed based on social and academic community pressures. To this end, it is essential that those actors involved in the process of change believe in their individual and collective capacities to sustain the efforts necessary for this to take place:

Social reformers strongly believe that they can mobilize the collective effort needed to bring social change. Although their beliefs are rarely fully realized they sustain reform efforts that achieve important gains. Were social reformers to be entirely realistic about the prospects of transforming social systems they would either forego the endeavor or fall easy victim to discouragement. Realists may adapt well to existing realities. But those with a tenacious self-efficacy are likely to change those realities (Bandura, 1994, p. 13).

Ways of achieving Bandura's social reform might include "a commitment to collegiality (over and above competitiveness); challenging the normative discourses of over-work and exhaustion in the quest for productivity; and attending to the 'quieter' intellectual virtues of the profession"(Skea, 2021, p. 9). This will require a collective response and, therefore, needs to

be built together by lecturers and the institutions in which they work to promote a true academic community. In this context, reflections on one's own beliefs and on collective efficacy beliefs can play a decisive role.

Data availability statement

The datasets generated for this study are available on request to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the Ethics Commission of the Institute of Bioscience, São Paulo State University "Júlio de Mesquita Filho", Rio Claro, Brazil. The patients/participants provided their written informed consent to participate in this study.

Author contributions

MM conceived the idea, designed the study, collected the data, performed the analysis, and drafted the first version of the manuscript. RI was involved in planning and conceptualization and directed the project. JS guided the process of data analysis and contributed to the interpretation of the results. JS and RI reviewed and edited the first written draft. All authors helped to shape the final 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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How does teacher-perceived principal leadership affect teacher self-efficacy between different teaching experiences through collaboration in China? A multilevel structural equation model analysis based on threshold

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Teacher self-efficacy is one of the most critical factors influencing Students' learning outcomes. Studies have shown that teacher-perceived principal leadership, teacher collaboration, and teaching experience are the critical factor that affects teacher self-efficacy. However, little is known about the mechanisms behind this relationship. This study examined whether teacher collaboration would mediate the relationship between teacher-perceived principal leadership and teacher self-efficacy, and the moderating role of teaching experience in the mediating process. With an analysis of a dataset from 14,121 middle school teachers in China, this study first testified to the positive role that teacher-perceived principal leadership played in teacher self-efficacy. Furthermore, it revealed that teacher collaboration mediates this relationship and the mediated path was moderated by teaching experience. Finally, it also indicated that the threshold of teaching experience linking the teacher-perceived leadership with teacher self-efficacy was approximately in the third year, and their relationship was stronger when teaching experience was below the threshold. This study highlighted the mediating and moderating

mechanisms linking the teacher-perceived principal leadership and teacher self-efficacy, which has important theoretical and practical implications for intervention and enhancement of teacher self-efficacy.

KEYWORDS

teacher-perceived principal leadership, teacher collaboration, teaching, teaching experience threshold, teacher self-efficacy

Introduction

Teaching is an indispensable and irreplaceable factor impacting Students' learning outcomes (Rockoff, 2004; Hattie, 2008). Effective teaching greatly improves Students' academic achievement and narrows the gaps among students with various socioeconomic and cultural backgrounds (Odden et al., 2004; Akiba et al., 2007). The international community has paid increasing attention to teaching quality and teaching effectiveness in the past decades (Klassen et al., 2011). Among the factors that impact teaching quality and effectiveness, teacher self-efficacy, "a belief in their abilities to plan, organize, and carry out activities required to attain given educational goals" (Skaalvik and Skaalvik, 2007), has been found to play an important role in influencing teachers' classroom performance and achieving satisfactory teaching results (Tschannen-Moran and Hoy, 2001; Bellibas and Liu, 2017). Considering the promoting effect of teacher self-efficacy on Students' academic achievement, it is of critical value to explore the predictors of teacher self-efficacy. Rooted in the self-efficacy theory (Bandura, 1986), a body of extant research has indicated that principal leadership, teacher collaboration, and teachers' teaching experience are the main predictors of teacher self-efficacy (Tschannen-Moran and Hoy, 2007; Avalos, 2011; deVries et al., 2013; Duyar et al., 2013; Fackler and Malmberg, 2016; Lambersky, 2016; Pfitzner-Eden, 2016; Bellibas and Liu, 2017; Li et al., 2019; Ma and Marion, 2021). Principals can promote positive teacher efficacy through direct supervision and engagement in instructional leadership activities (Duyar et al., 2013). Teachers' collaboration refers to working with colleagues, which involves a series of activities such as exchanging feedback on teaching tasks, or participation in continuing professional development (CPD), which can cultivate a mutual learning environment and promote teachers' teaching skills, and therefore contribute to Students' academic achievement (deVries et al., 2013; Rutherford et al., 2017). The years that teachers have worked and their self-efficacy remain undecided as positive, negative, and no association have all been concluded, and therefore, there is a need for further investigation regarding their relationship (Li et al., 2019).

In present-day China, one of the most important activities of school principals is to organize novice teachers to pair up with experienced teachers to cooperate in teaching and research activities, so as to improve the teachers' teaching skills and their self-efficacy afterward in the school (Li et al., 2019). The paired cooperation between novice and experienced teachers in teaching and research activities has gradually become the tradition of teachers' professional development in China. With the popularity of this new format of teacher collaboration, there is a necessity to investigate the relationship between principal leadership, teacher collaboration, teaching experience, and teacher self-efficacy. Moreover, few studies have been conducted to explore the differences between novice and experienced teachers in the relationship. Furthermore, the trend of teachers' professional development has been discussed in non-linear ways (Garner and Kaplan, 2021). With the complex dynamic systems (CDS) approach, they studied teachers' professional development learning as a complex system, which can respond adaptively to internal and external changing conditions. With different years of teaching experience, teachers may exhibit differences in cognitive dissonance as well as when confronting conflicting beliefs, values, and practices.

Therefore, in our study, it was hypothesized that a non-linear relationship existed between teachers' teaching experience and teacher self-efficacy and a threshold existed in dividing the notice and experienced teachers. With this hypothesis, it was expected to explore the differences between novice and experienced teachers in the relationship between principal leadership, teacher collaboration, teaching experience, and teacher self-efficacy, and hopefully could provide an in-depth nuanced understanding of the development of teacher self-efficacy and empirical data evidence from the Asian country to enrich teacher self-efficacy theory.

Literature review

Relationship between teacher-perceived principal leadership and teacher self-efficacy

Principal leadership refers to the ability that the school managers have in commanding, leading, and interacting with

the team to achieve the school's developmental goals (Bush and Glover, 2014). Modern educational management theory holds that effective principal leadership creates a positive school atmosphere through perception, behavior, and interaction related to the core driving force of teaching and learning (Blase, 1987; Leithwood, 1992; Hallinger et al., 2017; Liu and Hallinger, 2018). Principal leadership is a key factor in determining a school's performance, which directly or indirectly affects teachers' professional development and Students' academic achievement (Leithwood, 1992; Dinham, 2007; Leithwood et al., 2010; Gumus et al., 2016; Bellibas and Liu, 2017). One important responsibility that school principals take in schools is to provide opportunities for teachers to develop teachers' professional abilities. Teachers are often found to have stronger self-perceptions of principal leadership when they have more professional development opportunities organized by schools. At the same time, teachers who perceive higher levels of principal leadership are more supportive of schools' development visions and are more likely to develop higher self-efficacies (Fackler and Malmberg, 2016; Lambersky, 2016; Gkolia et al., 2018; Liu and Hallinger, 2018). In this study, the term teacher-perceived principal leadership was used to refer to the teachers' self-perception of principal leadership and it was hypothesized that a positive relationship existed between teacher-perceived principal leadership and teacher self-efficacy.

The mediating role of teacher collaboration

As a professional practice of high interest, teacher collaboration plays a critical role in various teachers' work, including instructional practice and professional learning (Goddard et al., 2007; Desimone, 2009; Chong and Kong, 2012; Muckenthaler et al., 2020). Schools are viewed as potential "communal organizations" characterized by "enhanced collegiality and collaboration," within which collaboration may occur (Hausman and Goldring, 2001). Teacher collaboration is an essential part of teaching activities to establish and keep relationships among school staff (Chong and Kong, 2012; Muckenthaler et al., 2020).

According to Bandura (1997), teacher self-efficacy comes from four sources, which are mastery experiences, vicarious experiences, verbal persuasion, and emotional and physiological states. From this perspective, through cooperating in preparation for class, teaching, class evaluation, and teaching reflection, teachers not only develop mastery experiences, vicarious experiences, and verbal persuasion but also improve their confidence in teaching through continuous teaching cooperation and communication. Therefore, teacher collaboration provides a great opportunity for the development of teacher self-efficacy, and teacher activities which have teaching collaboration involved are more likely to develop their self-efficacy.

Furthermore, the higher the teacher perceives principal leadership in a school, the more cooperative teaching opportunities teachers can get and participate to improve teaching (Goddard et al., 2007). Therefore, it can be reasonably hypothesized that there exists a relationship between teacher-perceived principal leadership and teacher collaboration. When teachers participate in more cooperative teaching and research activities, teacher self-efficacy is more likely to develop. Studies have also shown that teacher collaboration has exerted a significant positive impact on teachers' professional growth (Egodawatte et al., 2011; Vangrieken et al., 2015). Increased teacher collaboration was associated with a higher level of teacher self-efficacy (Shachar and Shmuelevitz, 1997; Yang, 2020). Vangrieken et al. (2015) concluded that teachers' positive outcomes, including improvement in instruction, heightened efficacy, and improved professional knowledge are often documented. Therefore, it was hypothesized that teacher collaboration played a mediating role between teacher-perceived principal leadership and teacher self-efficacy in this study.

The moderating role of teaching experience

Although teacher-perceived principal leadership is a positive factor of teacher self-efficacy through the intermediary role of teacher collaboration, this may not apply to all due to individual differences (Klassen and Chiu, 2010; Li et al., 2019). Teaching experience is the relevant experience accumulated by individuals engaged in teaching throughout the years. One source of teacher self-efficacy is teachers' teaching experience (Bandura, 1986, 1997), which is closely related to teachers' years of teaching. The longer the years of teaching, the more teaching experience they are to accumulate, and the higher their self-efficacy is. A positive relationship has been testified between teachers' teaching experience and their self-efficacy (Prieto and Altmaier, 1994; Klassen and Chiu, 2010; Li et al., 2019).

Teachers' professional careers can be divided into preservice and in-service phases, and they can be further divided into additional phases (Eros, 2011; Richter et al., 2011). Compared with experienced teachers with long years of teaching, novice teachers with short years of teaching may exhibit more obvious perceptions of principal leadership (Fantilli and McDougall, 2009; Bellibas and Liu, 2017; Mikser et al., 2020). The impact of teacher-perceived principal leadership on teacher self-efficacy may vary with teachers' teaching experience. Novice teachers with short years of teaching experience need more communication and cooperation between teachers in the initial period of teaching while experienced teachers may not. Therefore, we can reasonably hypothesize that teacher collaboration is more likely to play a role in teacher self-efficacy

for novice teachers than for experienced teachers with long years of teaching experience.

The current study

To further explore the nature of this relationship between teacher-perceived principal leadership and teacher self-efficacy, the current study examines a conceptual model (**Figure 1**) using a sample of Chinese high school teachers through a series of hypotheses. Specifically, we have made three hypotheses, as follows:

> H1: Teacher-perceived principal leadership was positively and directly related to teacher self-efficacy.

> H2: Teacher collaboration would play a mediating role in the relationship between teacher-perceived principal leadership and teacher self-efficacy. Teacher-perceived principal leadership would be positively related to teacher collaboration, which in turn would be positively associated with teacher self-efficacy.

> H3: Teaching experience would moderate the direct and indirect relationship between teacher-perceived principal leadership and teacher self-efficacy through teacher collaboration.

In addition, this study divided teachers into novice and experienced through the non-linear relationship between teaching experience and teacher self-efficacy and explored the differences between novice and experienced teachers in the above model.

Materials and methods

Participant

The data we selected were from Region Education Assessment Project (REAP), a large-scale education assessment project in China. A two-stage stratified sample design was used to collect data from a province in the eastern area of China in 2018. According to the basic requirements of stratified sampling on sample size (Johnson and Christensen, 2019) and the need for a local education department, we randomly selected 90% of high schools in each city. It resulted in 139 high schools overall. Next, 50% of the second-grade teachers in high schools were randomly assigned to participate in the study, with a total of 14,121 teachers (male: 46.3%), whose ages ranged from 22 to 60 years (M = 38.93, SD = 8.17). Their academic degrees were specifically: associate (23.4%), bachelor (65.9%), and graduate (10.7%). These teachers were required to complete a survey including relevant demographic information (gender, age, educational background, and professional title), teacher-perceived principal leadership, teacher collaboration, teaching experience, and teacher self-efficacy information.

Measures

Teacher-perceived principal leadership

TALIS2013 principal leadership scale (OECD, 2014) was modified to measure teacher-perceived principal leadership. The scale included five self-reported items (e.g., *Principal took actions to support collaboration among teachers to develop new teaching practices*) on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Higher total scores indicate higher levels of teacher-perceived principal leadership. The goodness of fit is acceptable: $\chi^2(3, 14{,}121) = 123.62$, $p < 0.001$, RMSEA = 0.05, CFI = 0.99, TLI = 0.99, and SRMR = 0.003. The reliability McDonalds' omega (ω) was 0.96 (>0.90) (Watkins, 2017; Hayes and Coutts, 2020) and therefore, considered acceptable.

Teacher collaboration

This study adopted the TALIS2013 teacher collaboration scale to measure teacher collaboration (OECD, 2014). In this scale, teachers reported their individual teaching collaboration activities with the questionnaire "On average, how often do you do the following in this school?" One sample item was "*Observe other teachers' classes and provide feedback*." Teachers' responses consisted of the following options: 1 (never), 2 (1–2 times per month), 3 (3–5 times per month), 4 (6–9 times per month), and 5 (10 or more times per month). A higher score suggested a greater tendency for teacher collaboration. The goodness of fit is acceptable: $\chi^2(1, 14{,}121) = 13.78$, $p < 0.001$, RMSEA = 0.03, CFI = 1.00, TLI = 0.99, and SRMR = 0.002. The scale's internal consistency reliability (McDonalds' omega, ω) was 0.91.

Teacher self-efficacy

This study adopted the TALIS2013 teacher self-efficacy scale (OECD, 2014) to assess the participants' level of teacher self-efficacy. It consisted of 12 items: 4 items for efficacy in instruction (e.g., *Provide an alternative explanation for example when students are confused*); 4 items for efficacy in classroom management (e.g., *Control disruptive behavior in the classroom*); and 4 items for efficacy in student engagement (e.g., *Get students to believe they can do well in school work*). Items were scored using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) with higher total scores indicating higher levels of teacher self-efficacy. The goodness of fit is acceptable: $\chi^2(48, 14{,}121) = 3377.273$, $p < 0.001$, RMSEA = 0.07, CFI = 0.98,

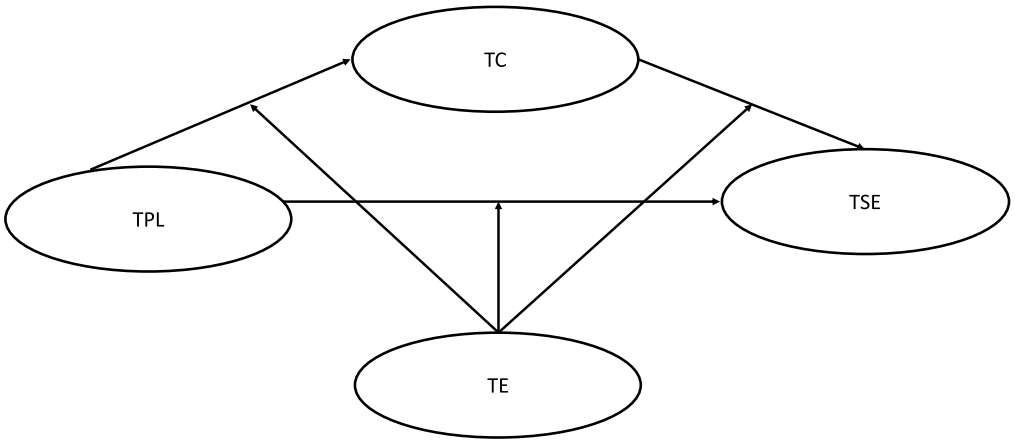

FIGURE 1
Structure of the proposed model. TPL, Teacher-perceived principal leadership; TC, Teacher collaboration; TE, Teaching experience; TSE, Teacher self-efficacy.

TLI = 0.97, and SRMR = 0.02. The scale's internal consistency reliability (McDonalds' omega, ω) was 0.96.

Teaching experience and demographic information

Demographic information included information from individual level, which were participant's age, gender, education level, and professional title, and school level, which was school location. The item to investigate teachers' teaching experience was "how many years has each participant been a teacher?" and teachers responded to their years of teaching individually.

Individual-level and school-level indicators can affect teacher self-efficacy as well (Avalos, 2011). Therefore, gender, teachers' educational level, school level, and school location were treated as covariate variables controlled in this study.

Statistical analyses

The statistical analysis of this study consisted of three steps: first, we checked the descriptive statistics and zero-order correlation between variables. Second, given the hierarchical data structure (teachers nested in schools), we used *Mplus version 8.3* (Muthén and Muthén, 1998–2018) and followed the procedure of Preacher et al. (2010, 2016) to test hypotheses 1–3 using the multilevel structural equation model (MSEM). The multilevel solution allows the variance of level 1 variables to be decomposed into components within and between components and takes into account the fact that the relationships between within and between groups may be different. Because all three variables were evaluated at the teacher level, this model can be described as a 1-1-1 multilevel mediation model. Sobel's test was used to test the mediating effects (Sobel, 1982). Third, based on the multilevel mediation model, we included the moderating variables teaching experience to build a 1-1-1 multilevel moderating mediation model. The covariate variables at the teacher level were gender and teachers' education level, and at the school level were school location and school level (see **Figure 2**). All continuous variables are centralized, and the interaction terms were calculated according to these centralized scores. Moreover, this study analyzed the threshold of teaching experience in terms of the relationship with teaching self-efficacy through the method of segmented regression models (Muggeo, 2008), and analyzed the difference in moderating effect between teachers whose teaching experience is below the threshold (coded as 0) and teachers whose teaching experience is above the threshold (coded as 1).

To ensure the validity of this study, we conducted one of the most widely adopted techniques, namely Harman's single-factor method, to test for common method bias (Chang et al., 2010; Podsakoff et al., 2013; Tehseen et al., 2017). Exploratory factor analysis shows that the interpretation rate of the first of the three factors was less than 40% (Kong et al., 2020), indicating that the common method bias had little impact on this study.

Results

Preliminary analysis

The mean, standard deviation, and zero-order correlation of all variables are shown in **Table 1**. Teacher self-efficacy was positively related to teacher-perceived principal leadership (r = 0.42, p < 0.001), teacher collaboration (r = 0.46, p < 0.001), and teachers' teaching experience (r = 0.09, p < 0.001). Therefore, Hypothesis 1 was verified. Teacher-perceived principal leadership was positively related to teacher collaboration (r = 0.21, p < 0.001) and teachers' teaching

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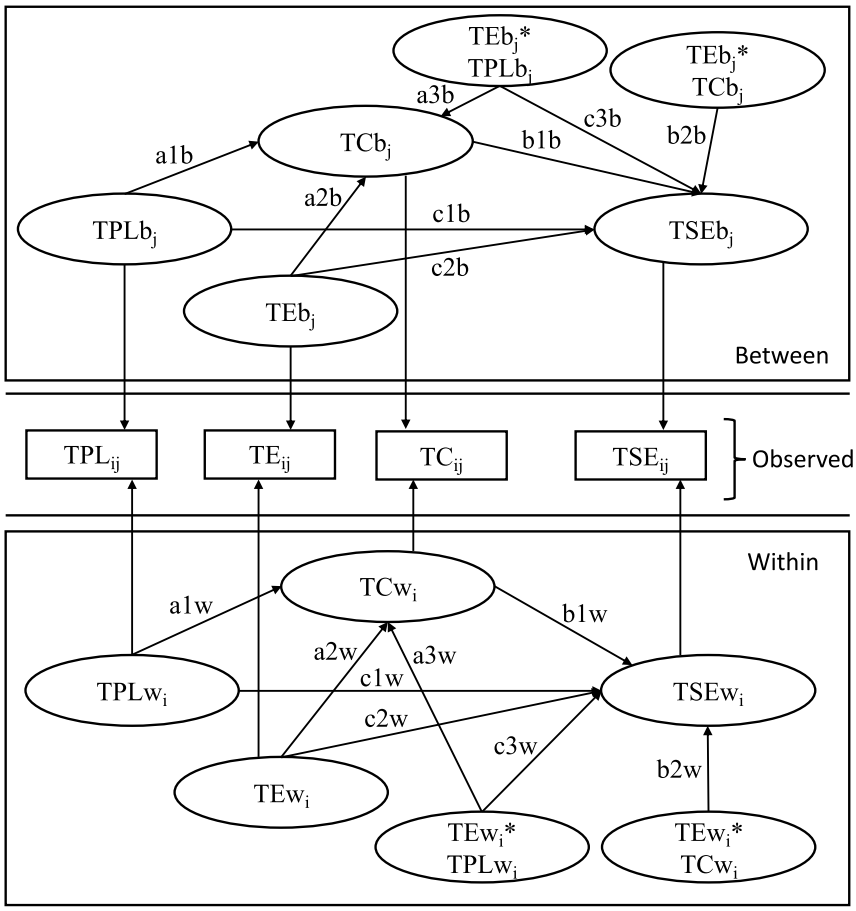

FIGURE 2
The multilevel structural equation model depicts a 1–1-1 multilevel moderated mediation model. The figure is based on Preacher et al. (2010, 2016). TPL, Teacher-perceived principal leadership; TC, Teacher collaboration; TE, Teaching experience; TSE, Teacher self-efficacy.

TABLE 1 Descriptive statistics and correlations of the main study variables.

Variables	Mean	*SD*	1	2	3
1. TSE	4.28	0.68			
2. TPL	4.04	0.97	0.42***		
3. TC	4.49	0.84	0.46***	0.21***	
4. TE	14.42	7.41	0.09***	0.12***	−0.04***

***$p < 0.001$.

experience ($r = 0.12$, $p < 0.001$). But teacher collaboration was negatively correlated with teachers' teaching experience ($r = -0.04$, $p < 0.001$).

Multilevel mediation model test

In Hypothesis 2, we predicted that teacher collaboration mediated the relationship between teacher-perceived principal leadership and teacher self-efficacy. Given the hierarchical data structure (teachers nested in schools), the group correlation coefficient (ICC) of teacher self-efficacy was 0.10, which was higher than the critical value of 0.059 (Cohen, 1988), we used a multilevel mediation model to analyze the relationship between teacher-perceived principal leadership and teacher self-efficacy at within-group and between-group levels after controlling the covariate variables. Results of this multilevel mediation model investigating the effect of teacher-perceived principal leadership on teacher self-efficacy mediated by teacher collaboration are shown in Table 2. At the within-group level, teacher-perceived principal leadership was significantly related to teacher collaboration (β = 0.169, $p < 0.001$) and teacher self-efficacy (β = 0.231, $p < 0.001$). Further, the relationship between teacher collaboration and teacher self-efficacy was also significant (β = 0.298, $p < 0.001$). The within indirect effect through the teacher collaboration on the relationship between teacher-perceived principal leadership and teacher self-efficacy was significant (β = 0.050, 95% CI [0.035, 0.067], $p < 0.001$). At the between-group level, teacher-perceived principal leadership was significantly related to teacher collaboration (β = 0.207, p

TABLE 2 Coefficients for the multilevel mediation model predicting teacher self-efficacy.

Variables	Estimate	SE
Level 1: Within-teacher level		
Path a1w: TPL → C	0.169***	0.017
Path b1w: TC → TSE	0.298***	0.014
Path c1w: TPL→ TSE	0.231***	0.012
Indirect effect	0.050***	0.007
Residual variance TC	0.587***	0.026
Residual variance TSE	0.295***	0.008
Level 2: Between-teacher level		
Intercept	1.812***	0.326
Path a1b: TPL → C	0.207***	0.060
Path b1b: TC→ TSE	0.569***	0.083
Path c1b: TPL → TSE	0.250***	0.033
Indirect effect	0.118**	0.040
Residual variance TC	0.034***	0.007
Residual variance TPL	0.009***	0.001

**$p < 0.01$, ***$p < 0.001$.

< 0.001), and was also significantly related to teacher self-efficacy (β = 0.250, $p < 0.001$). The relationship between teacher collaboration and teacher self-efficacy was significant (β = 0.569, $p < 0.001$). It indicated that the within indirect effect through teacher collaboration on the relationship between teacher-perceived principal leadership and teacher self-efficacy was significant (β = 0.118, 95% CI [0.015, 0.220], $p < 0.001$).

Multilevel moderated mediation model test

In Hypothesis 3, this study assumed that teachers' teaching experience would mediate the indirect relationship between teacher-perceived principal leadership and teacher self-efficacy. The results of the multilevel moderated mediation model are given in Table 3. At the within-group level, the interaction between teacher-perceived principal leadership and teaching experience on teacher collaboration (β = −0.096, $p < 0.001$) and the interaction between teacher-perceived principal leadership and teaching experience on teacher self-efficacy (β = −0.060, $p < 0.001$) were both statistically significant. The average effect size of moderate tests published in major journals was only0.094 (Aguinis et al., 2005), so the current effect at the within-group level was medium. In addition, at the between-group level, the interaction between teacher-perceived principal leadership and teaching experience on teacher collaboration (β = −1.781, $p < 0.001$) was also significant.

Furthermore, we analyzed the segmented regression between teaching experience and teacher self-efficacy and found that there was a breakpoint (β = 2.214, SE = 0.052). It indicated that with the increase in teachers' teaching experience, there existed a threshold in the development of teacher self-efficacy between 2 and 3 years. We took year 3 as the threshold. The segmented regression model results are presented in Table 4, the slope of piecewise function 1 (β = 0.637, 95% CI [0.510, 0.763], $p < 0.001$) and the slope of piecewise function 2 (β = 0.005, 95% CI [0.003,0.007], $p < 0.001$) were different. We recorded the teaching experience below the threshold as L = 0 and the teaching experience above the threshold as H = 1. Then, we calculated the indirect effect of teacher-perceived principal leadership and teacher self-efficacy = $(a1_i + a3_i * L \text{ or } H) * b1_i$, where, i = within-group level (w) or between-group level (b), L = 0, H = 1.

At the within-group level, to illustrate the moderating effect of teachers' teaching experience on the indirect effects of teacher-perceived principal leadership on teacher self-efficacy through teacher collaboration, we plotted the regression of teacher-perceived principal leadership on teacher self-efficacy

TABLE 3 Coefficients for the multilevel moderated mediation model predicting teacher self-efficacy.

Variables	Estimate	SE
Level 1: Within-teacher level		
Path a1w: TPL → C	0.200***	0.018
Path a2w: TEw → C	0.094***	0.014
Path a3w: TPL*TE → C	−0.096***	0.011
Path b1w: TC → TSE	0.360***	0.016
Path b2w: TC*TE→ TSE	−0.002	0.010
Path c1w: TPL→ TSE	0.332***	0.016
Path c2w: TE→ TSE	0.051***	0.011
Path c3w: TPL*TE→ TSE	−0.060***	0.014
Indirect effect	0.072***	0.009
Residual variance TC	0.827***	0.036
Residual variance TSE	0.630***	0.017
Level 2: Between-teacher level		
Intercept	0.910***	0.297
Path a1b: TPL → C	0.303***	0.055
Path a2b: TEb → C	0.601***	0.155
Path a3b: TPL*TE → C	−1.781***	0.297
Path b1b: TC → TSE	0.744***	0.155
Path b2b: TC*TE→ TSE	−1.608	2.176
Path c1b: TPL→ TSE	0.001	0.475
Path c2b: TE→ TSE	−0.931	0.989
Path c3b: TPL*TE→ TSE	3.884	5.069
Indirect effect	0.225***	0.070
Residual variance TC	0.023***	0.005
Residual variance TSE	0.016***	0.009

***p < 0.001. For brevity, the effects of other background variables (gender, education level, school level, school location) were not presented. Std. Coef., Standardized beta coefficients.

TABLE 4 Coefficients of the segmented regression models.

	Estimate	Std. error	*t*-value	95% CI
β_1	0.637***	0.064	9.89	[0.510, 0.763]
β_2	0.005***	0.001	5.72	[0.003, 0.007]

***p < 0.001.

for teaching experience both below and above the threshold. As shown in Figure 3, the simple slope tests showed that the within indirect effect between teachers-perceived principal leadership and teacher self-efficacy was stronger for teaching experience below the threshold (b_{simple} = 0.072, p < 0.001) than that for above threshold (b_{simple} = 0.037, p < 0.001).

In addition, at the between-group level, we plotted the regression of teacher-perceived principal leadership on teacher self-efficacy for teaching experience below and above thresholds to illustrate the moderating effect of teachers' teaching experience on the indirect effects of teacher-perceived principal leadership on teacher self-efficacy through teacher collaboration. As shown in Figure 4, the simple slope test showed that the indirect between effect between teachers-perceived principal leadership and teacher self-efficacy was stronger for teaching experience below threshold (b_{simple} = 0.225, p < 0.001) than that for above threshold (b_{simple} = −1.100, p < 0.001).

Discussion

The effect of principal leadership on teacher self-efficacy has garnered considerable empirical support (Bellibas and Liu, 2017; Prochazka et al., 2017; Gkolia et al., 2018; Liu and Hallinger, 2018; Salanova et al., 2020). However, few previous studies have examined the mediating effect of teachers' collaboration and moderating effect of years' teaching experience between teacher-perceived principal leadership and teacher self-efficacy separately with a threshold approach. The linear relationship differs with a cut-off value for the number of years of teaching for teachers. In view of the impact of teacher collaboration and teaching experience, it is necessary to understand the driving force of the development of teacher self-efficacy development more comprehensively. This study has developed a multilevel moderated mediating model to examine the indirect relationship between teacher-perceived principal leadership and teacher self-efficacy through teacher collaboration and tested whether this indirect association was moderated by teaching experience. Furthermore, we explored the difference in the indirect effect of teaching experience below and above the threshold. The main contribution of this study was to improve our understanding of how and when teacher-perceived principal leadership was related to teacher self-efficacy. It provided a broad perspective for the intervention and improvement of teacher self-efficacy.

Mediating role of teacher collaboration

As hypothesized, this study confirmed the mediating role of teacher collaboration in the multilevel association between teacher-perceived principal leadership and teacher self-efficacy. According to self-efficacy theory (Bandura, 1986, 1997), teacher professional learning activities affect teacher self-efficacy. Some studies have found that teacher self-efficacy is closely related to teacher collaboration (Chong and Kong, 2012; Liu et al., 2021). Other studies have found that principal leadership is closely related to teacher collaboration (Egodawatte et al., 2011; Vangrieken et al., 2015). However, this study makes a novel contribution by examining the mediating role of teacher collaboration between teacher-perceived principal leadership and teacher self-efficacy. Therefore, teacher collaboration was an important mechanism to connect teacher-perceived principal leadership with teacher self-efficacy. To our knowledge, this study was the first to report such results in Confucian culture. These findings illustrated how modern educational management and teacher collaboration affect the development of teacher self-efficacy. Whether within or between teacher groups, teacher collaboration explained and mediated the impact of teacher-perceived principal leadership on teacher self-efficacy. We noted that the indirect impact of teacher collaboration in the teacher group was not particularly strong in this study. One possible reason is that the impact of teacher collaboration is slow and may reflect longitudinally, which might be not fully reflected in this cross-sectional study. The proportion of important mediators identified in the longitudinal study was actually higher than that in the cross-sectional study (Davies et al., 2016). The relatively small effect also suggested that other important mediating factors, such as teacher–peer relationship, should be examined in future research.

Mastery experiences and vicarious experiences in teaching activities are significant factors impacting the development of teacher self-efficacy (Bandura, 1986). Moreover, collective efficacy belief is "shared beliefs in group capacities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 447). Research conducted in organizations showed that when individuals cooperate, they may share beliefs and attitudes, thus showing similar persuasion and personal standards of conduct (George, 1990, 1996). This study discussed the mediating role of teacher collaboration in the relationship between teacher-perceived principal leadership and teacher self-efficacy. It is

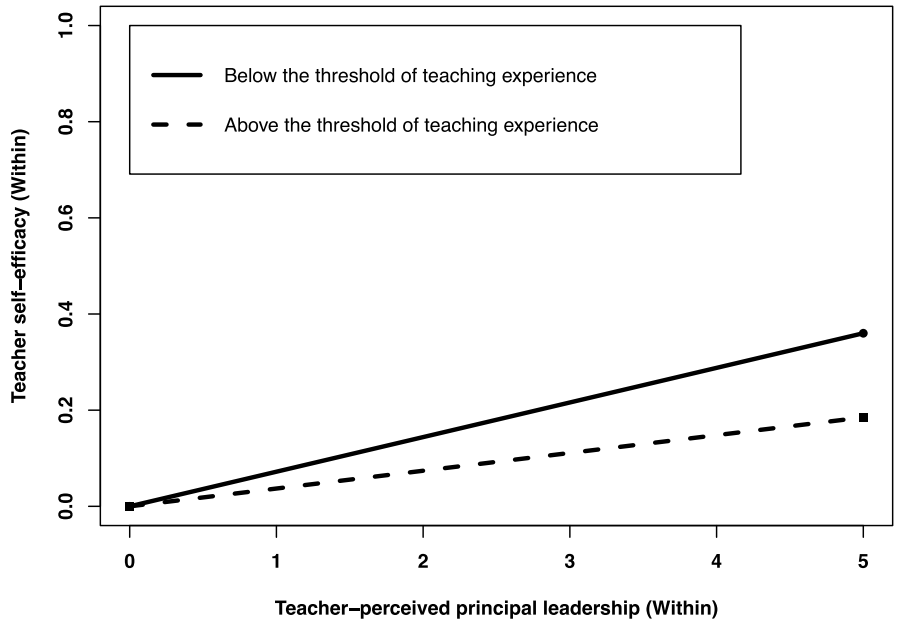

FIGURE 3
Teaching experience as a moderator of the indirect effect between teacher-perceived principal leadership and teacher self-efficacy through teacher collaboration at the within-group level. Functions are graphed for two levels of positive coping: Teaching experience below and above a threshold.

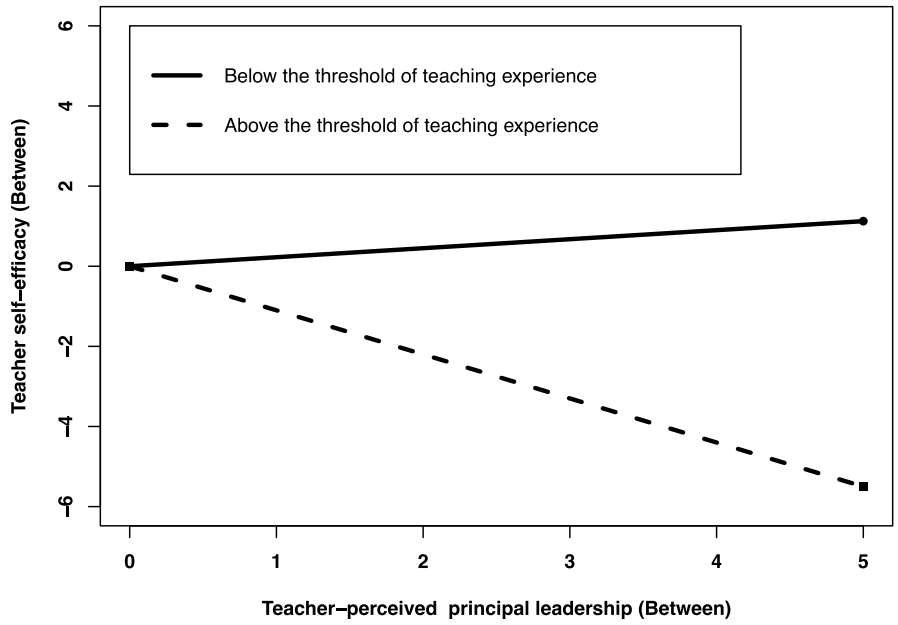

FIGURE 4
Teaching experience as a moderator of the indirect effect between teacher-perceived principal leadership and teacher self-efficacy through teacher collaboration at the between-group level. Functions are graphed for two levels of positive coping: Teaching experience below and above a threshold.

an important extension and complement of the current self-efficacy theory. The current research suggested that school leaders should encourage teachers to participate in teacher collaboration, which can improve teacher self-efficacy and promote their teaching and development (deVries et al., 2013; Coldwell, 2017).

Moderating role of teaching experience

As another important aspect of process-oriented research, Hypothesis 3 assumed that teachers' teaching experience would moderate the direct or indirect relationship between teacher-perceived principal leadership and teacher self-efficacy. The results showed that within the teacher group, teachers' teaching experience moderates the path among teacher-perceived principal leadership, teacher collaboration, and teacher self-efficacy. At the between-group level, teachers' teaching experience moderated the path between teacher-perceived principal leadership and teacher collaboration. Another contribution of this study was to consider the threshold factors of teaching experience and teacher self-efficacy development. This study found that the threshold of teaching effectiveness between novice teachers and experienced teachers is in the 3rd year of teachers' employment, which provides large-scale investigation evidence for the previous studies (Tschannen-Moran and Hoy, 2007; Fantilli and McDougall, 2009).

Specifically, we have found that both within and between groups, the impact of teacher-perceived principal leadership on teacher collaboration was stronger for teachers below the threshold of teaching experience than for those with teaching experience above the threshold. The prediction ability of teaching experience is consistent with previous studies regarding the relationship between years of teaching experience and teacher self-efficacy (Klassen and Chiu, 2010; Lee et al., 2013; Li et al., 2019).

Results of the above model showed that novice teachers whose teaching years were below the threshold were more likely to benefit from self-efficacy renewal, collaborative activities, and reflection. Participation in teacher collaboration can meet the needs of young teachers in improving their practice, such as classroom management (Grangeat and Gray, 2007; deVries et al., 2013). For them, emotional support, information support, positive interaction with tutors, and resource integration are the four key factors affecting their success adjustment and promotion in school (Li et al., 2019). An emphasis has also been on the value of teacher collaboration for experienced teachers, and their self-efficacy is related to more participation in reflective and collaborative activities. They may not be able to experience mastery in update activities, because they have higher abilities and accumulated diversified knowledge to solve potential problems (Eros, 2011; Louws et al., 2017).

Limitations

Several limitations must be considered when interpreting the results of this study. First, the cross-sectional design of this study excludes the test of causality or directionality. Although the current research showed that teacher-perceived principal leadership may improve the development of teacher self-efficacy, the increase of teacher self-efficacy may also improve teacher-perceived principal leadership. Future studies can use experiments or longitudinal designs to clarify the causality of these variables. Second, this study mainly relied on teachers' self-report to collect data. Future research should collect data from multiple insiders (e.g., principals, students, parents, or peers). Finally, the participants in this study were only middle-school teachers in Shandong Province, China, rather than all teachers from different locations. Therefore, caution should be exercised in applying the research results to groups from other cultures. Future research can be conducted in other samples (e.g., a sample of primary school teachers or teachers from other cultural backgrounds) to test the model.

Conclusion

Despite these limitations, results still have important practical significance. First, the results emphasized the importance of principal leadership in the development of teacher self-efficacy and showed that teacher-perceived principal leadership may be directly or indirectly related to teacher self-efficacy. School administrators could improve teachers' participation to enhance teacher self-efficacy through teacher collaboration and communication among teachers. Second, this study found that the threshold for teaching experience regarding the development of teacher self-efficacy is approximately in year 3. Compared with experienced teachers whose teaching experience was above the threshold, novice teachers' participation in teacher collaboration benefited more in the development of teacher self-efficacy. This conclusion reminded educational practitioners to pay more attention to the professional development of novice teachers, and it will be more effective to develop teacher self-efficacy for teachers whose teaching experience is below the threshold of teaching years.

To conclude, this study contributed to the literature by examining a multilevel moderated mediation model, which provided a unique perspective for understanding the relationship between teacher-perceived principal leadership and teacher self-efficacy. It provided evidence that the relationship between teacher-perceived principal leadership and teacher self-efficacy was partly mediated by teacher collaboration. In addition, it showed the existence of a threshold for teaching experience for teacher self-efficacy development. These findings were in an aim to promote the current understanding of the mechanism regarding the relationship between teacher-perceived principal leadership and teacher self-efficacy.

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 from the patients/participants or patients/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

ZX: conceptualization, methodology, formal analysis, funding acquisition, writing – original draft, writing – review and editing, visualization, and validation. RW: conceptualization, writing – review and editing. JL and HL: investigation, data curation, resources, supervision, and project administration. 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.

Publisher's note

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The effect of individual and classroom moral disengagement on antisocial behaviors in Colombian adolescents: A multilevel model

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The present study examined the predictive effect of moral disengagement (within and between classrooms) on antisocial behaviors in Colombian adolescents, as well as the interaction of moral disengagement with classroom composition by age, socioeconomic status (SES), and perceived teacher–student relationship quality. Multilevel modeling was used to identify individual, compositional, and contextual effects on antisocial behaviors. The predictive variables were: (a) classroom mean score (i.e., between-classroom analysis), and (b) student deviation from the classroom mean score (i.e., within-classroom analysis). The sample included 879 students nested in 24 seventh-grade classrooms in three Colombian cities. The results showed that age, SES, and moral disengagement at the within-classroom level predicted antisocial behaviors. At the between-classroom level, antisocial behaviors were predicted by higher moral disengagement and lower aggregate SES. In addition, significant interactions were found between moral disengagement at the within-classroom level and SES at the between-classroom level. The findings expand our knowledge of the interdependence between individual and classroom contexts in the exercise of moral agency during adolescence.

KEYWORDS

antisocial behaviors, moral disengagement, classroom composition, contextual effects, multilevel

Introduction

Adolescence is a developmental period characterized by greater independence from parents and higher peer influence. It is also a period in which antisocial behaviors are explored. Antisocial behaviors refer to behaviors that violate social norms and rules, challenge authority, and break social conventions; in many cases, they are also illegal. Due to the negative consequences of these behaviors for individuals and society, many researchers have dedicated significant effort to identifying predictors and explanatory models to prevent and limit their occurrence (Manrique-Millones et al., 2021).

There is a wide body of criminological, sociological, and psychological research on antisocial behaviors in adolescence (Curtis, 2015). Several meta-analyses have accounted for a variety of predictors and explanatory models for such behaviors (e.g., Serketich and Dumas, 1996; Ogilvie et al., 2011; Malti and Krettenauer, 2013; Braga et al., 2018). However, as evidenced by Yousefi-Nooraie et al. (2006) and Plancikova et al. (2021), most studies have considered samples from English-speaking and high-income countries, despite the fact that 80% of the world's population lives in low- and middle-income countries with high rates of crime and violence.

The present study examined determinants of antisocial behaviors in a sample of Colombian adolescents, thus contributing to the literature on low- and middle-income countries. As recently reported (Institute for Economics and Peace, 2022), Colombia ranks 143rd out of 163 countries in the Global Peace Index. In fact, Colombia is a country with a long history of violence due conflict between the Colombian Government and illegal armed groups. Many Colombian children and adolescents are raised amidst and otherwise exposed to violent and transgressive behavior, and although the country is currently in a state of peace (recently inaugurated by the government), more empirical studies are needed to provide insight into the psycho-social processes involved in the development of antisocial behaviors in adolescents, which may still apply to many Colombian youth.

The study adopted Bandura's (1986) socio-cognitive model, which holds that aggressive and antisocial behaviors are determined by a reciprocal interplay between contextual, personal, and behavioral factors. In particular, it focused on mechanisms of moral disengagement that operate at both an individual and a contextual level. Unlike ethical theories that focus on moral reasoning as a direct generator of moral behavior, Bandura's theory focuses on self-regulatory mechanisms in the exercise of moral agency. Most of the time, individuals are knowledgeable about the negative consequences of their wrongdoing and possess moral principles that condemn norm violations and antisocial behaviors. However, as Bandura (2002, p. 102) reported, "the self-regulation of morality is not entirely an intrapsychic matter as rationalist theories might lead one to believe. People do not operate as autonomous moral agents impervious to the social realities in which they are enmeshed."

Adolescence is a developmental period in which youth increase their use of abstract reasoning and adopt moral principles and personal standards to account for their behaviors. However, while adolescents may generally refrain from violating their moral standards to avoid self-condemnation, they may still commit antisocial actions by justifying their wrongdoing. Thus, adolescents' enactment of antisocial behaviors may result from their incapacity to self-regulate their moral behaviors. In this vein, Bandura et al. (1996) proposed that cognitive mechanisms of moral disengagement represent active maneuvers to defuse internal moral sanctions (e.g., guilt) and allow for antisocial behaviors, despite established moral principles (Bandura, 2016).

As a result of interactive, coordinative, and synergistic group dynamics, moral disengagement may also be activated at a collective level (Bandura, 2002; White et al., 2009; Zimbardo, 2011). In recent years, studies focused on bullying behaviors have highlighted the importance of the classroom context (in which adolescents spend several hours a day interacting with peers of the same age), and particularly classroom moral disengagement (e.g., Gini et al., 2014; Bjärehed et al., 2021). The present study aimed at expanding the knowledge base on the relationship between moral disengagement and antisocial behaviors at both individual and classroom levels.

Individual and classroom moral disengagement and antisocial behaviors

Social cognitive theory (Bandura, 1986), which focuses on aggressive and antisocial conduct, highlights the role of moral disengagement in either activating or disengaging from moral self-sanction. Mechanisms of moral disengagement operate individually and collectively according to three sets of self-regulatory practices. The first set of practices is comprised of moral justification, euphemistic labeling, and advantageous comparison. These practices have the effect of substantially redefining a reprehensible action. Through moral justification, individuals appeal to a desired outcome (i.e., "the ends justify the means") to overshadow the reprehensibility of their conduct. Through euphemistic labeling, they misdescribe their actions to mitigate the severity of the effects. And through advantageous comparison, they again diminish the severity of their offenses by comparing their conduct with more serious and reprehensible actions committed by others.

The second set of practices is comprised of distortion of responsibility, diffusion of responsibility, and distortion of consequence. These practices aim at deforming the relationship between the cause and the effect of a reprehensible action. Through distortion of responsibility, individuals appeal to the fault of others to alleviate the blame placed on themselves.

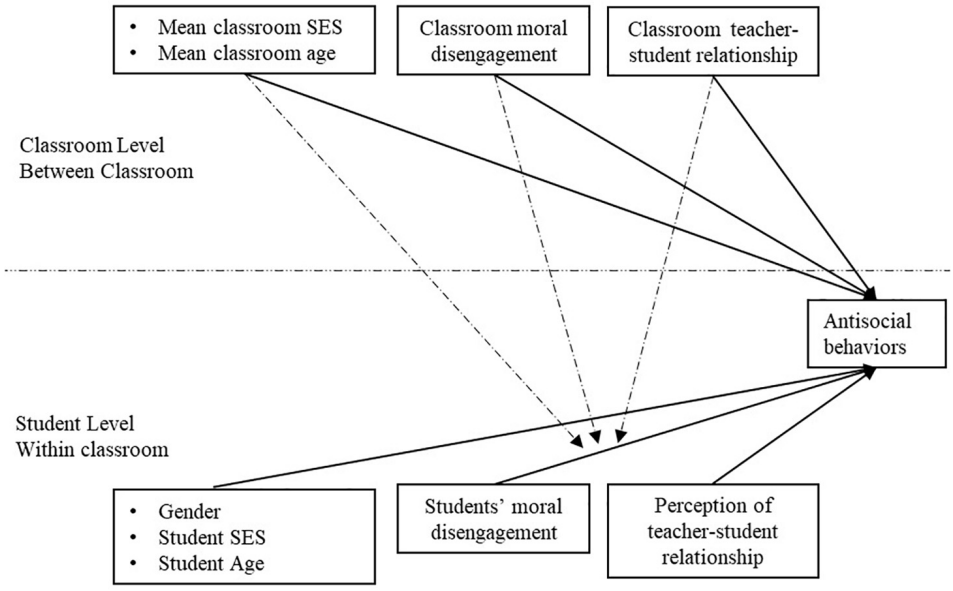

FIGURE 1
Hypothesized cross-level interaction between moral disengagement within and compositional classroom predictors on antisocial behaviors.

Through diffusion of responsibility, they exempt all others from imputability. And through the distortion of consequences, they minimize or ignore the seriousness of the consequences of their conduct.

Finally, the third set of practices is comprised of the attribution of blame (i.e., "victim blaming") and dehumanization. These practices involve a reconsideration of the victim. Through the attribution of blame, individuals attest that the offense they caused to another was fully deserved. And through dehumanization, they degrade the victim to a lower object or species and thereby perceive and treat them as a target of offense with no empathic or identifying concern (Bandura et al., 1996; Bandura, 2002; Caprara et al., 2006).

Research has confirmed the predictive and mediating role of moral disengagement on various transgressive behaviors. For example, moral disengagement has been associated with a higher probability of alcohol consumption (Newton et al., 2012), aggressive behavior (Bandura et al., 1996; Gini et al., 2014), bullying (Killer et al., 2019; Bjärehed et al., 2021), and cyberbullying (Bjärehed, 2021; Thornberg et al., 2021). Regarding antisocial behavior, studies have shown that adolescents with high moral disengagement manifest more problem behaviors (Yang and Wang, 2012). In addition, a meta-analysis showed that the effect of moral disengagement on antisocial behaviors increases in line with the severity of the action (Férriz-Romeral et al., 2019). Longitudinal studies have shown that, in most youths (89%), levels of moral disengagement are relatively high in early adolescence and decrease with age into early adulthood (Paciello et al., 2008). Furthermore, some studies have shown that a decrease/increase in moral disengagement contributes to a decrease/increase in antisocial behaviors in the transition to adulthood (Bandura et al., 2001; Shulman et al., 2011).

Moral disengagement has also been studied as a mediator in cross-sectional and longitudinal studies to explain the relationship between school and family factors and antisocial behaviors. Specifically, the mediating effects of moral disengagement have been observed in the relationship between peer rejection in middle adolescence and adult delinquency (Fontaine et al., 2014); a positive perception of the school climate and antisocial behaviors (Zhang et al., 2020); parental monitoring (but only with the most collaborative strategies) and school climate with respect to cyberbullying (Bartolo et al., 2019); positive parenting and child antisocial behaviors (Pelton et al., 2004); and secure parental attachment and child antisocial behaviors (Bao et al., 2015).

Classroom composition and antisocial behaviors

Some studies (Vitoroulis et al., 2016; Alivernini et al., 2019; Rambaran et al., 2020) have explored the effect of classroom composition on adolescents' transgressive behaviors. In particular, research has shown that classrooms with more students (Finn et al., 2003), lower academic performance (Junger-Tas et al., 2009), and a lower median income (Westphal et al., 2016) have more student antisocial behaviors. Most studies in this area have explored school-related behaviors in the educational context (e.g., school bullying).

TABLE 1 Descriptive statistics and correlation for study variables.

Variables	% or *M* (*SD*)	1	2	3	4	5	6	7	8	9
Outcome variable										
1. Antisocial behaviors (multi-informant)	0.29 (0.26)									
Variables										
2. Gender[a]	55.6%	0.056								
3. Age	12.72 (1.03)	0.253**	−0.003							
4. SES[b]	0.44 (0.50)	−0.087*	0.054	−0.009						
5. Moral disengagement	2.01 (0.61)	0.365**	0.225**	0.138**	−0.031					
6. Teacher-student relation	3.13 (0.86)	−0.108**	−0.047	−0.044	−0.044	−0.133**				
Transformed variables										
7. Age classroom (mean aggregate)	12.72 (0.32)	0.218**	−0.058	0.305**	−0.071	0.045	−0.126**			
8. SES classroom (mean aggregate)	0.43 (0.16)	−0.121**	0.006	−0.077*	0.311**	−0.284**	0.032	−0.269**		
9. Moral disengagement (mean aggregate)	2.03 (25)	0.150**	0.013	0.048	−0.219**	0.399**	−0.054	0.174**	−0.741**	
10. Teacher-student relation (mean aggregate)	3.13 (24)	−0.181**	0.087*	−0.136**	0.035	−0.070*	0.286**	−0.443**	0.117**	−0.187**

[a]boy = 1, girl = 0; [b]Middle = 1, Low = 0.
*$p < 0.05$ and **$p < 0.01$.

However, as suggested by Müller et al. (2016), the effects of classroom composition on adolescent aggressive and antisocial behaviors should be explored more widely, to expand our understanding of the predictive value of classroom composition on (especially) severe antisocial problems. Also, in considering the class context, we considered the quality of teacher-student relationship. As part of the classroom climate, the protective function of teacher-student relationships on antisocial behavior has been pointed out. Students who feel supported and close to their teachers give importance to the expectations of their teachers not to transgress and to contrast the expression of aggressive and antisocial behaviors (Cunningham, 2008).

Longitudinal studies have shown that students who report better relationships with their teachers at age 10 engage in fewer criminal acts at ages 13, 15, and 17 (Obsuth et al., 2021). On the contrary, stressful classroom environments, with other conflicts between teachers and students and lack of teacher support, contribute to mental health problems, school failure, and antisocial behavior (Roslyne Wilkinson and Jones Bartoli, 2021).

Finally, during early adolescence, there is a significant influence of peers on antisocial behaviors (e.g., Kaplan et al., 1987; Dishion and Patterson, 2016). Peer behavior also contributes to establishing classroom dynamics, which may have a further effect on antisocial behaviors (Müller et al., 2016). The nesting of individual student characteristics could explain the variability in individual student behaviors. Individuals who belong to a group (e.g., a classroom) tend to be interdependent, whereby the behavior of one group member influences the group's behavior either directly, through interaction with others (i.e., within-classroom level), or indirectly, by contributing to the formation of a group environment that influences each member of the group (i.e., between-classroom level) (Feaster et al., 2011). The influence of classroom composition, represented by the average of individual characteristics, can be explained by Cialdini et al.'s (1990) concept of the *descriptive norm*. A descriptive norm refers to a belief about what most others in a social group actually do. Unlike prescriptive norms, which are beliefs about what should be done, descriptive norms do not typically imply social sanctions for non-compliance with the norm.

The present study

The present study aimed at examining the predictive role of moral disengagement (both within and between classrooms) on antisocial behaviors in Colombian adolescents, and the interaction of moral disengagement with classroom composition by age, SES, and perceived teacher–student relationship quality. More specifically, the study analyzed: (a) the degree of variance in antisocial behaviors explained by classroom composition; (b) the predictive effect of students'

TABLE 2 Multilevel estimates for models predicting student antisocial behaviors.

Effect	Student antisocial behaviors					
	Model 1. unconditional	Model 2. within classroom	Model 3. reduced	Model 4. between classroom	Model 5. cross level interaction	Model 6. final model
Fixed effects						
Intercept	0.284 (0.02)***	0.248 (0.03)***	0.268 (0.02)***	−1.53 (0.60)*	−1.54 (0.57)*	−2.10 (0.47)***
City (dummy variables)						
SMT vs. MED MAZ		0.014 (0.04)				
MED vs. SMT MAZ		0.050 (0.04)				
Student variables						
Gender (1 = boy)		−0.001 (0.02)				
Age (Age_cwc)		0.031 (0.01)***	0.031 (0.01)***	0.031 (0.01)***	0.030 (0.01)***	0.030 (0.01)***
SES (SES_cwc)[1]		−0.043 (0.02)*	−0.039 (0.01)*	−0.039 (0.02)*	−0.040 (0.02)*	−0.040 (0.02) *
Moral disengagement (MD_cwc)		0.135 (0.02)***	0.132 (0.01)***	0.131 (0.01)***	−1.91 (0.8)*	−1.88 (0.57)**
Teacher-student relation (TSR_cwc)		−0.011 (0.01)				
Classroom variables						
Age classroom (Age_mean)				0.137 (0.04)**	0.139 (0.04)**	0.162 (0.03)***
SES classroom (SES_mean)				0.026 (0.09)	0.029 (0.09)	0.043 (0.09)
Moral disengagement (MD_mean)				0.126 (0.06)*	0.126 (0.06)*	0.140 (0.06)*
Teacher−student relation (TSR_mean)				−0.065 (0.05)	−0.066 (0.04)	
Cross-level interaction						
MD_mean*MD_cwc					0.077 (0.09)	
SES_mean*MD_cwc					0.315 (0.14)*	0.225 (0.04)*
Age_mean*MD_cwc					0.147 (0.05)**	0.151 (0.04)**
TSR_mean*MD_cwc					−0.037 (0.06)	
Random effects						
Student level variance	0.064 (0.003)***	0.043 (0.002)***	0.043 (0.002)***	0.042 (0.002)***	0.040 (0.002)***	0.042 (0.002)***
Classroom level variance	0.005 (0.002)*	0.004 (0.002)*	0.005 (0.002)*	0.0008 (0.0006)	0.0009 (0.0007)	0.0009 (0.0007)
ICC	0.067					
Model deviance						
−2*Log likelihood	110.366 (3)	−181.33 (10)	−192.04 (6)	−214.55 (10)	−229.84 (14)	−226.15 (11)
χ^2 test		291.69***	10.71*	22.51***	15.28**	3.69
Within-classroom R^2		0.331	0.336	0.356	0.349	0.375
Between-classroom R^2		0.137	0.011	0.823	0.837	0.739

SMT, Santa Marta city; MED, Medellin city; MAZ, Manizales city; SES, Socioeconomic status (Middle = 1, Low = 0).
*$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$.

moral disengagement within classrooms on antisocial behavior; (c) the predictive effect of between-classroom differences in moral disengagement on students' antisocial behaviors; and (d) the moderating effect of classroom composition by age, SES, and perceived teacher–student relationship quality on the relationship between moral disengagement and antisocial behaviors (see Figure 1).

On the basis of social cognitive theory and the literature, it was expected that moral disengagement at the individual and classroom levels would be associated with more frequent antisocial behaviors. It was also expected that classroom climates perceived as positive would reduce the effect of moral disengagement on antisocial behaviors and, on the contrary, classrooms composed of older students and students with a lower socio-economic status (SES) would increase the impact of moral disengagement on antisocial behaviors.

Materials and methods

Data and analytic sample

The sample included 879 seventh-grade students in 24 classrooms across three Colombian cities (M = 12.7 years; SD = 1.03; 55.6% boys), and their parents (N = 734). Recruitment proceeded according to the following steps:

(1) four public schools were identified in each city that agreed to participate in the project; (2) in each school, two seventh-grade classes were randomly selected; and (3) students from each of the selected classes who voluntarily agreed to participate and whose parents gave their consent were enrolled in the study. No exclusion criteria were established for age, sex, or SES.

Procedure

All study data were collected within the CEPIDEA project (i.e., "Promotion of Prosocial Behaviors and Emotional Regulation Competencies in Adolescence"), which was conducted in 2015–2016 in three Colombian cities. The project was submitted for ethical review at the Universidad del Magdalena, the Universidad San Buenaventura, and the Universidad de Manizales. The participation of all schools, students, and parents was voluntary. Prior to the data collection, informed consent was obtained from the students' parents, according to the Colombian regulations for the participation of minors in investigations. Subsequently, the questionnaires were administered in the classrooms by three research assistants, who provided the necessary guidance and were available to answer any questions. Participants' identifying data were replaced with codes to maintain confidentiality.

Measures

Outcome (antisocial behavior)

The outcome variable of antisocial behaviors was measured using eight items from the parent-report Child Behavior Checklist (CBCL; Achenbach and Rescorla, 2001) and eight identical items from the self-report version of this form (YSR). Means of the matched items were used to calculate a score for antisocial behaviors. The selected items measured antisocial behaviors such as theft, cheating, lying, destructiveness, and truancy. Responses ranged from 0 (*not true*) to 2 (*very true*). Cronbach's alpha was 0.67 for the CBCL and 0.72 for the YSR.

Predictors

Two predictor variables were used: (1) student deviation from the classroom mean (i.e., Level 1, within-classroom) and (2) classroom mean scores (i.e., Level 2, between-classroom).

Level 1 variables

Predictor variables at the student (i.e., within-classroom, individual) level included demographic factors (i.e., gender, age, SES), moral disengagement, and teacher–student relationship quality. Gender was a dichotomous variable coded as 1 for boys and 0 for girls. SES was evaluated according to the classification established in Law 142 of 1994 of Colombia; the variable was coded as 0 for low SES and 1 for medium SES.

The Moral Disengagement Scale (Bandura et al., 1996) was used as a measure of moral disengagement. The 32 items on this scale assess the degree to which adolescents resort to mechanisms (i.e., moral justification; palliative comparison; euphemistic labeling; minimizing, ignoring, or misconstruing consequences; displacement; diffusion of responsibility; dehumanization; attribution of blame) to selectively disengage from moral self-regulation of their harmful behaviors (e.g., "It is okay to tell small lies because they don't really do any harm"). Responses ranged from 1 (*don't agree at all*) to 5 (*totally agree*). In the present study, Cronbach's alpha for this scale was 0.90.

Quality of the student–teaching relationship was also included as a predictor at this level. For this, four items from the Comer School Development Program (Cook et al., 1999) were used as a measure (e.g., "How many teachers listen to the students' proposals with pleasure?").

Level 2 variables

All classroom variables (i.e., mean SES, mean age, mean moral disengagement, mean teacher–student relationship quality) were constructed from aggregate student data.

Data analysis

Several scholars have emphasized the importance of using multilevel models to examine the influence of the school context on antisocial behaviors (Gottfredson, 2001; Müller et al., 2016). Accordingly, the present study used a multilevel random intercept model to explore individual and contextual effects on antisocial behaviors. The complete multilevel random intercept model was executed in three steps. In the first step, an unconditional mean model (Model 1) was used to determine the intraclass correlation coefficient (ICC), indicating the variance in antisocial behaviors explained by the grouping structure (i.e., classrooms). The second step employed a hierarchical linear model that initially added within-classroom predictors (Model 2) and subsequently added classroom-level predictors (Model 4). The hypothesized interaction effects (see **Figure 1**) were then estimated (Model 5). The third and final step involved the estimation of a reduced model with a backward elimination of predictors and non-significant interactions to ease model interpretation (Model 6). According to Heck and Thomas (2009), for predictive studies (i.e., the present study), variables can be retained in a model only when they are statistically significant.

All hierarchical linear model analyses were estimated with the maximum likelihood method, using SPSS version 25 statistical software. Deviation (-2^*Log Likelihood) and explained variance (Pseudo R^2) were

used to evaluate model fit, with lower significant deviation and higher explained variance considered indicative of better model fit. In addition, the likelihood-ratio chi-square test (χ^2 test) was used to evaluate the significance of the difference in model fit between subsequent models.

Results

Descriptive statistics

Table 1 presents the descriptive statistics and correlation analysis of the observed and transformed variables at the classroom level. The mean for delinquent behavior was0.29 (min = 0, max = 2). Of note, 55.6% of the sample were boys, and students' mean age was 12.72 years. Antisocial behaviors (according to both the CBCL and the YSR) were positively associated with age and moral disengagement, as well as with classrooms' mean age and mean moral disengagement. On the contrary, antisocial behaviors were negatively associated with students' SES, teacher–student relationship quality at the student level, classroom mean SES, and teacher–student relationship quality at the classroom level.

Unconditional mean model

An unconditional mean model was estimated to calculate ICC. Table 2 (Model 1) shows that the intercept was estimated at0.284, representing the level of antisocial behaviors across the 24 classrooms. The ICC for antisocial behaviors was 0.067 [ICC = 0.005/(0.005 + 0.064)], describing that 6.7% of the variance in antisocial behaviors was between classrooms. The deviation (−2LL) of the unconditional model was 110.366.

Multilevel analysis

Within-classroom level

At the within-classroom level, the predictive effect of moral disengagement on antisocial behaviors was modeled, while controlling for the effects of sites (i.e., cities), gender, age, SES, and teacher–student relationship quality. As shown in Table 2 (Model 2), a significant positive association was found between moral disengagement (within-classroom level) and antisocial behaviors. Regarding the control variables, antisocial behaviors were positively associated with age and negatively associated with SES and teacher–student relationship quality. Gender and sites were not significantly associated with antisocial behaviors; therefore, a reduced model was run without these variables (see Model 3). The reduced model showed lower deviance (−2*LL) than the unconditional model, and the difference in fit between Model 2 and the reduced Model (3) was not statistically significant. The reduced model explained 33.6% of the variance in antisocial behaviors within the classroom.

Between-classroom level

At the between-classroom level, the effect of moral disengagement on antisocial behaviors was tested while controlling for individual predictors and covariates at the classroom level (i.e., age, SES, teacher–student relationship quality). As Table 2 (Model 4) shows, a significant positive association was found between moral disengagement (mean classroom) and antisocial behaviors. Regarding the control variables (i.e., classroom level), antisocial behaviors were positively associated with age (mean classroom). SES (mean classroom) and student–teacher relationship quality (mean classroom) were not significantly associated with antisocial behaviors. This model showed a lower deviation (−2* LL) than Model 3, and the difference in fit between the two models was statistically significant. Model 4 explained 35.6% of the variance in antisocial behaviors within the classroom and 82.3% between classrooms.

Interplay between within-classroom and between-classroom predictors

Table 2 (Model 5) shows the interaction effects of moral disengagement (individual level) with moral disengagement (classroom level), age (classroom level), SES (classroom level), and teacher–student relationship quality (classroom level). A significant interaction of age (classroom level) was found between moral disengagement (individual level) and antisocial behaviors, whereby students with higher moral disengagement in classrooms with a higher mean age showed more delinquent behaviors (see Figure 2). A significant SES interaction was also found between moral disengagement (individual level) and antisocial behaviors, whereby students with high moral disengagement in classrooms with a lower SES showed more antisocial behaviors (see Figure 3). The final model (Model 6) explained 37.5% of the variance in antisocial behaviors within the classroom and 73.9% between classrooms.

Discussion

The present study explored the predictive role of moral disengagement (both within and between classrooms) on antisocial behaviors in Colombian adolescents, and the interaction of moral disengagement with classroom composition by age, SES, and perceived teacher–student relationship quality. Bivariate analyses showed that student

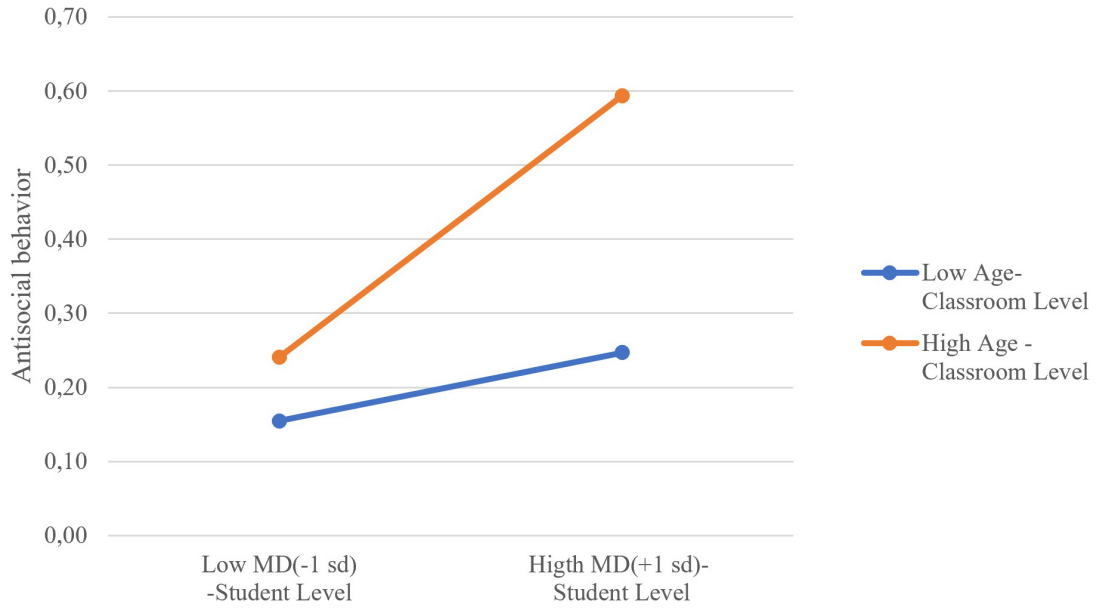

FIGURE 2
Cross-level interaction effect of individual moral disengagement with classroom mean age on antisocial behaviors.

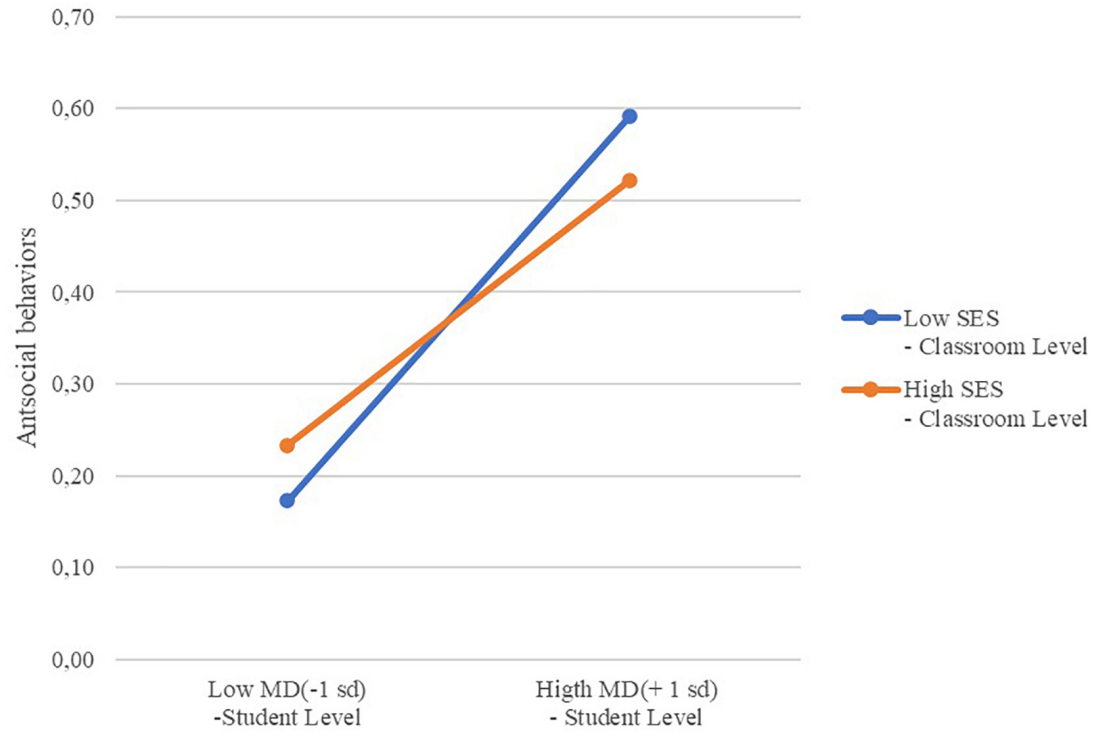

FIGURE 3
Cross-level interaction effect of individual moral disengagement with classroom means SES on antisocial behavior.

antisocial behaviors were positively associated with age and moral disengagement and negatively associated with SES and teacher–student relationship quality. In other words, students with high moral disengagement, older age, and lower SES who perceived a poor teacher–student relationship quality showed more antisocial behavior. These results are consistent with the findings of prior studies that have identified moral disengagement (e.g., Yang and Wang, 2012; Gini et al., 2014; Férriz-Romeral et al., 2019), SES (e.g., Guerra, 2018; Khaliq and Rasool, 2020), and age (e.g., Wissink et al., 2014) as risk factors, as well as teacher–student relationship quality (Roslyne Wilkinson and Jones Bartoli, 2021) as a protective factor for adolescents' transgressive behaviors.

Multilevel modeling showed that moral disengagement predicted antisocial behaviors at both individual (i.e., within-classroom) and classroom (i.e., between-classroom) levels, while controlling for the effect of age, SES, and teacher–student relationship quality. In other words, students with high moral disengagement, nested in classrooms with high moral disengagement, showed high antisocial behaviors. These findings align with the results of recent multilevel studies that have analyzed moral disengagement at the individual and classroom levels as a predictor of bullying and cyberbullying behaviors (Gini et al., 2015; Bjärehed, 2021; Bjärehed et al., 2021; Thornberg et al., 2021).

Regarding compositional effects, an association was found between student age and antisocial behaviors at both individual and classroom levels. Thus, students who were older than their classmates and who belonged to a classroom with older students were more likely to engage in high antisocial behavior. Considering that all of the participating students were in the same academic grade, older students may have had a history of academic failure or a period of school dropout. According to the literature (Patterson et al., 1989; McEvoy and Welker, 2000), academic failure plays a significant role in escalating antisocial behaviors, through affiliation with deviant peers. School dropout has also been shown to be associated with peer rejection and antisocial behaviors (French and Conrad, 2001; Gubbels et al., 2019).

Cross-level interaction analyses showed a significant interaction between age at the classroom level and individual moral disengagement in predicting antisocial behaviors, whereby the relationship between moral disengagement and antisocial behaviors was stronger in classrooms with an older mean age than those with a lower mean age.

Although the bivariate analyses showed a significant correlation between teacher–student relationship quality and antisocial behavior, this association was not significant when the variable was factored within and between classrooms, and moral disengagement, gender, and SES were included as covariates. It is possible that the moral disengagement effect suppressed the effect of teacher–student relationship quality. In this vein, a previous study found that moral disengagement mediated the relationship between school climate and cyberbullying (Wang et al., 2021).

These findings expand our knowledge of the interdependence between individuals and the classroom in the exercise of moral agency during adolescence.

Limitations and recommendations for future research

Despite several strengths of the present study (e.g., a relatively large sample size, multi-informant data), some limitations should also be considered. First, the sample size at the classroom level was relatively small, since it did not meet the 30/30 rule discussed by Bickel (2007). This may have generated bias in the estimation of variance components, as some simulation studies have documented (Maas and Hox, 2005). Therefore, the models tested here should be replicated with a larger number of students in each classroom.

Second, the study was based on correlational data, which did not allow for causal inferences to be drawn. Therefore, future studies may benefit from experimental designs or instrumental variable approaches that are capable of identifying causal effects.

Finally, some classroom factors, such as the number of students and the type of establishment (e.g., private or public), should be considered in future research analyzing classroom composition in Latin American contexts, which are characterized by unequal educational systems.

Conclusion

The present results highlight the role of moral disengagement, measured at the individual and classroom levels, as a predictor of students' antisocial behavior in adolescence. Students with higher levels of moral disconnection and students from more disengaged classes were found to engage in more antisocial behaviors.

Regarding the influence of the classroom context on student behavior, a significant effect of age and SES at the classroom level was found in the relationship between moral disengagement and antisocial behaviors. In classrooms composed of older students with a lower SES, the effect of the relationship between moral disengagement and antisocial behaviors was amplified.

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 Ethics Committee of the Universidad del Magdalena, Universidad de Manizales, and Universidad San Buenaventura- Medellin. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

MGP: investigation, data curation, formal analysis, and writing—original draft. FL: conceptualization and supervision. CP: conceptualization, supervision, and writing—review and editing. CPB, MN, and LU: investigation, data curation, and validation. BL: conceptualization, investigation, and validation. MRG: validation and data curation. AZ: methodology and formal analysis. FC: methodology and data curation. GT: investigation and validation. MG: conceptualization. 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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Self- vs. External-Regulation Behavior Scale™ in different psychological contexts: A validation study

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The *self- vs. external-regulation behavior theory*, SR-ER Theory (2021) model has postulated the Self-Regulation /Non or De-Regulation/Dys-regulation (SR-NR-DR) continuum in the person and in their context. The model also generates a behavioral heuristic that allows us to predict and explain the variability of other dependent behavioral variables in a range of scenarios (clinical, educational, health and technology contexts). Consequently, the objective of this study was to validate the different scales prepared on the basis of the theory presented. A total of 469 students voluntarily completed at different times the five questionnaires presented, to give a total of 1,385 completed questionnaires. Using an *ex post facto* design, descriptive, correlational, confirmatory factorial analysis (CFA), reliability, and concurrent validity analyses were carried out. The scales were analyzed individually and as a whole. The results showed the acceptable structure of scale and consistent levels of reliability. The five levels generated by the SR-NR-DR (personal and contextual) combinatory heuristic that arises from the theoretical model determined significant differences in the levels of the variables analyzed for each psychological context. We discuss the theoretical implications and the implications for the assessment and improvement of the behaviors analyzed in function of the personal and contextual regulation levels evaluated.

KEYWORDS

self-regulated behavior/context, non-regulated behavior/context, dys-regulated behavior/context, validation, self- vs. external-regulation theory

Introduction

Classical theoretical psychological models of human self-regulatory behavior (*Self-Regulation, SR*) have been fertile ground for work on defining, conceptualizing, evaluating, and creating strategies to improve self-regulation (Carver and Scheier, 1981; Mischel, 1981). From the seminal work of Bandura (1991) in his Social Cognitive Theory in which

he described the construct of Self-Regulation until today there has been an avalanche of research. Searching for the term *self-regulation* in Google Scholar produced 1.95 million articles, an indication of the level of research interest in this area of study. Further, a search for *self-regulation and health* yielded 1.45 million articles and another for *self-regulation and education* gave 1.44 million articles.

There is copious support from both research findings and theoretical works for the importance of self-regulation as a psychological construct and the need to measure self-regulation (Pandey et al., 2018; Solé-Ferrer et al., 2019). Work in classical self-regulation theory has thus far focused on determining the contribution of self-regulation to the variability of studied behaviors. However, like other concepts in Psychology, the concept of self-regulation behavior is continuously developing as researchers endeavor to explain and better adapt to the reality studied. Our research group identified that this research approach left out of account psychological phenomena whose relationship with different levels or types of self-regulation has been insufficiently considered and did not adequately explore the extent to which context is predictive of self-regulatory behavior. That realization raised a number of questions that gave rise to this line of research (new theory of Self-Regulatory Behavior). Does self-regulatory behavior carry with it different meanings or levels that have not thus far been sufficiently examined? Can self-regulation be seen as a characteristic of the subject alone? Alternatively, should we also assume that context (depending on its nature) can promote or not promote self-regulation and may operate in the same way in terms of predicting such behavior? These open questions, raised by our research team, gave rise to the new theoretical model that supports this work (de la Fuente et al., 2022a). Finally, we concluded that it was necessary to create the new scales presented here. For this reason, the objectives of this manuscript are two: (1) to synthetically show the underlying theoretical construct; there are other recent works that do it more precisely (de la Fuente et al., 2022a), (2) present the structure and initial validation process of the Scales that allow it to be evaluated.

The *classical theory* of self-regulation

Self-Regulation (SR) is a construct of personality (Mithaug, 1993; Boekaerts et al., 1999; Hoyle, 2010) that describes the capacity of people to exercise planning, monitoring, and evaluation of their own behavior (Karoly, 1993; Brown, 1998; Vohs and Baumeister, 2016; Koopmann et al., 2019; Robson et al., 2020). The abundant prior research has shown SR's positive association with factors such as personal adjustment (Mithaug, 1993; Wrosch et al., 2003) and its associations with aspects of personality: positive with conscientiousness and negative with neuroticism (Guido et al., 2015; de la Fuente et al., 2020b). An association has also been shown with behavioral adjustment in academic performance (Becker et al., 2014; Blair and Raver, 2015; Akfırat et al., 2016; Panadero, 2017; Bernardo et al., 2019; Alonso-Tapia et al., 2020). The classical understanding of the construct can be found in the work of Pervin (1988). Early notions of SR, based as they were on a molecular psychological analysis (de la Fuente et al., 2020b), had three common *principles*:

1. SR is a variable of the subject and is determined by other variables or factors particular to the subject, such as aspects of personality and metacognition (Hoyle, 2010; Malanchini et al., 2019; Jacqueline et al., 2020; Valikhani et al., 2020; Vega et al., 2020).
2. Contextual factors are of secondary importance and do not have a significant role in explaining the variability of behavioral regulation in the individual or its level, either in general or specifically in relation to education and health.
3. Individuals have higher or lower levels of SR; there are no defined categories of SR, merely degrees of SR.

The *new vision* of self-regulated vs. externally regulated behavior theory (SR–ER)

This *Self- vs. External- Regulated Behavior Theory*, or *SR vs ER Theory* model (de la Fuente, 2021b; de la Fuente et al., 2022a) has emerged to specify and expand the previous explanatory model, based exclusively on Self-Regulation (SR) variable (for a review, focused on the Educational Psychology context, please, see: de la Fuente, 2017). Through a molar analysis, this new model seeks to analyze the interaction between the regulatory characteristics of the person and the regulatory characteristics of their context (de la Fuente et al., 2020a). The SR-ER model is based on three *principles and hypothesis*:

Principle and Hypothesis 1: Types of Behavioral Regulation. Self-Regulation is a personal variable, which can be gradual, that is, levels or typologies can be established:

1. *Self-Regulation Behavior Type* (SR): It is the action of self-regulation (planning, self-control, and self-assessment) or internal regulation of the three levels of behavior: thoughts, emotions, and actions. It is considered an adaptative and positively proactive behavioral level (SR = +1).
2. *Non-Regulation or De-regulation Behavior Type* (NR): It can be considered as the action of ceasing to regulate or moving to a behavioral state of non-regulation of thoughts, emotions, and actions. It is considered a reactive or neutral behavioral level in positive and negative proactivity (SR = 0).
3. *Dys-Regulation Behavior Type* (DR): It refers to being unable to control behavior (thoughts, emotions, actions) in the way most people can. Before a situation. It supposes an excessive level of response (hyper-response or behavioral excesses) or negligible (under-response or behavioral deficits) that would characterize this type of behavior level. It is considered an adaptative and negative proactive behavioral level (SR = −1). See Figure 1.

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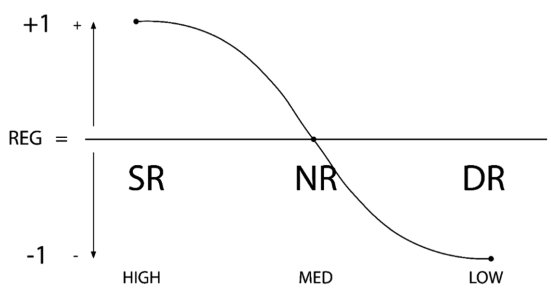

FIGURE 1
Graphic representation of the types of regulation: SR (Self-Regulation), NR (Non-Regulation or De-Regulation) and DR (Dys-Regulation). The degree of regulation (high-medium-low) is plotted on the x axis and the y axis shows positivity/negativity (+1, 0, –1). The curved line shows the possible types of regulatory stages of a person and also the possible directionality of behavioral change.

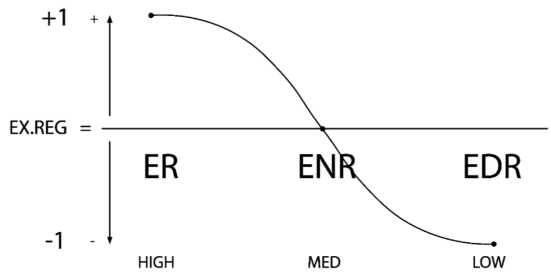

FIGURE 2
Graphic representation of the types of external regulation: ER (External Regulation), ENR (External Non-Regulation or De-regulation) and EDR (External Dys-Regulation). The degree of external regulation (high-medium-low) is plotted on the x axis and the y axis shows the positivity/negativity of external regulation (+1, 0, –1). The curved line shows the possible types of the context regulatory types and the possible directionality of the change in types of contexts.

In this case, the concept of SR is assumed from Zimmerman's previous model (Zimmerman, 2000; Zimmerman and Labuhn, 2012), but the types of non-regulatory behavior are incorporated, such as the absence of regulation and dysregulatory behavior such as malfunction of regulation. In the biological field, the concept of biological dysregulation has been coined to define the malfunction of a biological system (Goldman et al., 2006; Gouin, 2011; Carbone, 2020); consequently, it is possible to coin the term behavioral dysregulation this term in the psychological field. Previous behavioral research has also assumed it to define a maladjusted psychological or behavioral level (Beauchaine and Crowell, 2020; Forkus et al., 2020). The American Psychological Association (APA) defines dysregulation as "any excessive or otherwise poorly managed mechanism or response[1]". In the field of psychology, a commonly discussed type of dysregulation is that of emotion dysregulation, which can negatively impact our well-being. Such is the human capacity for behavioral regulation that the individual can carry out SR, NR, and DR behaviors. These types of self-regulation are then associated with the three possible levels of SR (high-medium-low) whereby positive SR describes the presence of self-regulation whilst there are two levels for absence of regulation. SR and NR can therefore be expected to be negatively associated, whilst NR and DR are positively associated, such that NR is the intermediate or prior step toward DR.

Principle and Hypothesis 2: Types of External Regulation. Context factors are also considered proximal or influential when determining the variability of this behavior, with the *External-Regulation* Behavior (ER), *External Non-Regulation or De-regulation* behavior (ENR), and *External Dys-Regulation* behavior (ER) typologies:

4. *External-Regulation Behavior Type* (SR): It refers to the design and the characteristics of the context (such as antecedents and consequences of behavior), which probabilize and help exercise behavioral self-regulation (thoughts, emotions, and actions). It is considered an context adaptive and positively proactive behavioral level (ER = +1).
5. *External Non-Regulation or External De-regulation Behavior Type* (NR): It refers to the design and the characteristics of the context (such as antecedents and consequences of behavior), which do not externally probabilize or help self-regulation or dys-regulation; that is, the design of the context leaves the entire weight of regulation in the hands of the person. It is considered a context reactive or neutral contextual behavioral level in positive and negative proactivity (ER = 0).
6. *External Dys-Regulation Behavior Type* (DR): It refers to the design and the characteristics of the context (such as antecedents and consequences of behavior), which make possible and help exercise behavioral dys-regulation (in thoughts, emotions, and actions), making different kinds of behavioral excesses or deficits probable. It is considered a context adaptative and negative proactive behavioral level (ER = −1). See Figure 2.

From a behavioral perspective, if a context has a pro-regulatory value that means that it promotes self-regulation through specific behavioral mechanisms: adequate understanding of the precursors to and consequences of behavior, the degree of behavioral predictability that can be inferred from the context. Such is the susceptibility of human beings to the influence of their context that context can induce or externally promote SR, NR, and DR behaviors. Thus, context can be categorized into the same three levels of external regulation: ER (External Regulation), ENR (External Non-Regulation); and EDR (External Dys-Regulation). Here too, the absence of regulation has two levels rather than just one. ER and ENR can therefore be expected to be negatively associated, whilst ENR and EDR are positively associated such that ENR is the intermediate or prior step toward EDR.

1 dictionary.apa.org

Principle and Hypothesis 3: Internal vs. External Behavior Combination Regulation (combined regulation). Variability in human behavioral regulation depends on the combination of personal and contextual factors. That is, on the specific combination of the subject's levels of personal self-regulation (high-medium-low) and the regulatory levels of the contextual regulation (high-medium-low). The heuristic used has five possible combinations of self-regulation and external regulation. This hypothesis has previously been tested and validated, with considerable consistency (de la Fuente et al., 2017, 2019b). The combination of both joint levels will be able to predict the level of this behavior, in different areas of behavior, for example, the clinical, educational, health, or technological field. The categories of high-medium-low behavioral combination of the subject and the context define 5 types of possible heuristic levels, already reported previously (de la Fuente, 2017; de la Fuente et al., 2022a). See Table 1.

A graphical presentation of the SR-ER combination can be seen in a number of published works which have repeatedly corroborated the same trend (de la Fuente et al., 2017). See Figure 3.

Self-regulation vs. external behavior regulation (SR-ER) in clinical psychology contexts

Self-regulation (SR) in clinical psychology contexts

In the field of clinical research, the *self-regulation* variable has appeared to be important for the explanation of other psychological constructs, such as personality (Inzlicht et al., 2021), resilience (de la Fuente et al., 2017), personal strengths (Lerner et al., 2021), coping strategies (Amate-Romera and de la Fuente, 2021), emotionality (Lajoie et al., 2021) and perfectionism (Thakre and Sebastian, 2021). Recently, studies have considered the dysfunctional level of self-regulation (*dys-regulation*) as a transdiagnostic variable (*p factor*) underlying numerous psychiatric psychopathologies (Duncan et al., 1996; Choi and Abbott, 2020; Huffhines et al., 2020; Smith et al., 2020; Levin-Aspenson et al., 2021; Romer et al., 2021) varying levels of which are relevant to criminal pathologies (Billen et al., 2021).

Internal vs. external self-regulation, non-regulation, dys-regulation (SR-ER) behavior in clinical psychology contexts

The SR-ER theoretical model (de la Fuente, 2017) proposes that the interaction of each person's SR-NR-DR levels with their contextual ER-ENR-EDR levels is predictive and explanatory of *adaptive vs. maladaptive* behaviors for which explanation is sought. Thus, that interaction has been shown to determine the level of the variables of psychological reactance (Pachón-Basallo et al., 2021), procrastination (de la Fuente et al., 2021b), symptoms of stress and anxiety (de la Fuente et al., 2021b), positive–negative affects and psychological well-being and executive functioning and emotional dysregulation (Leerkes et al., 2020; de la Fuente et al., 2022b) with repeated consistent effects. In each case, the five-level SR-ER combinatory heuristic shows discriminatory power to determine the level of the dependent variables measured. Recent research has also shown the dysregulatory effect of traumatic experiences in childhood and adolescence, because they have produced regulatory imbalances, producing cognitive, emotional, and behavioral excesses or deficits (Claudine et al., 2021).

Self-regulated vs. externally regulated learning (SRL–ERL) in educational psychology contexts

SR in educational psychology contexts

In the field of education, SR research has focused on the *Self-Regulated Learning* (SRL) construct. Historically, different theoretical models of SRL have coexisted (Panadero, 2017). Of those competing models, one of the most successful in determining the specific behavioral levels of the learning process is the model put forward by Zimmerman (Zimmerman and Schunk, 2001).

There is extensive evidence available in relation to the role of SRL in education and educational processes. SRL has been shown to be associated with numerous aspects of the learning process: motivation, emotion, and performance (de la Fuente and Eissa, 2010; Peña-Lara, 2015; Dinsmore et al., 2020). Those associations

TABLE 1 Combinations of the model parameters hypothesized by SRL vs. ERL Theory (de la Fuente et al., 2019a).

Combination level		Regulation average/rank		Regulation tendency	Protection level	Risk level
SR Level (range)	RT level (range)					
3 (3.85–5.00)**H**	**3** (3.84–5.00)**H**	3.0	**5**	**High-High:** *High-Regulation*	*High protector*	*Low risk*
2 (2.34–3.84)**M**	**3** (3.85–5.00)**H**	2.5	**4**	**Medium-High:** *Regulation*	*M-H protector*	*M-L risk*
3 (3.85–5.00)**H**	**2** (2.35–3.84)**M**	2.5	**4**	**High-Medium:** *Regulation*	*M-H protector*	*M-L risk*
2 (2.34–3.84)**M**	**2** (2.35–3.84)**M**	2.0	**3**	**Medium-Medium:** *Non-Regulation*	*Medium protector*	*M risk*
2 (2.34–3.84)**M**	**1** (1.00–2.34)**L**	1.5	**2**	**Medium-Low:** *Dys-regulation*	*M-L protector*	*M- H risk*
1 (1.00–2.34)**L**	**2** (2.35–3.84)**M**	1.5	**2**	**Low-Medium:** *Dys-regulation*	*M-L protector*	*M- H risk*
1 (1.00–2.34)**L**	**1** (1.00–2.34)**L**	1.0	**1**	**Low-Low:** *High Dys-regulation*	*Low protector*	*High risk*

The type and level of personal and contextual regulation is calculated through cluster analysis, to delimit the low-medium and high groups. The values in parentheses mark the upper and lower cut-off points of each group. Group 1 = Low; group 2 = Medium; group 3 = High; the average of both types gives rise to a regulation average and a regulation ranking between 1 and 5.

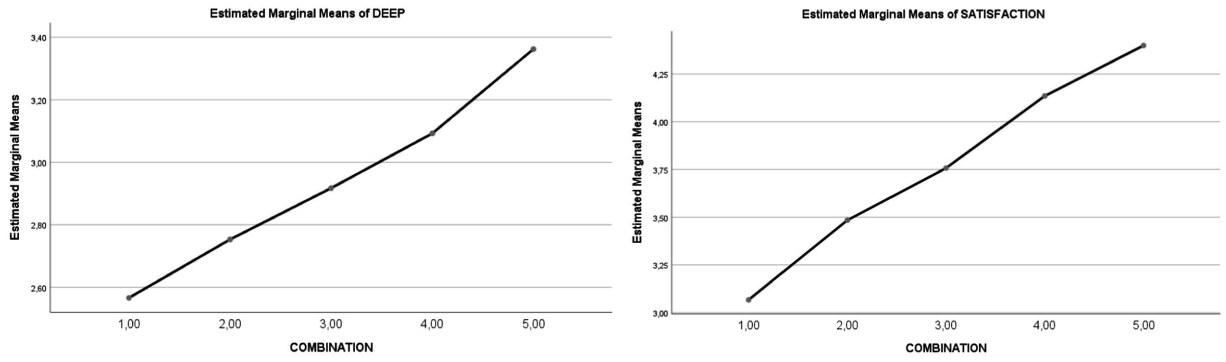

FIGURE 3
Effect of the SR-ER couple on the variables of *deep learning* and *satisfaction in learning*.

have also been shown in different stages of education, in particular university education (de la Fuente et al., 2017).

Recent studies have also shown that SR is a personality variable that suggests or predicts SRL (de la Fuente et al., 2015), academic emotions (de la Fuente et al., 2020a), coping strategies (de la Fuente et al., 2020c), and levels of academic stress (de la Fuente et al., 2020c).

Internally vs. externally regulated, unregulated, and dysregulated learning (SRL-ERL) behavior in educational psychology contexts

A number of studies have considered SRL-ERL, some of which have gone as far as to propose that the environment has a greater regulatory value than the subject in computer contexts (Azevedo et al., 2005). Earlier work by our research team using the SRL-ERL model (de la Fuente, 2017) also showed how the combination of the low-medium-high SR level of students and the RT level of the teaching process produces an effect with a stable linear rising function for the five levels described. That linear function determines the level of other dependent variables, such as emotions associated with academic achievement (de la Fuente et al., 2020a), learning focus (de la Fuente et al., 2020c), academic confidence (de la Fuente et al., 2021c), and protective and risk factors for stress (de la Fuente, 2021a) in a recurrent manner.

Self-regulation vs. external regulation in psychology of health (SRH-ERH) contexts

SR and psychology of health contexts

Research into SR has also been significant in the field of health. SR has been integrated into models of a number of health problems and their prevention (Hull and Slone, 2004; Blood, 2012; Mann et al., 2013; Rathnayake and Chandradasa, 2020). The positive predictive value of SR in relation to health has been confirmed (Quinn and Fromme, 2010; Garzón-Umerenkova et al., 2017). Evidence in relation to the role of SR in chronic disease in the field of the Psychology of Health is extensive (Hennessy et al., 2020; Wilson et al., 2020). The SR model has also been used in specific pathologies (Clark and Zimmerman, 1990; Zimmerman et al., 1999).

Generally speaking, earlier evidence has in common the secondary or indirect value attributed to context in the explanation of the probability of different behaviors, although some recent work has considered context (Höhn et al., 2020). Hence the need to widen the focus of our vision, moving from the molecular to the molar, to pay closer attention to the interaction between the person and their environment (de la Fuente et al., 2020a).

Internal vs. external self-regulation, non-regulation, dys-regulation (SRH-ERH) behavior in psychology of health contexts

Earlier research has shown the harmful effects of dysregulatory contexts on psychological well-being. Other earlier studies have consistently shown that the *SR-ER combination* of the low-medium-high SR level of students and of the teaching process produces an effect with a linear function—that rises or fall depending on the variable—for the five levels described. That linear function determines in a recurrent format the level of other dependent variables such as the factors leading to, and the symptoms of, academic stress (de la Fuente et al., 2020c) and the coping strategies used (de la Fuente et al., 2020a).

Self-regulation vs. external regulation In psychology of technology (SRT-ERT) contexts

SR and psychology of technology contexts

SR has appeared to be an important variable in determining how appropriately technology is used that offers a degree of protection against addictive behaviors (Chen et al., 2021; Khan et al., 2021). Alongside that, there is considerable prior research that provides systematic evidence that an individual's level of' behavioral self-regulation (impulsiveness and lack of control) affects and may determine where on the appropriate use-abusive dependent use of technology continuum the individual falls

(Azevedo and Feyzi-Behnagh, 2011). In fact, the term "behavioral addiction" was coined to refer to the problem and the maladjustment inherent to lack of self-regulation in the use of today's technological devices (Kuss et al., 2014; Maya, 2020).

Internal vs. external self-regulation, non-regulation, dys-regulation (SRH-ERH) behavior in psychology of technology contexts

Contextual factors have also been associated with or predictive of technology-related addictive behaviors (Li, 2021). However, we know relatively little about the role of the interaction of the individual with their context in terms of the fostering of maladjusted behavior in the use and abuse of technology. Knowledge of the interaction between an individual's level of self-regulation (SR-NR-DR) and their context (ER-ENR-ED) could materially advance our knowledge of the relative contribution of combinations of those factors to explaining the variability of addictive vs. non-addictive use of technology. The different levels predicted by this new theoretical model have yet to be shown.

Aims

Against that theoretical background, the objectives of this research were: (1) to provide empirical validation of the (internal and external) SR-NR-DR continuum proposed by using the instrument put forward; (2) to validate the different versions of the tool, as applied to different psychological contexts: clinical, educational, health and technology. The assumed *hypotheses* were: (1) The total scores for the different versions of the instrument would share a construct structure and acceptable levels of reliability in the continuum proposed and would have sufficient discriminant validity to categorize the different types of combination proposed in the SR-ER combination: 1. Low; 2. Medium-Low; 3. Medium; 4. Medium-High; 5. High. (2) The different versions of the instrument would have adequate construct validity and reliability with sufficient discriminant power or external validity with respect to different constructs of relevance in each field: clinical, educational, health, and technology.

Materials and methods

Participants

A total sample of 1,358 (770 women and 558 men) carry out was obtained through convenience sampling, from Spanish university students attending public universities. The students were studying different academic subjects at different levels. The age range was 18–25 (mean = 22.50; dt = 1.90). Each scale was completed by an average of 489 students. The sample was randomly divided into two subsamples (50 and 50%) in order to carry out parallel studies that would allow corroborating and verifying the results obtained (cross validation). The first half (subsample 1) was made up of 680 students: 390 women and 294 men. The second half (subsample 2) was made up of 678 students: 380 women and 264 men.

Instruments

Self-regulation vs. external regulation behavior (de la Fuente, 2022; See Supplementary Material).

1. *Self-Regulation vs. External Regulation in Clinical Psychology Contexts (ER vs. ER)*. This variable was measured using the *Self-Regulation vs. External Regulation Scale* (de la Fuente, 2022). The scale consists of a total of 36 items self-reported against a Likert scale (1 = does not apply to me, 5 = very much applies to me). It has six components each formed of six items, through which both the behavioral types, Self-Regulation Behavior (SR), Non-regulation Behavior (NR), and Dys-Regulation Behavior (DR), and the contextual types, external regulation behavior (ER), External Non-regulation behavior (ENR), and External dys-regulation Behavior (EDR) are measured.
2. *Self-Regulated vs. Externally Regulated Learning Behavior in Educational Psychology Contexts (SRL vs. ERL)*. This variable was measured using the *Self-Regulated vs. Externally Regulated Learning Scale in Educational Psychology* (de la Fuente, 2022). This scale consists of a total of 36 items self-reported against a Likert scale (1 = does not apply to me, 5 = very much applies to me). It contains six factors each formed of six items through which both the behavioral types SRL (Self-Regulated Learning), NRL (Non-Regulated Learning) and DRL (Dys-Regulated Learning), and the contextual types ERL (Externally Regulated Learning), ENRL (Externally Non-Regulated Learning) and EDRL (Externally Dys-Regulated Learning) are measured.
3. *Self-Regulation vs. External Regulation Behavior in Health Psychology Contexts (SRH vs. ERH)*. This variable was measured using the *Self-Regulation vs. External Regulation Scale in Health Psychology Contexts* (de la Fuente, 2022). This scale consists of a total of 36 items self-reported on a Likert scale (1 = does not apply to me, 5 = very much applies to me). It has six components each formed of six items through which both the behavioral types SRH (Self-Regulation in Health), NRH (Non-Regulation in Health) and DRH (Dys-Regulation in Health), and the contextual types ERH (External Regulation in Health), ENH (External Non-Regulation in Health) and EDH (External Dys-Regulation in Health) are measured.
4. *Self-Regulation vs. External Regulation Behavior in Technology Contexts*. This variable was measured using the *Self-Regulation vs. External Regulation Scale in Technology*

Contexts (de la Fuente, 2022). This scale consists of a total of 36 items self-reported on a Likert scale (1 = does not apply to me, 5 = very much applies to me). It has six components each formed of six items through which both the behavioral types SRT (Self-Regulation in Technology), NRT (Non-Regulation in Technology), and DRT (Dys-Regulation in Technology), and the contextual types ERT (External Regulation in Technology), ENT (External Non-Regulation in Technology), and EDT (External Dys-Regulation in Technology) are evaluated. See Table 2.

Self-Regulation Behavior. This variable was measured using the *Short Self-Regulation Questionnaire* (SSRQ), based on the original Self-Regulation Questionnaire. It has previously been validated in Spanish samples (Pichardo et al., 2014), and has acceptable validity and reliability values comparable to those of the English version. The SSRQ is composed of four factors (goal setting-planning, perseverance, decision-making, and learning from mistakes) and 17 items (all of them with saturations greater than 0.40), with a consistent confirmatory factor structure (Chi-square = 845,593, df = 113, CH/DF = 7.48; $p < 0.001$; RMR = 0.0299; NFI = 0.959, RFI = 0.951, IFI = 0.964, TLI = 0.957; CFI = 0.964; RMSEA =0.06). Internal consistency was acceptable for all questionnaire items collectively ($\alpha = 0.811$) and for the factors of goal setting-planning ($\alpha = 0.709$), perseverance ($\alpha = 0.735$), and decision making ($\alpha = 0.757$), and learning from mistakes ($\alpha = 0.703$).

Negative Emotional Reactivity. The Perth Emotional Reactivity Scale, PERS (Becerra et al., 2017). This scale measures domains such as positive and negative emotional reactivity, it comprises 30 items and has a consistent confirmatory factor structure (Chi-square = 26.054, df = 5, CH/DF = 5.211; $p < 0.001$; RMR = 0.039; NFI = 0.954, RFI = 0.916, IFI = 0.962, TLI = 0.958; CFI = 0.961; RMSEA = 0.08). Reliability coefficients are Alpha total = 0.878, Omega = 0.846; Alpha 1 = 0.775, Alpha 2 = 0.797; Spearman–Brown = 0.867; Guttman = 0.867.

Psychological Well-Being. We used the *Scales of Psychological Well-Being* (Ryff, 1989) in Spanish (Díaz et al., 2006) in the 29-item version which has a consistent confirmatory factor structure (Chi-square = 845,593, df = 113, CH/DF = 7.48; $p < 0.001$; RMR = 0.029; NFI = 0.937, RFI = 0.942, IFI = 0.961, TLI = 0.956; CFI = 0.964; RMSEA = 0.05). The scale has six sub-scales: self-acceptance, positive relationships, autonomy, environmental mastery, personal growth, and purpose in life. We used a six-point Likert scale from "Does not apply to my life at all" to "Totally applicable." Reliability coefficients are appropriate: Alpha total = 0.905, Omega = 0.886; Alpha 1 = 0.823, Alpha 2 = 0.832; Spearman–Brown = 0.867; Guttman = 0.867.

Achievement Emotion (Studying). Learning-Related Emotions (de la Fuente et al., 2015). The psychometric properties of LRE were satisfactory in students from Spain. In this sample, the model obtained good fit indices. Unidimensionality of the scale and metric invariance were confirmed in the samples evaluated (Chi-square = 10,885.597, Degrees of freedom = 3,052, $p < 0.001$; CFI = 0.959, TLI = 0.942, IFI = 0.969, TLI = 0.955, and CFI = 0.958; RMSEA = 0.038; HOELTER = 501, $p < 0.05$; 511 $p < 0.01$). Reliability coefficients are appropriate [Cronbach Alpha = 0.930, omega = 0.897; part 1 = 0.880 (38 items), and part 2 = 0.846 (37 items), respectively, for each part (75 items)].

TABP: Impatience-Hostility. Action-emotion style. The Jenkins Activity Survey for Students – Form H (JASE-H) was used. This scale for measurement of TABP was adapted (Bermúdez et al., 1990, 1991) from the form T Jenkins Activity Survey (Krantz et al., 1974). It measures four components: Impatience, Hostility, Competitiveness, and Overwork. In total, the questionnaire contains 32 items, each with a six-point Likert-type response format. The subject has to choose the degree to which an item applies to them, where 1 means that the item does not apply at all to the subject and 6 means that it is fully applicable. The JASE-H offers both a global TABP score, obtained by adding the scores for all the items, and specific measurements for each component of the TABP. The JASE-H shows high internal consistency (alpha coefficient of 0.85 for the total scale, 0.81 for Impatience-Hostility, 0.82 for Competitiveness, and 0.70 for Overwork) and high stability over time, both for the complete scale (0.68) and for each subscale (0.61, 0.76 and 0.70, respectively). Reliability and validity measurements reported by the authors are consistent. The statistics are Alpha = 0.832, Omega = 8.031; and Guttman Split-Half = 0.803.

Procedure

In five different studies, students completed their questionnaires (see Complementary Material) on an online

TABLE 2 Table-summary of the types of regulation in the scales.

Type of Regulation	Self-Regulation	Non-Regulation	Dys-Regulation	External Regulation	External Non-Regulation	External Dys-Regulation
Clinical Psychology	SR	NR	DR	ER	ENR	EDR
Educational Psychology	SRL	NRL	DRL	ERL	ENRL	EDRL
Health Psychology	SRH	NRH	DRH	ERH	ENRH	EDRH
Technological Psychology	SRT	NRT	DRT	ERT	ENRT	EDRT
N° items	6	6	6	6	6	6
Level	Personal	Personal	Personal	Contextual	Contextual	Contextual

platform: www.inetas.net (de la Fuente et al., 2015), after signing an informed consent form. Different students completed five specific questionaries during a two-year academic period. *Inventory 1* was assessed in September–October of 2019 and 2020; *Inventory 2*, in November–December of 2019 and 2020; *Inventory 3*, in February–March of 2019 and 2020; *Inventory 4*, in April–May of 2019 and 2020; and *Inventory 5* variables in May–June of 2019 and 2020. The *Self-Regulation Questionnaire* was completed with the other questionnaires in April–May 2019–2020. Questionnaire completion was voluntary. The respective Ethics Committees of the two universities approved the procedure as part of an R&D Project (2018–2021): http://www.estres.investigacion-psicopedagogica.org/lib/pdf/CERTIFICADO_COMITE_DE_ETICA_UNAV.pdf.

Data analysis

Sample design. A random sample was designed to estimate the proportion of interest if measured at a level that is greater than 200 people ($n > 200$); that is, the maximum permissible error in the estimation of the proportions of 7% and equivalently for the estimation of the average score of the scale.

Content validity: through expert validity. The methodological reference for the process of content validity by expert judgment was considered as "an informed opinion of people with experience in the subject, who are recognized by others as qualified experts in it, and who can provide information, evidence, judgments and assessments" (Escobar and Cuervo, 2008; p. 29). A template was used, developed by these authors, with four categories, and a licker-type response range from 1 (not at all) to 5 (a lot):

1. *Clarity*: the items are understood correctly, with adequate syntax and semantics.
2. *Coherence:* the items have an adequate relationship with the dimension and scale.
3. *Relevance:* the items are completely related to the dimension and scale under analysis.
4. *Sufficiency:* the items of each dimension are sufficient to measure it adequately.

This template was sent to seven experts on the topic (self-regulation), from each area and type of Scale. They were considered so if they were accredited by their research experience with more than 10 recently published articles on the topic. Upon receipt, a content validity coefficient analysis was applied by degree of interjudge agreement per item. A degree of agreement of 80% was obtained in the items of each scale, which was considered acceptable, es decir un IFV de 0.80 (Rubio et al., 2003).

Preliminary analysis. Adequacy of parametric analyses was first confirmed by determination of normal distribution (Kolmogorov–Smirnov test), skewness, and kurtosis (+/−0.05). In this case, the majority of values were below or near 0.50.

Criterion or concurrent validity: Correlation. For purposes of evaluation of the associations posited by the study hypotheses, positivity was correlated with resilience, coping strategies, and engagement-burnout (Pearson bivariate correlation) using SPSS (v.26). The assumptions for the bivariate correlation were: (1) The data have a linear relationship as established by scatter plot; (2) The variables are normally distributed; (3) The observations used for the bivariate correlation are a random sample from the reference population. Correlation bands were set according to customary criteria: low (0.10–0.30), medium (0.40–0.70), and high (0.80–0.90).

Construct validity. The sample was randomly divided into two subsamples (50 and 50%) using the Statistical Package for the Social Sciences (SPSS, version 26) in order to carry out parallel studies that would allow corroborating and verifying the results obtained (cross validation):

1. *Exploratory Factorial Analysis (EFA)*. This analysis was performed with 50% of the sample. The Kaiser–Meyer–Olkin indices, Bartlett's Sphericity Test, and factor communality values were used. Varimax rotation was used, with maximum likelihood and percentage of variance explained by each factor and the total of the scale. KMO was taken to be 0.80 and the Bartlett significance level was $p < 0.001$.
2. *Confirmatory Factorial Analysis (CFA)*. With the remaining 50% of the sample, the previous factorial structure was calculated. Model fit was assessed by the Chi-square: degrees of freedom ratio, Comparative Fit Index (CFI), Normed Fit Index (NFI), Incremental Fit Index (IFI), and Relative Fit Index (RFI). Target values were greater than 0.90. We used the Hoelter Index to confirm that the sample was of adequate size (Tabachnick and Fidell, 2001). AMOS (v.26) was used.

Reliability. Cronbach's Alpha index and the Omega Index (McDonald, 1999) were used. Cut-off values were set at 0.80.

Variance Analysis. ANOVA and MANOVA were performed to analyze external and concurrent validity. First, each subject's score for regulation in each questionnaire was calculated as: *Total Internal and External Regulation* = [(SR + ER)/2 − (SNR + ENR)/2 − (SDR + EDR)/2)]/3. This continuous heuristic is adjusted to a linear format (see Figures 1, 2) with respect to the previous scalar heuristic (see Table 1). Subsequent cluster analysis determined the central values and the intersection points between them for each questionnaire and for the questionnaires as a whole. As can be seen, the distribution of the inventories follows the curve of the proposed theoretical relationship, albeit in a wider range of approximately −2.00–1.00. This comes about because levels of regulation are totaled; thus, whilst self-regulation is positive (+1.00), non-regulation and dys-regulation are negative (up to −2.00 at most). It should be noted that the scores in the table are similar for the different scales and the General Scale. See Table 3.

Results

Study 1. Self-regulation vs. external regulation behavior psychology total inventory (SRT-ERT)

Descriptive results

The descriptive values found met the normality requirements to be expected of this type of sample and subsequent analysis. See Table 4.

Construct validity

Correlation

SRTOT was negatively correlated with NRTOT and DRTOT; NRTOT and DRTOT had a significant negative correlation. Across this context, the correlations are the same in terms of direction: negative between ERTOT and ENTOT and positive between ENTOT and EDTOT. Note also the consistent negative and positive correlation of components of the scale with the aggregate score for the SR-ER.TOT construct. See Table 5.

Exploratory Factorial Analysis (EFA). This analysis was carried out with 50% of the sample, obtaining adjusted values: Kaiser–Meyer–Olkin = 0.936; Bartlett's Sphericity Test (630) = 15,703, 146, $p < 0.001$; factor communality was between 0.426 (item 8) and 0.785 (item 34). In the varimax rotation, six factors appeared that explained 65% of the variance: Factor 1, *EDRT* (24.5% variance) = items 34, 33, 35, 36, 32, 31; Factor 2, *ERT* (13.14% variance) = 21,23,20, 24, 22, 19; Factor 3, *SRT* (14.05%) = 3,4,5,6,2,1; Factor 4, *DRT* (11.54% variance) = 16,15,13, 17,18, 14; Factor 5, *NRT* (10.64%) = 29, 28, 27,25,26,30; Factor 6, *NRT* (5.71%) = 10,7,9,8,11,12.

Confirmatory Factorial Structure. The structural values for this construct appeared to be acceptable [Chi-square = 3,527.914, $p < 0.001$; df (702–118) = 584; CH/DF = 6.041; CFI = 0.912; GFI = 0.900; IFI = 0.926; TLI = 0.915; CFI = 0.926, RMSEA = 0.019;

TABLE 3 Central and limit value for the clusters for each questionnaire and general.

Context	Inventory	Limit	Level 5	Limit	Level 4	Limit	Level 3	Limit	Level 2	Limit	Level 1	Limit
Clinical Psychology	SR-ER	1,00	**0.64**	0.39	**0.15**	0.08	**−0.29**	−0.49	**−0.70**	−0.92	**−1.15**	−2.00
Education Psychology	SRL-ERL	1,00	**0.68**	0.44	**0.21**	−0.08	**−0.37**	−0.63	**−0.92**	−1.11	**−1.33**	−2.00
Health Psychology	SRH-ERH	1,00	**0.72**	0.51	**0.30**	0.05	**−0.20**	−0.48	**−0.77**	−1.00	**−1.23**	−2.00
Technology Psychology.	SRT-ERT	1,00	**0.57**	0.33	**0.10**	−0.13	**−0.37**	−0.60	**−0.84**	−1.06	**−1.28**	−2.00
General	SRG-ERG	1,00	**0.62**	0.38	**0.14**	−0.10	**−0.35**	−0.59	**−0.84**	−1.06	**−1.28**	−2.00
(n = 2,716)			(n = 358)		(n = 516)		(n = 750)		n = 742		n = 350	

Level 5, High; Level 4, Medium-high; Level 3, Medium; Level 2, Medium-low; Level 1, Low. The levels (5,4,3,2,1) in each inventor are highlighted in bold.

TABLE 4 Values descriptive of the total validation sample (n=1,358).

Variable	Range	Mean (dt)	Deviation error	Asymmetry	Dev. Error	Kurtosis	Dev. Error
SRTOT	1–5	3.96 (0.739)	0.018	−0.592	0.060	0.209	0.119
NRTOT	1–5	2.67 (0.760)	0.018	0.245	0.060	−0.072	0.119
DRTOT	1–5	2.49 (0.911)	0.022	0.295	0.059	−0.441	0.119
ERTOT	1–5	3.76 (0.934)	0.023	−0.530	0.061	−0.230	0.121
ENRTOT	1–5	2.51 (0.957)	0.023	0.234	0.060	−0.577	0.121
EDRTOT	1–5	2.42 (1.02)	0.025	0.323	0.060	−0.710	0.121

SRTOT, Self-Regulation Behavior Total; NRTOT, Non-Regulation Behavior Total; DRTOT, Dys-Regulation Behavior Total; ERTOT, External Regulation Behavior Total; ENRTOT, External Non-Regulation Behavior Total; EDTOT, External Dys-Regulation Behavior Total.

TABLE 5 Correlation between internal and external regulation and the total score for the scale (n=1,358).

	SRTOT	NRTOT	DRTOT	ERTOT	ENTOT	EDTOT
SRTOT						
NRTOT	−0.220**					
DRTOT	−0.053*	0.648**				
ERTOT	0.500**	−0.113**	−0.015			
ENTOT	−0.175**	0.617**	0.582**	−0.265**		
EDTOT	−0.033	0.572**	0.703**	−0.021	0.681**	
SR-ER.TOT	0.463**	−0.770**	−0.749**	0.478**	−0.843**	−0.763**

SRTOT, Self-Regulation Behavior Total; NRH, Non-Regulation Behavior Total; DRH, Dys-Regulation Behavior Total; ERTOT, External Regulation Behavior Total; ENRTOT, External Non-Regulation Behavior Total; EDRTOT, External Dys-Regulation Behavior Total; **$p < 0.001$; *$p < 0.01$.

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TABLE 6 Standardized total effects (default model; *n*=840).

	F1	F2	F3	F4	F5	F6
SRERTOT1	0.696					
SRERTOT2	0.754					
SRERTOT3	0.824					
SRERTOT4	0.818					
SRERTOT5	0.789					
SRERTOT6	0.609					
SRERTOT7		0.591				
SRERTOT8		0.331				
SRERTOT9		0.704				
SRERTOT10		0.677				
SRERTOT11		0.777				
SRERTOT12		0.528				
SRERTOT13			0.651			
SRERTOT14			0.625			
SRERTOT15			0.699			
SRERTOT16			0.771			
SRERTOT17			0.771			
SRERTOT18			0.735			
SRERTOT19				0.790		
SRERTOT20				0.860		
SRERTOT21				0.887		
SRERTOT22				0.880		
SRERTOT23				0.894		
SRERTOT24				0.845		
SRERTOT25					0.632	
SRERTOT26					0.653	
SRERTOT27					0.789	
SRERTOT28					0.849	
SRERTOT29					0.828	
SRERTOT30					0.705	
SRERTOT31						0.778
SRERTOT32						0.795
SRERTOT33						0.811
SRERTOT34						0.844
SRERTOT35						0.808
SRERTOT36						0.818

TABLE 7 Standardized total effects (default model; *n*=360).

	F1	F2	F3	F4	F5	F6
SRERL1	0.670					
SRERL2	0.786					
SRERL3	0.807					
SRERL4	0.873					
SRERL5	0.820					
SRERL6	0.623					
SRERL7		0.511				
SRERL8		0.313				
SRERL9		0.730				
SRERL10		0.702				
SRERL11		0.783				
SRERL12		0.521				
SRERL13			0.680			
SRERL14			0.662			
SRERL15			0.795			
SRERL16			0.773			
SRERL17			0.823			
SRERL18			0.728			
SRERL19				0.793		
SRERL20				0.870		
SRERL21				0.897		
SRERL22				0.871		
SRERL23				0.872		
SRERL24				0.825		
SRERL25					0.628	
SRERL26					0.632	
SRERL27					0.750	
SRERL28					0.822	
SRERL29					0.833	
SRERL30					0.724	
SRERL31						0.819
SRERL32						0.817
SRERL33						0.850
SRERL34						0.849
SRERL35						0.784
SRERL36						0.796

RSMR = 0.045; Hoelter = 2,417 ($p < 0.05$), 2,512 ($p < 0.01$)]. See Table 6.

Criterion-related validity: SR-ER general

Formation of groups. The ANOVA carried out to form the groups showed a significant principal Group Factor effect for SR-ER TOTAL relative to the total score for SR-ER.TOT [$F(4.1353) = 5430.739$, $p < 0.001$; $eta^2 = 0.941$, *power* = 1.00; *post-hoc* = 5 > 4 > 3 > 2 > 1, $p < 0.001$]. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.1353) = 1.949$, $p < 0.127$]. See Table 7 for the descriptive statistics.

Effect of the SR-ER General group on each type of regulation. The ANOVA carried out showed a significant principal effect of the SR-ER General Group relative to each FACTOR IN TOTAL REGULATION [$F(24.5404) = 77.493$ (Pillai), $p < 0.001$; $eta^2 = 0.256$, power = 1.00], and to the individual components: *SRT* [$F(4,1,353) = 93.301$, $p < 0.001$; $eta^2 = 0.216$, power = 1.00]; *NRG* [$F(4.1353) = 93.301$, $p < 0.001$; $eta^2 = 0.561$, power = 1.00]; *DRT* [$F(4.1353) = 387.232$, $p < 0.001$; $eta^2 = 0.534$, power = 1.00]; *ERT* [$F(4,1,353) = 93.301$, $p < 0.001$; $eta^2 = 0.261$, power = 1.00]; *ENRT* [$F(4.1353) = 93.301$, $p < 0.001$; $eta^2 = 0.676$, power = 1.00]; *EDRT* [$F(4.1353) = 93.301$, $p < 0.001$; $eta^2 = 0.556$, power = 1.00]. Note the greater explanatory weight of the indices in both the internal and external non-regulation and dys-regulation components. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.1353) = 2.788$, $p < 0.099$]. See Table 8 for the descriptive statistics.

Reliability

The total reliability of the scale showed adequate ratios (Cronbach's Alpha = 0.900; Omega Index = 0.897). Split-half analysis showed adequate values (Alpha 1 = 0.802; Alpha 2 = 0.858; Spearman–Brown Coefficient = 0.828; Guttman Split-half Coefficient = 0.828). The ratios for each scale also: SR (Alpha = 0.888), NR (Alpha = 0.738), DR (Alpha = 0.857), ER (Alpha = 0.943) ENR (Alpha = 0.880); EDR (Alpha = 0.918).

Study 2. Self-regulation vs. regulatory behavior inventory regulation in *clinical psychology* contexts (SR-ER)

Descriptive results

The descriptive values found met the normality requirements to be expected of this type of sample and subsequent analysis. See Table 9.

Construct validity

Correlation

There was a significant negative correlation of SR with NR and DR and a significant positive correlation of NR with DR. Across this context, the correlations are consistent in direction: negative between ER and EN and positive between ENR and EDR. Finally, the trend seen with general *Self-Regulation* was confirmed. The correlations between the components of the scale and the scores for the total construct have the same directions. See Table 10.

Exploratory Factorial Analysis (EFA). This analysis was carried out with 50% of the sample, obtaining adjusted values: Kaiser–Meyer–Olkin = 0.876; Bartlett's Sphericity Test (630) = 4, 154, 307, $p < 0.001$; factor communality was between 0.362 (item 8) and 0.827 (item 22). In the varimax rotation, six factors appeared that explained 65.50% of the variance: Factor 1, *EDR* (15.38% variance) = items 34, 36, 35, 32, 31, 33; Factor 2, *ER* (13.30% variance) = 23, 22, 21, 19, 24, 20; Factor 3, *SR* (11.21%) = 5, 3, 4, 6, 1, 2; Factor 4, *ENR* (10.17% variance) = 28, 29, 26, 30, 27, 25; Factor 5, *NR* (7, 78% variance) = 10, 7, 9, 11, 8, 12; Factor 6, *DR* (7.63%) = 14, 16, 17, 15, 13, 18.

Confirmatory Factorial Analysis (CFA). The structural values for this construct appeared to be adequate [Chi-square = 1,575.861, df (702–118) = 584, $p < 0.001$; Chi/df = 2.689; RMR = 0.0351; NFI = 0.910, RFI = 917; IFI: 938; TLI = 0.903; CFI = 0.928; RMSEA = 0.0231; HOELTER = 1,353 ($p < 0.05$) and 406 ($p < 0.01$)], showing six factors with six items each: SRL, NRL, SDL, ERL, ENRL, EDRL, with acceptable standardized effects, factorial weights adjusted. See Table 11.

Reliability

The reliability of the total Scale showed adequate ratios (Cronbach Alpha = 0.902; Omega Index = 0.896). Split-half

TABLE 8 Descriptive statistics for the groups formed with the total scores (*n*=1,385).

SR-ER TOT groups	*n* = 1,385	Mean	SRTOT	NRTOT	DRTOT	ERTOT	ENRTOT	EDRTOT
1. LTOT	185	−1.26 (0.15)	3.63 (0.85)	3.67 (0.58)	3.61 (0.73)	3.27 (0.81)	3.79 (0.57)	3.61 (0.82)
2. MLTOT	365	−0.836 (0.13)	3.70 (0.72)	3.01 (0.48)	2.92 (0.60)	3.46 (0.96)	3.01 (0.54)	2.93 (0.70)
3. MTOT	374	−0.345 (0.14)	3.94 (0.63)	2.57 (0.50)	2.35 (0.65)	3.61 (0.89)	2.39 (0.60)	2.30 (0.74)
4. MHTOT	258	−0.137 (0.13)	4.26 (0.58)	2.20 (0.48)	1.93 (0.59)	4.14 (0.77)	1.76 (0.50)	1.68 (0.61)
5. HIGTOT	179	618 (0.17)	4.60 (0.43)	1.77 (0.45)	1.41 (0.43)	4.72 (0.44)	1.25 (0.35)	1.17 (0.28)
Mean			3.95 (0.78)	2.66 (0.73)	2.47 (0.90)	3.75 (0.94)	2.48 (0.28)	2.38 (0.1.01)
Post-hoc			5 > 4 > 3 > 2.1**	5 < 4 < 3 < 2 < 1**	5 < 4 < 3 < 2 < 1**	5 > 4 > 3 > 2.1**	5 < 4 < 3 < 2 < 1**	5 < 4 < 3 < 2 < 1**

LTOT, Low; MLTOT, Medium-Low; MTOT, Medium; MHTOT, Medium-High; HIGTOT, High; SRTOT, Self-Regulation Total; NRTOT, Non-Regulation Total; DRTOT, Dys-Regulation Total; ERTOT, External-Regulation Total; ENRTOT, External Non-Regulation Total; EDRTOT, External Dys-Regulation Total; **$p < 0.001$.

TABLE 9 Values descriptive of the validation sample (*n*=422).

Variable	Range	Mean (dt)	Deviation error	Asymmetry	Dev. Error	Kurtosis	Dev. Error
SR	1–5	4.00 (0.686)	0.033	−0.579	0.119	0.765	0.237
NR	1–5	2.71 (0.723)	0.035	0.281	0.119	0.365	0.237
DR	1–5	2.62 (0.845)	0.041	0.232	0.119	−0.236	0.237
ER	1–5	4.25 (0.906)	0.045	−0.585	0.121	0.025	0.242
ENR	1–5	2.52 (0.963)	0.047	0.304	0.121	−0.562	0.242
EDR	1–5	2.55 (1.01)	0.049	0.197	0.120	−0.850	0.238

SR, Self-Regulation; NR, Non-Regulation; DRL, Dys-Regulation; ERB, External Regulation; ENR, External Non-Regulation; EDR, External Dys-Regulation.

TABLE 10 Correlations between the Self-Regulation General (SRG) construct and the types of self-regulation and external regulation (SR-ER; *n*=422).

	SR	NR	DR	ER	ENR	EDR
SR						
NR	−0.111**					
DR	−0.086*	0.611**				
ER	0.460**	0.096*	0.151**			
ENR	−0.130**	0.590**	0.546**	−0.047		
EDR	−0.059	0.504**	0.643**	0.156*	0.619**	
SRG	0.413**	−0.221**	−0.131**	0.211**	−0.186**	−0.020
SR-ER	0.315**	−0.677**	−0.745**	0.231**	−0.695**	−0.841**

SR, Self-Regulated Behavior; NRL, Non-Regulated Behavior; DRL, Dys-Regulated Behavior; ER, External Regulation Behavior; ENR, External Non-Regulation Behavior; EDR, External Dys-regulation Behavior; SRG, General Self-Regulation. SR-ER, Total Self-Regulation vs. External Regulation; **$p < 0.001$; *$p < 0.01$.

analysis (Alpha 1 = 0.805; Spearman–Brown Coefficient = 0.828; Guttman Split-half Coefficient = 0.828). Additionally, the values for the subscales were consistent: SR (Alpha = 0.864; Omega = 0.843); SNR (Alpha = 0.717; Omega = 0.701); SDR (Alpha = 0.818; Omega = 0.802); ER (Alpha = 0.845; Omega = 0.846); ENR (Alpha = 0.877; Omega = 0.853); EDR (Alpha = 0.900; Omega = 0.878).

External validity: Negative emotional reactivity

Formation of groups. The ANOVA carried out to form the groups showed a significant principal Group Factor effect for SR-ER relative to the total score for SR-ER [$F(4.335) = 1185.439$, $p < 0.001$; $eta^2 = 0.930$, *power* = 1.00; *post-hoc* = 5 > 4 > 3 > 2 > 1, $p < 0.001$]. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.355) = 2.430$, $p < 0.100$]. See Table 6 for the descriptive statistics.

Effect of the SR-ER group on the level of Negative Emotional Reactivity. The ANOVA carried out showed a significant principal Group Factor effect for SR-ER relative to reactance [$F(4.307) = 6.887$, $p < 0.001$; $eta^2 = 0.08$, *power* = 0.999; *post-hoc* = 5.4 > 4 > 3.2 > 2 > 1, $p < 0.001$]. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.307) = 1.099$, $p < 0.357$]. See Table 12 for the descriptive statistics.

Study 3. Self-regulatory vs. external regulatory learning behavior inventory in *educational psychology* contexts (SRL-ERL)

Descriptive results

The descriptive values found met the normality requirements to be expected of this type of sample. See Table 13.

TABLE 11 Standardized total effects (default model; *n*=399).

	F1	F2	F3	F4	F5	F6
SRER1	0.646					
SRER2	0.646					
SRER3	0.813					
SRER4	0.810					
SRER5	0.801					
SRER6	0.602					
SRER7		0.607				
SRER8		0.389				
SRER9		0.690				
SRER10		0.674				
SRER11		0.747				
SRER12		0.522				
SRER13			0.507			
SRER14			0.664			
SRER15			0.501			
SRER16			0.727			
SRER17			0.772			
SRER18			0.735			
SRER19				0.794		
SRER20				0.820		
SRER21				0.895		
SRER22				0.885		
SRER23				0.902		
SRER24				0.875		
SRER25					0.596	
SRER26					0.683	
SRER27					0.815	
SRER28					0.848	
SRER29					0.841	
SRER30					0.678	
SRER31						0.741
SRER32						0.749
SRER33						0.729
SRER34						0.864
SRER35						0.804
SRER36						0.801

Construct validity

Correlation

There was a significant negative correlation of SRL with NRL and DRL and a significant positive correlation of NRL and DRL. Across this context, the correlations are all in the same directions: negative for ERL with ENL and positive for ENL with EDL. Note also the positive and negative correlations between the components of SRL-ERL and the general SR construct. See Table 14.

Exploratory Factorial Analysis (EFA). This analysis was carried out with 50% of the sample, obtaining adjusted values: Kaiser–Meyer–Olkin = 0.888; Bartlett's Sphericity Test (630) = 4,782,893 $p < 0.001$; factor communality was between 0.546 (item 6) and

TABLE 12 Descriptive statistics for the groups formed (n=360).

SR-ER groups	$n = 360$	Group mean	(dt)	Lower limit	Upper limit	Negative emotional reactivity	(dt)
1. LOW	59	−1.1455	(0.133)	−0.92	−1.50	3.3224	(0.961)
2. MLOW	94	−0.7027	(0.133)	−0.49	−0.91	2.9694	(0.808)
3. MEAN	129	−0.2289	(0.166)	0.08	−0.48	2.8167	(0.973)
4. MHIGH	46	0.2403	(0.085)	0.39	0.07	2.5683	(0.964)
5. HIGH	32	0.6450	(0.161)	1.03	0.38	2.3214	(0.847)

LOW, Low; MLOW, Medium-Low; MEAN, Medium; MHIGH, Medium-High; HIGTOT, High.

TABLE 13 Values descriptive for the validation sample (n=360).

Variable	Range	Mean (dt)	Deviation error	Asymmetry		Dev. error kurtosis	Dev. error
SRL	1–5	3.96 (0.727)	0.032	−0.442	0.110	−0.295	0.220
NRL	1–5	2.64 (0.755)	0.033	0.260	0.110	−0.167	0.219
DRL	1–5	2.38 (0.914)	0.041	0.428	0.110	−0.374	0.219
ERL	1–5	3.71 (0.940)	0.043	−0.438	0.112	−444	0.223
ENRL	1–5	2.48 (0.940)	0.043	0.214	0.112	−0.517	0.224
EDRL	1–5	2.33 (0.990)	0.045	0.391	0.112	−0.588	0.223

SRL, Self-Regulation of Learning Behavior; NRL, Non-Regulation of Learning Behavior; DRL, Dys-Regulation of Learning Behavior.

TABLE 14 Correlation between the types of internal and external regulation and the total score for the scale (n=320).

	SRL	NRL	DRL	ERL	ENL	EDL
SRL						
NRL	−0.279**					
DRL	−0.199**	0.730**				
ERL	0.486**	−0.188**	−0.097*			
ENL	−0.266**	0.626**	0.615**	−0.325*		
EDL	−0.186**	0.575**	0.706**	−0.122**	0.693**	
SR	0.434**	−0.247**	−0.231**	0.296**	−0.159**	−0.094
SRL-ERL	0.572**	−0.797**	−0.775**	0.551**	−0.846**	−0.769**

SRL, Self-Regulation in Learning; NRL, Non-Regulation in Learning; DRL, Dys-Regulation in Learning; ERL, External Regulation in Learning; ENRL, External Non-Regulation in Learning; EDL, External Dys-regulation in Learning; SR, Self-Regulation; SRL-ERL, Total Self-Regulation vs. External Regulation in Learning; **$p < 0.001$; *$p < 0.01$.

0.831 (item 21). In the varimax rotation, six factors appeared that explained 67.00% of the variance: Factor 1, *EDRL* (15.92% variance) = items 34, 32, 33, 35, 31, 36; Factor 2, *DRL* (13.81% variance) = 15,13,16, 14, 17, 18; Factor 3, *ERL* (13.54%) = 20, 21, 24, 23, 22 19; Factor 4, *SRL* (12.27% variance) = 4,5,2, 3, 1, 6; Factor 5, *ENRL* (7, 41% variance) = 30, 29,28, 25, 26, 27; Factor 6, *SNRL* (4.19%) = 8,10,7, 9,11,12.

Confirmatory factor analysis

The structural values for this construct are acceptable [Chi-square = 1,598.384, df = (702–118) 584; Chi/df = 2,737; RMR = 0.0321; NFI = 0.967, RFI = 958; IFI: 918; TLI = 0.906; CFI = 0.917; RMSEA = 0.023; 1,334; 1,386], showing six components each containing six items (SRL, NRL, SDL, ERL, ENRL, EDRL), with consistent weights. See Table 7.

Reliability

The reliability of the total Scale showed adequate ratios (Cronbach Alpha = 0.881; Omega Index = 0.876). Split-half analysis showed adequate values (Alpha 1 = 0.781; Alpha 2 = 0.831; Spearman–Brown Coefficient = 0.787; Guttman Split-half Coefficient = 0.780). The reliability of the subscales also appeared to be acceptable: SRL (Alpha = 0.897; Omega = 0.886); SNL (Alpha = 0.753; Omega = 0.732); SDL (Alpha = 0.880; Omega = 0.821); ERL (Alpha = 0.940; Omega = 0.902); ENL (Alpha = 0.877; Omega = 0.851); EDL (Alpha = 0.922; Omega = 0.901).

External validity: Study achievement emotions

Formation of groups. The ANOVA carried out to form the groups showed a significant principal Group Factor effect for SRL-ERL relative to the total score for SRL-ERL [$F(4.385) = 1{,}798.369$, $p < 0.001$; $eta^2 = 0.949$, $power = 1.00$; $post\text{-}hoc = 5 > 4 > 3 > 2 > 1$, $p < 0.001$]. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.385) = 1.825$, $p < 0.100$]. See Table 11 for the descriptive statistics.

Effect of the SRL-ERL group on the type and level of achievement emotion (during the study). The ANOVA carried out showed a significant principal effect of the SR-ER Group relative to academic

TABLE 15 Descriptive statistics for the groups formed (n=360).

RL-ERL groups	$n=360$	Mean	(dt)	Enjoyment	Conf	Pride	Anger	Anxiety	Shame	Desp	Boredom
1. LOW	28	−1.31	(0.130)	3.32	3.25	3.51	3.09*	3.18*	3.02*	3.02*	3.33*
2. MLW	74	−0.89	(0.132)	3.29	3.30	3.49	2.44	2.80	2.34	2.34	2.62
3. EAN	74	−0.35	(0.146)	3.50	3.52	3.89	2.08	2.76	2.05	2.05	2.28
4. MH	56	0.18	(0.134)	3.70	4.03	4.14	1.62	2.19	1.47	1.47	1.79
5. HIGH	45	0.65	(0.167)	3.82**	4.15**	4.30**	1.41	2.15*	1.40	1.40	1.69

LOW, Low; MLOW, Medium-Low; MEAN, Medium; MHIGH, Medium-High; HIGTOT, High. **5,4 > 3 > 2,1 positive emotions (enjoyment, confidence, pride); *1,2 > 3 > 2,1 negative emotions (anger, anxiety, shame, despair, boredom).

TABLE 16 Values descriptive of the validation sample (n=400).

Variable	Range	Mean (dt)	Deviation error	Asymmetry		Dev. error kurtosis	Dev. error
SRH	1–5	3.93 (0.782)	0.039	−0.595	0.124	0.135	0.248
NRH	1–5	2.52 (0.807)	0.040	0.378	0.123	−0.226	0.246
DRH	1–5	2.30 (0.914)	0.045	0.440	0.123	−0.368	0.245
ERH	1–5	3.81 (0.955)	0.049	−0.495	0.125	−0.343	0.250
ENRH	1–5	2.37 (0.977)	0.049	0.279	0.124	−0.790	0.247
EDRH	1–5	2.27 (1.05)	0.053	0.534	0.125	−0.505	0.249

SRH, Self-Regulation in Health; NRH, Non-Regulation in Health; DRH, Dys-Regulation in Health; ERH, External Regulation in Health; ENRH, External Non-Regulation in Health; EDRL, External Dys-Regulation in Health; **$p<0.001$; *$p<0.01$.

achievement emotions during the study [$F(32.1072)=4.538$, $p<0.001$; $eta^2=0.119$, power = 1.00]. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.385)=1.825$, $p<0.157$]. See Table 11 for the descriptive statistics. See Table 15.

Study 4. Self-regulatory vs. external regulatory behavior inventory in *health psychology* context (SRH-ERH)

Descriptive results

The descriptive values found met the normality requirements to be expected of this type of sample. See Table 16.

Construct validity

Correlations

There was significant negative correlation of SRH with NRH and DRH and significant positive correlation of NRH and DRH. Across this context, the correlations are consistent in direction: negative for ERH with ENH and positive for ENH with EDH. Note also the consistent negative and positive correlation of components of the scale with the SR and SR- ER constructs. See Table 17.

Exploratory Factorial Analysis (EFA). This analysis was carried out with 50% of the sample, obtaining adjusted values: Kaiser–Meyer–Olkin = 0.892; Bartlett's Sphericity Test (630) = 4, 459, 189 $p<0.001$; factor communality was between 0.513 (item 6) and 0.842 (item 23). In the varimax rotation, six factors appeared that explained 70.04% of the variance: Factor 1, *EDRH* (21.60% variance) = items 34, 36, 35, 33, 31, and 30; Factor 2, *ERH* (14.97% variance) = 23, 20, 21, 22, 24, 19; Factor 3, *SRH* (11,24%) = 1, 3, 2, 4, 5, 6; Factor 4, *DRH* (10,81% variance) = 16, 15, 13, 17, 14, 18; Factor 5, *NRH* (7, 56% variance) = 9, 11, 7, 10, 12, 8; Factor 6, *ENRH* (4,19%) = 28, 26, 29, 25, 30, 31.

TABLE 17 Correlation between the types of internal and external regulation Health Psychology (n=400).

	SRH	NRH	DRH	ERH	ENH	EDH
SRH						
NRH	−0.543**					
DRH		0.520**				
ERH	0.622**	−0.518**				
ENH		0.510**	0.516**	−0.509*		
EDH			0.617**		0.551**	
SR	0.338**	−0.255**	−0.250**	0.265**	−0.192**	−0.157**
SRH-ERH	0.513**	−0.785**	−0.792**	0.558**	−0.868**	−0.824**

SRH, Self-Regulation in Health; NRH, Non-Regulation in Health; DRH, Dys-Regulation in Health; **$p<0.001$; *$p<0.01$.

Factorial Confirmatory Structure. The structural values for this construction appeared to be acceptable [Chi-square = 1647.619, $p<0.001$; df(702–118) = 584; CH/DF = 2,821; CFI = 0.958; GFI = 0.938; IFI = 0.926; TLI = 0.928; CFI = 0.926, RMSEA = 0.023; RSMR = 0.052; Hoelter = 1,294 ($p<0.05$), 1,345 ($p<0.01$)]. See Table 18.

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TABLE 18 Standardized total effects (default model; *n*=383).

	F1	F2	F3	F4	F5	F6
SRERH1	0.762					
SRERH2	0.805					
SRERH3	0.846					
SRERH4	0.811					
SRERH5	0.834					
SRERH6	0.663					
SRERH7		0.588				
SRERH8		0.378				
SRERH9		0.732				
SRERH10		0.718				
SRERH11		0.832				
SRERH12		0.594				
SRERH13			0.735			
SRERH14			0.649			
SRERH15			0.730			
SRERH16			0.834			
SRERH17			0.707			
SRERH18			0.751			
SRERH19				0.825		
SRERH20				0.888		
SRERH21				0.894		
SRERH22				0.892		
SRERH23				0.904		
SRERH24				0.848		
SRERH25					0.644	
SRERH26					0.704	
SRERH27					0.795	
SRERH28					0.871	
SRERH29					0.840	
SRERH30					0.711	
SRERH31						0.832
SRERH32						0.864
SRERH33						0.854
SRERH34						0.836
SRERH35						0.825
SRERH36						0.872

Reliability

The total reliability of the scale showed adequate ratios (Cronbach Alpha = 0.897; Omega Index = 0.868). Split-half analysis showed adequate values (Alpha 1 = 0.790; Alpha 2 = 0.855; Spearman–Brown Coefficient = 0.837; Guttman Split-half Coefficient = 0.829). The reliability of the subscales also appeared to be acceptable: SRL (Alpha = 0.901; Omega = 0.888); SNL (Alpha = 0.785; Omega = 0.743); SDL (Alpha = 0.873; Omega = 0.852); ERL (Alpha = 0.950; Omega = 0.934); ENL (Alpha = 0.805; Omega = 0.794); EDL (Alpha = 0.939; Omega = 0.914).

External validity: Psychological well-being

Formation of groups. The ANOVA carried out to form the groups showed a significant principal Group Factor effect for SRH-ERH relative to the total score for SRH-ERH [$F(4.315) = 1426.336$, $p < 0.001$; $eta^2 = 0.948$, *power* = 1.00; *post-hoc* = 5 > 4 > 3 > 2 > 1, $p < 0.001$]. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.315) = 1.848$, $p < 0.119$]. See Table 18 for the descriptive statistics.

Effect of the SRH-ERH group on the level of psychological well-being. The ANOVA carried out showed a significant principal Group Factor effect for SRH-ERH relative to the total score for psychological well-being. [$F(4) = 22.295$, $p < 0.001$; $eta^2 = 0.241$, *power* = 1.00; *post-hoc* = 4.3 > 4 > 2.1 > 2 > 1, $p < 0.001$]. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.281) = 1.788$, $p < 0.131$]. See Table 19 for the descriptive statistics.

Study 5. Self-regulatory vs. external regulatory inventory in *technology psychology* contexts

Descriptive results

The descriptive values found met the normality requirements to be expected of this type of sample. See Table 20.

Construct validity

Correlations

There was a significant negative correlation of SRT with NRT and DRT and a significant positive correlation of NRT with DRT. Across this context, correlations were consistent in direction: negative between ERT and ENRT and positive between ENT and EDRT. Note also the consistent negative and positive correlation of components of the scale with the SR and SR-ERT constructs. See Table 21.

Exploratory Factorial Analysis (EFA). This analysis was carried out with 50% of the sample, obtaining adjusted values: Kaiser–Meyer–Olkin = 0.852; Bartlett's Sphericity Test (630) = 3,672,012 $p < 0.001$; factor communality was between 0.476 (item 9) and 0.843 (item 3). In the varimax rotation, six factors appeared that explained 68.75% of the variance: Factor 1, *ERT* (14.30% variance) = items 23, 21, 20, 24, 22, 19; Factor 2, *EDRT* (12.58% variance) = 34, 33, 35, 31, 36, 32; Factor 3, *SRT* (10.52%) = 3, 1, 2 4,5,6; Factor 4, *DR* (12.27% variance) = 16, 17,14, 15, 13, 18; Factor 5, ENRT (10.20% variance) = 28, 29, 25, 27, 26, 30; Factor 6, *SNRT* (7.16%) = 7, 11, 12, 9, 8, 10.

Confirmatory Factorial Structure. The structural values for this construct appeared to be acceptable [Chi-square = 1628.730, $p < 0.001$; df(702–118) = 584; CH/DF = 2.789; CFI = 0.927;

TABLE 19 Descriptive statistics for the groups formed (n=286).

SRH-ERH groups	$n=286$	Mean	(dt)	Well-being	Self-help	Social relationships	Autonomy	Environment	Growth	Purpose
1. LOW	48	−1.20	(0.184)	4.07	4.19	3.91	3.71	3.70	4.44	4.17
2. ML	68	−0.74	(0.140)	4.18	4.26	4.14	3.99	3.96	4.61	4.37
3. *M*	64	−0.19	(0.143)	4.37	4.24	4.50	4.03	4.02	5.05	4.39
4. MH	66	0.29	(0.148)	4.69	4.66	4.78	4.18	4.51	5.24	4.79
5. HIGH	40	0.71	(0.145)	5.14	5.26	5.47	4.43	4.87	5.58	5.24

L, Low; ML, Medium-Low; M, Medium; MH, Medium-High; High, High; 5,4 > 3 > 2,1, $p < 0.001$ in well-being and all components.

TABLE 20 Descriptive values for the validation sample (n=760).

Variable	Range	Mean (dt)	Deviation error	Asymmetry		Dev. error kurtosis	Dev. error
SRT	1–5	3.94 (0.767)	0.039	−0.645	0.125	0.314	0.250
NRT	1–5	2.82 (0.726)	0.037	0.197	0.125	0.020	0.250
DRT	1–5	2.67 (0.930)	0.045	0.134	0.125	−0.510	0.249
ERT	1–5	3.72 (0.929)	0.048	−0.573	0.127	0.034	0.254
ENRT	1–5	2.70 (0.923)	0.049	0.206	0.126	−0.388	0.251
EDRT	1–5	2.56 (1.02)	0.053	0.192	0.127	−0.703	0.254

SRT, Self-Regulation in Technology; NRT, Non-Regulation in Technology; DRT, Dys-Regulation in Technology; ERT, External Regulation in Technology; ENRT, External Non-Regulation in Technology; EDRT, External Dys-Regulation in Technology; $^{**}p < 0.001$; $^{*}p < 0.01$.

TABLE 21 Correlation between the types of internal and external regulation in Technology Psychology (n=760).

	SRT	NRT	DRT	ERT	ENT	EDT
SRT						
NRT	−0.129**					
DRT	−0.160**	0.537**				
ERT			0.191**			
ENT		0.582**	0.576**	−0.108*		
EDT		0.547**	0.733**	0.190**	0.610**	
SR	0.214**	−0.190**	−0.65	0.140**	−0.105*	0.007
SRT-ERT	0.354**	−0.574**	−0.692**	0.365**	0.819**	−0.725**

SRT, Self-regulation in Technology; NRH, Non-Regulation in Technology; DRH, Dys-Regulation in Technology; $^{**}p < 0.001$; $^{*}p < 0.01$.

GFI = 0.903; IFI = 0.926; TLI = 0.946; CFI = 0.926, RMSEA = 0.023; RSMR = 0.042; Hoelter = 1,309 ($p < 0.05$), 1,360 ($p < 0.01$)]. See Table 22.

Reliability

The total reliability of this scale showed adequate values (Cronbach Alpha 0.916; Omega = 0.885). Split-half analysis showed adequate values (Alpha 1 = 0.824; Alpha 2 = 0.882; Spearman–Brown Coefficient = 0.858; Guttman Split-half Coefficient = 0.850). The reliability of the subscales also appeared to be acceptable: SRT (Alpha = 0.881; Omega = 0.876); NRT (Alpha = 0.701; Omega = 0.683); DRT (Alpha = 0.858; Omega = 0.834); ERT (Alpha = 0.943; Omega = 0.925); ENT (Alpha = 0.865; Omega = 0.850); EDT (Alpha = 0.915; Omega = 0.901).

External validity: Impatience-hostility (TABP)

Formation of groups. The ANOVA carried out to form the groups showed a significant principal Group Factor effect for SRT-ERT relative to the total score for SRT-ERT [$F(4.294) = 1008.857$, $p < 0.001$; $eta^2 = 0.932$, *power* = 1.00; *post-hoc* = 5 > 4 > 3 > 2 > 1, $p < 0.001$]. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.296) = 1.749$, $p < 0.128$]. See Table 7 for the descriptive statistics.

Effect of the SRT-ERT group on the level of Type A Behavior Pattern (TABP). The ANOVA carried out showed a significant principal effect of the SRT-ERT group relative to the total TABP score [$F(4.252) = 1.527$, $p < 0.05$; $eta^2 = 0.035$, power = 0.660;], its dimensions [$F(8.504) = 3.103$, $p < 0.001$; $eta^2 = 0.064$, power = 0.964; *IH*, $F(4.252) = 4.702$, $p < 0.001$; $eta^2 = 0.069$, power = 1.00; *post-hoc*, 5.4 < 1, 2, $p < 0.05$] and its components [$F(16,1,008) = 2,121$, $p < 0.01$; $eta^2 = 0.033$, power = 0.973; *IMP*, $F(4,252) = 4.211$, $p < 0.001$; $eta^2 = 0.063$, power = 1.00; *post-hoc*, 5.4 < 1, 2, 3, $p < 0.05$]. Levene's test of error variance based on the mean showed the adequacy of the groups [$L(4.225) = 1.788$, $p < 0.199$]. See Table 23 for the descriptive statistics.

Discussion

The results obtained provide support for these instruments, and the hypotheses proposed in relation to the instrument presented based on the SR-ER Theory model (de la Fuente, 2017,

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TABLE 22 Standardized total effects (default model; *n*=380).

	F1	F2	F3	F4	F5	F6
SRERT1	0.763					
SRERT2	0.803					
SRERT3	0.841					
SRERT4	0.810					
SRERT5	0.831					
SRERT6	0.668					
SRERT7		0.545				
SRERT8		0.365				
SRERT9		0.641				
SRERT10		0.550				
SRERT11		0.771				
SRERT12		0.599				
SRERT13			0.647			
SRERT14			0.586			
SRERT15			0.767			
SRERT16			0.741			
SRERT17			0.758			
SRERT18			0.747			
SRERT19				0.757		
SRERT20				0.861		
SRERT21				0.858		
SRERT22				0.868		
SRERT23				0.899		
SRERT24				0.872		
SRERT25					0.638	
SRERT26					0.559	
SRERT27					0.802	
SRERT28					0.855	
SRERT29					0.787	
SRERT30					0.717	
SRERT31						0.712
SRERT32						0.746
SRERT33						0.800
SRERT34						0.847
SRERT35						0.850
SRERT36						0.831

2021). *Hypothesis 1*, relating to the demonstration of a stable, valid structure with six components inherent to the theoretical model and common to the different versions of the questionnaire has demonstrated empirical adequacy. It has also been empirically shown that the SR-ER construction allows scores to be ordered in a continuum of the combined scores for the SR-NR-DR (self-regulation) and ER-ENR-EDR (external regulation) components that make up the Scale in its different versions. The reliability and validity results are similar to those found previously with other samples (de la Fuente et al., 2021b; Pachón-Basallo et al., 2021). However, the design of Item 8 of the De-Regulation Scale should be reviewed since it appears to have a lower level of reliability. Future research will allow us to better adapt to the situations of different users in different contexts.

The total score, as an aggregate averaged continuum of Self-Regulation and External Regulation, has allowed the level of regulation in the behavior of a given person to be placed on a conceptual continuum from +1 to −1, as envisaged by the model whereby moving toward +1 represents increasing average regulation and moving toward −1 represents increasing dysregulation. Those scores could be used in practice to assess the degree of personal and contextual regulation of each person in a given environment. Future research should determine the connection between this construct and other more classical constructs in the area of the regulatory difficulties and problems inherent to different pathologies. Some recent studies have suggested that the *dysregulatory* level of subjects is an essential and predictive element in psychiatric pathologies (Billen et al., 2021; Levin-Aspenson et al., 2021); however, those studies have not explicitly addressed the dysregulatory effect of context, which remains to be determined.

Empirical support has also been established for *Hypothesis* 2, that the different versions of the instrument would have adequate construct validity and reliability with sufficient discriminant power or external validity with respect to different constructs of relevance in each field (clinical, educational, health and technology). The same consistent factorial structure with six factors appeared in all versions of the instrument, which can be interpreted as demonstrating factorial invariance (Meredith, 1993).

The relationship between the Self-Regulation, Non-Regulation, and Dys-Regulation constructs was also consistent across the different contexts, giving a stable relationship between Self-Regulation, Non-Regulation, and Dys-Regulation behaviors, both personal (*self-regulated*) and contextual (*externally regulated*). We believe that the ability to distinguish these three types or levels of behavioral regulation is of interest in itself given the behavioral continuum in which they are situated. In addition, we have established that it is possible to externally validate each version of the instrument through a continuous regulation heuristic of *person-context* combinations (with five levels), that has sufficient explanatory power to determine the variability of the different dependent variables analyzed in each context: *clinical* (negative emotional reactivity), *educational* (study achievement emotions), *health* (psychological well-being) and *technology psychology* (impatience-hostility). The consistency found allows us to infer the external convergence validity of the different scales.

A limitation of this work relates to the inconsistency described in the measurement of Item 8, which has now been amended. However, a strength of this work is that the instruments have been translated into other languages. Subsequent research should focus on validation of the instruments with samples from different countries and cultures as a form of transfer of the instrument and the inherent theoretical model and demonstration of factorial invariance, required as part of that process of validation.

TABLE 23 Descriptive statistics for the groups formed (n=286).

SRH-ERH groups	*n*	Mean	(dt)	TABP	COW	IH*	COMP	OVERW	IMPAC**	HOST*
1. LOW	46	−1.27	(0.169)	3.58	3.61	3.35	3.51	3.99	3.62	3.09
2. ML	95	−0.84	(0.125)	3.55	3.97	3.28	3.70	4.05	3.57	2.99
3. *M*	81	−0.37	(0.149)	3.35	3.69	3.02	3.54	3.84	3.26	2.94
4. MH	55	0.09	(0.133)	3.34	3.87	2.80	3.50	4.25	3.06	2.78
5. HIGH	24	0.56	(0.189)	3.15	3.61	2.69	3.26	3.95	2.91	2.46

L, Low; ML, Medium-Low; M, Medium; MH, Medium-High; High, High; 5,4 > 3 > 2,1; TABP, Type A Behavior Pattern; COW, Competitiveness-Overwork; IH, Impatience-Hostility; C, Competitiveness; OW, Overwork; I, Impatience; H, Hostility; **p < 0.001; *p < 0.05.

Conclusion

These results support the hypothesis of the types of behavioral regulation—internal and external—proposed by *SR vs. ER Behavior Theory* (de la Fuente, 2021b). As such, they contribute to advance the operational definition of such behavior in the three behavioral level types (SR-NR-DR) and contexts (ER-ENR-EDR). These new constructs and the possibility of measuring them will allow us to detect new behavioral realities and to advance the understanding of the role and effect of personal behavior in its interaction with the environment.

Implications

The development of these versions of the SR-ER evaluation instrument (de la Fuente, 2020d,e) provides a tool to validate associations between the different levels or types of regulatory behavior, personal and contextual, in different psychological contexts. In addition, it is a step forward in the conceptualization of the typologies of self-regulatory behavior (which can be measured) in relation to other dependent variables measured.

This *new model* and these new *scales* have many academic and professional implications. In the academic sphere, the model will allow the determination of new theoretical and empirical relationships in a continuum of human behavior by confirming the connection between the three levels of self-regulation factors (internal and external). The model will allow the transdiagnostic transition between the three levels of self-regulation proposed from the positive or protective (self-regulation) to the negative or risk level (dysregulation). As such, this analytical framework will help to behaviorally operationalize the p factor in a transdiagnostic way as recently proposed in the field of psychiatry (Kaminski et al., 2022; Smith, 2022). The research agenda for those lines of investigation has recently been laid out as it applies to different fields of Psychology (de la Fuente et al., 2022a). It is also important in the professional arena because the model and the scales allow assessment of the levels of personal and contextual regulation of an individual in a given psychological context. It represents significant progress because it allows contextualization of personal and contextual regulatory factors in interaction (to give a general regulation score). This transcends a purely clinical perspective focused on personality-based factors to explain a given psychopathological behavior. The model also allows assessment and then intervention with knowledge of an individual's specific behavioral momentum and its development in a particular regulatory direction: SR→NR→DR; SR←NR←DR; ER→ENR→EDR; ER←ENR←EDR.

This development is of theoretical and applied interest, because it supports the use of the concepts of regulation (R), non-regulation (NR), and dys-regulation (DR) which thus far have not been brought together in a coherent theoretical and applied continuum. As such, it opens the door to the exploration of assessment and intervention in different fields:

1. In the professional and academic field of *Clinical Psychology*, the categorization derived from this instrument (SR-NR-DR; ER-ENR-EDR) allows different types of potentially pathological behavior and contexts to be accurately determined. It is assumed that the different levels of self-regulation and external regulation may imply different types of behavioral dysfunction associated with levels of regulation through the *p factor,* as shown by psychiatric research (Billen et al., 2021; Levin-Aspenson et al., 2021).
2. In the professional and academic field of *Educational Psychology*, the existence of these new constructs (SR-NR-DR; ER-ENR-EDR) can help us to understand the factors that regulate the learning processes and the teaching context. Thus, psycho-educational intervention strategies can be based on assessment, evaluation, and intervention in both components of the teaching-learning process.
3. In the professional and academic field of *Health Psychology*, measurement along this continuum (SR-NR-DR; ER-ENR-EDR) will allow us to determine the profiles of individuals who require support and the contexts that promote or do not promote healthful behaviors.
4. In the professional and academic field of the *Psychology of Use of Technology,* measurement along this continuum (SR-NR-DR; ER-ENR-EDR) will allow us to more accurately identify maladjusted behaviors and maladjustive contexts associated with the use of technology at university.

However, there are as-yet unexplored fields to which the theoretical model can be applied, and for which tailored measurement instruments can be developed. Areas of intervention such as Organizational Psychology, Forensic Psychology, Sports Psychology, Psychology of Risk and Catastrophe, Traffic Psychology, and Aviation Psychology could be enriched by these contributions.

Data availability statement

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

Ethics statement

This study was reviewed and approved by Comité de Ética de la Investigación, University of Navarra (ref. 2018.170). The patients/participants provided their written informed consent to participate in this study.

Author contributions

JF and MP-B: R&D Project, idea, design, analysis, and initial writing. JM-V and FP-S: R&D Project, data collection, and revision of the draft. AG-U and PS: review of the final version in English. 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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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.922633/full#supplementary-material

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Predictive model of the dropout intention of Chilean university students

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Dropping out of university studies is one of the current problems of Higher Education; the increased rates during the first year of the study programme is considerable around the world. Dropping out has negative social implications that are reflected at the personal, family, institutional, and educational levels. The aim of this study was to evaluate a predictive model considering the mediation of university social satisfaction and perceived academic performance within the relations between perceived social support, social self-efficacy and academic purposes with career satisfaction and dropout intention in Chilean university students. A non-experimental explanatory design of latent and observed variables was used. Structural equation analyses with Mplus software were performed. The sample consisted of 956 first year university students. The study complied with the ethical requirements for research with human subjects. As a result, a predictive model with adequate adjustment indexes was obtained. When evaluating the explanatory capacity through the coefficient of determination (R^2), it was observed that it explains 38.9 and 27.4% of the variance of the dropout intention and career satisfaction, respectively. This percentage of explanation indicates a large effect size in Social Sciences; therefore, they are considered adequate predictive models. The mediation of university social satisfaction on the relationships between social support, social self-efficacy, and academic purposes with academic adjustment and dropout intention was, respectively, confirmed. The perception of academic performance has less influence on dropout intention and on career satisfaction among first-year students. The model obtained allows explaining the dropout intention and career satisfaction in first year students. In addition, it is composed of variables that can potentially be modified in the interaction of students and professors.

KEYWORDS

predictive model, dropout intention, university students, structural equation modeling, higher education

1. Introduction

1.1. The problem of university dropout in the world

Dropping out of university studies is one of the current problems of Higher Education; the increased rates during the first year of the career is considerable around the world, ranging between 20 and 30% (Micin et al., 2015; Aulck et al., 2017; Arzola, 2019; Bernardo et al., 2020). In Chile, a high incidence of students' dropout has been found in the first two semesters (39%), then it decreases over time (González-Campos et al., 2020). Dropping out has negative social implications that are reflected at the personal, family, institutional, and educational levels (González-Pérez and Uribe, 2002; Sarcletti and Müller, 2011; Oreopoulos and Petronijevic, 2013), which jeopardize the development of countries. At the family and personal levels, it causes financial and emotional issues that are difficult to overcome in the short term (Cáceres et al., 2019). At the institutional level, it affects the prestige and reputation of the establishments (Angulo-Ruiz and Pergelova, 2013), complicates the educational quality assurance process that is evaluated in Chilean universities, and determine the allocation of public resources (Toledo and Rojas-Palma, 2019).

Dropout intention refers to thoughts, wishes and intentions experienced by students at university concerning the possibility of withdrawing from their degree program before they graduate, or of departing from an institution of higher learning (Mashburn, 2000; Díaz-Mujica et al., 2018). Dropout intention is also understood as part of a decision-making process that unfolds in the early stages of the university experience and that is characteristically dynamic and convergent with multiple factors (Stinebrickner and Stinebrickner, 2014). Dropout intention functions as an indicator of the disposition that a student has as an antecedent of a behavior; and it is based on the attitude toward the behavior, the subjective norm, and the perceived behavioral control (Morales and Correa, 2017). Thoughts associated with dropout can facilitate this disengagement process (Bean and Metzner, 1985).

A central factor of this process is the educator's role. From Social Cognitive Learning Theory (Bandura, 1986), the reciprocal determinism proposed by Albert Bandura possible to explain how students function through the triadic causal structure: person, environment, behavior. According to the triadic casual structure, students are influenced by the context, which in turn, influences the person and behavior, and at the same time, the student can influence both the context and behavior (Bandura, 2012). Therefore, the interactions, the influences, and the experiences in the university community provide students with models, ideas and sequences of events that can generate an action sequence of learned behaviors for them to feel competent to carry out academic activities and succeed in different demands of the context.

The identification of factors related to university dropout generated the development of theoretical models, such as that of Tinto (1975, 1982), in order to explain this problem. This research is supported by Tinto's (1987) theoretical model considering that the variables included allow explaining the academic and social integration of students in the first year of Higher Education. Likewise, the variables allow institutions to understand how students' perceptions shape decisions to persist and how their actions influence those perceptions (Tinto, 2017). Although most theoretical models refer to the university dropout, this study focuses on the investigation of the intention to drop out since it facilitates the understanding of the phenomenon from a preventive approach, i.e., acting before the student dropout. Based on these theoretical models, research with varying degrees of empirical support has been carried out on university students.

1.2. Research topic gap

Most research associated with the dropout of university studies have focused on sociodemographic and contextual variables. There is less research on the cognitive-motivational variables of students who can be influenced by teachers in the course of the teaching-learning process (Díaz-Mujica et al., 2019).

A "quick review" was carried out in main or referential databases of interdisciplinary nature (Wos, Scopus, Elsevier) to identify empirical research that have proposed predictive or explanatory models of dropout intention and/or dropout in first year students; it showed that most of the research presented descriptive-correlational and predictive scopes (López-Angulo, 2021). The studies identified have proposed models to explain dropout; however, they present the following limitations: (1) they include variables that are difficult or not possible to modify; (2) the evidence of the models are associative in nature; that is, they conclude that there are significant relationships between variables, but do not explain or clarify how that system of relationships occurs; (3) most of them perform regression analysis, neural networks, machine learning and data mining, based on information from databases, institutional records and retrospective data; and (4) one of their main purposes is to define a successful student's profile about to be graduated, rather than to identify processes that can be influenced. The review of the literature shows a gap in terms of cognitive and motivational variables that can be modified in the interaction between students and teachers. The scarce research identified (Fisher, 2014; Respondek et al., 2017; Bäulke et al., 2018; Jeno et al., 2018; Díaz-Mujica et al., 2019; Bumbacco and Scharfe, 2020; Fourie, 2020) include different explanatory models of dropout, which are recognized as complex processes determined by individual, institutional and social factors. Notwithstanding, even though the predominant variables are relevant to explain dropout intention, most of them cannot be modified in the interaction of the environment with students; that is to say, they are difficult to change through the teaching-learning process. Only two investigations (Díaz-Mujica et al., 2019; Fourie, 2020) make explicit reference to the quality of some of the variables considered as "modifiable."

Summarizing the aforementioned, this research is based on the following foundations:

1. the existence of a gap regarding predictive models designed to work with modifiable variables in student-teacher interactions in Latin American, specifically in Chile;

2. the need to contribute to scientific knowledge that substantiate teaching methods in order to foster cognitive-motivational variables and learning;

3. the importance of teachers as models since their behavior and verbalizations facilitate successful academic performance while interacting with students;

Thus, it is relevant to corroborate an empirical model including modifiable variables that have not been analyzed conjointly (e.g., perceived social support, social self-efficacy, academic purposes, social adjustment, academic performance, and academic adjustment). This model will allow an approximation to explain the dropout intention of first-year university students.

1.3. Theoretical perspective, background and prior research

Social support is defined as the perception of being assisted by others and having a trusted network whenever one needs support in daily life situations or in moments of crisis (Taylor, 2011). More specifically, social support can come from three main sources: family, friends and significant others (Zimet et al., 1988). Perceived social support predicts and explains academic performance (Richardson et al., 2012; Vander Zanden et al., 2018), as well as the transition during the first year of university (Rodríguez et al., 2017). It is also related to social (Rahat and İlhan, 2016) and career satisfaction ($r = 0.56$, $p < 0.05$; Akanni and Oduaran, 2018).

Career satisfaction involves the degree to which students adapt to academic demands, calibrate their efforts, make a commitment to their studies, and manage their behavior in class (Baker and Siryk, 1989; Credé and Niehorster, 2012). Career satisfaction is positively related to academic performance (Rienties et al., 2012; Bailey and Phillips, 2016; Hazan and Miller, 2017; Páramo et al., 2017; Van Rooij et al., 2018) and academic success ($r = 0.186$, $p < 0.001$; Raza et al., 2020). A relevant sub-variable of career satisfaction is satisfaction with the study program, which has shown a significant and negative relationship to dropout intention (Duque, 2014). Study program satisfaction is related to persistence in one's university studies ($r = 0.51$, $p < 0.05$; Lent et al., 2016), and career satisfaction is influenced by interaction with teachers and classmates, with Higher Education social satisfaction being a significant determinant of academic performance (Delaney, 2008; Sevinc and Gizir, 2014). The degree to which students integrate into the university's social structures, participate in campus activities, meet new people and make friends, indicates the level of social satisfaction at university that they are attaining (Baker and Siryk, 1989; Páramo et al., 2017). The students' relationship with the university environment is significant and the sources of support (i.e., family, friends and significant others) are important for social fit ($r = 0.16$–0.27). The abovementioned social satisfaction impacts positively on career satisfaction ($r = 0.619$, $p < 0.01$).

A variable that influences Higher Education social satisfaction is the student's social self-efficacy because it enables them to initiate and maintain interpersonal relations with their classmates and other persons of interest (Gecas, 1989; Smith and Betz, 2000). It is conceptualized as the beliefs, perceptions or expectations held by individuals regarding their capacity to organize actions and efforts that are required to materialize a specific type of achievement (Bandura, 1997). This implies having the skill, self-assurance and perceived capacity for grasping and predicting social situations, expressed through behavior that is demonstrative of the individual's adaptation to social situations (Grieve et al., 2014). Social self-efficacy has been shown to have a positive relation to academic performance (Grieve et al., 2014; Dunbar et al., 2018). A higher degree of self-efficacy leads to being better adjusted to campus life and greater satisfaction with one's friendships. Social self-efficacy is associated with positive experiences of Higher Education social satisfaction (Meng et al., 2015). Consequently, social self-efficacy is a facilitator of social satisfaction for students admitted to university (Wei et al., 2005; Matsushima, 2016).

Another variable that is pertinent to fitting in and permanence at university are students' academic purposes. These refer to supra-ordinary, valuable and transcendent aims that promote intentional behaviors that can be structured as specific goals. They enable the student to persevere when faced by obstacles and adversities in the university context, and their self-regulating character thus aids the student in deciding the next course of action they should pursue, what to focus their attention on, and valuing the present but always with a future-oriented horizon (López-Angulo, 2021). Having an intent helps to keep motivation high and to persevere in adverse situations (McKnight and Kashdan, 2009). It impacts positively on students' perceptions of their academic workload, their participation in academic activities, and on their relationships with teachers and peers (Xerri et al., 2017).

Finally, academic performance is a multidimensional variable that can be influenced by personal factors (i.e., sociodemographic and psychological) and contextual ones (i.e., economic, familial and academic; Mayora-Pernía and Fernández-Morgado, 2015). More specifically, in the first year or semester, academic performance has a high positive correlation with permanence at university (Araque et al., 2009; Bernardo et al., 2016), and is considered an indicator of adaptation to the demands of academic life (Aranda et al., 2013) and one of the best predictors of retention in second and third year (Westrick et al., 2015).

Students who feel socially supported may adapt better to Higher Education (Rodríguez et al., 2017; De Oliveira-Nunes et al., 2020; Lee et al., 2020; Mostert & Pienaar, 2020), and may achieve higher academic performance (Richardson et al., 2012; Abdullah et al., 2014; González-Chong, 2017; Alipio, 2020), which has a positive impact on career satisfaction and decreased dropout intention (Esteban-García et al., 2016; Motl et al., 2018). Similarly, students with high social self-efficacy have beliefs, perceptions and

expectations about their abilities to establish social contact easily and develop interpersonal relationships, which is relevant for university social adaptation (Castellanos-Páez et al., 2017; Gazo et al., 2020), and the perception of academic performance (Casas and Blanco, 2016) which at the same time have positive impact on dropout intention. Students with established academic purposes give meaning and direction to academic life, therefore contribute to maintain motivation, and persist in the face of adverse situations (Steger et al., 2006; Hill et al., 2010); possessing academic purposes has a positive impact, as they help and guarantee permanence in studies (Kennett et al., 2013; Xerri et al., 2017).

The empirical evidence available on the relations between perceived social support, social self-efficacy, social adjustment and academic performance make it possible to propose the formulation of a predictive model of career satisfaction and dropout intention. With respect to academic purposes, in view of the paucity of empirical evidence in the academic context, it is important to describe their nature in this specific context, rather than generally, for which an abundance of empirical evidence already exists (DeWitz et al., 2009; Folgueiras and Palou, 2018; García-Alandete et al., 2018; Sun, 2018). This research therefore sought to evaluate model that would consider the mediation of social satisfaction and the perception of academic performance in the relationship of perceived social support, social self-efficacy and academic purposes to career satisfaction and dropout intention among university students. The following hypotheses were established:

> *H1*. There is an indirect relationship of perceived social support with career satisfaction and intention to drop out through social satisfaction and perceived academic performance.
>
> *H2*. There is an indirect relationship of social self-efficacy with career satisfaction and intention to drop out through social satisfaction and perceived academic performance.
>
> *H3*: There is an indirect relationship of academic purpose with career satisfaction and intention to drop out through social satisfaction and perceived academic performance.
>
> *H4*. Social satisfaction and perceived academic performance mediate the relationship between perceived social support, social self-efficacy and academic purposes with career satisfaction and intention dropout of university students, constituting a predictive model of the relationships between these variables, as shown in Figure 1.

2. Materials and methods

The study employed a cross-sectional predictive empirical design with latent variables having a structural model of relationships between variables, and a measurement model that includes the various indicators that define a construct or latent variable. These two models are represented through a system of structural equations, in which some variables are latent and others are observable (Ato et al., 2013).

2.1. Participants

The participants were university students of the 2019 cohort attending first semester. The sampling strategy was non-probability. A total number of 1,028 students volunteered to take part in the study. However, 72 were removed as they failed to meet one or more of the following inclusion criteria: (1) first time university students, and (2) outliers, detected using Mahalanobis distance, as it allows the identification of multivariate outliers. The sample consisted of 956 first year university students, see Table 1. Four Chilean universities took part, one state university and three private ones. The total sampling of students consisted of 500 males (52.3%), 454 females (47.5%) and 2 (0.2%) reporting another gender identity. Their ages ranged from 17 years to 23 years ($M = 18.781$; DE = 1.192).

2.2. Instruments

2.2.1. Multidimensional scale of perceived social support

The study employed the version of the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988) validated for Chilean universities (López-Angulo et al., 2021). It is a self-reporting instrument with a Likert-type response scale ranging from 1 = strongly disagree to 7 = strongly agree. The scale has a factorial structure of three second-order factors and a general factor. It contains 12 items that measure the support provided by social relationships established by the individual in his or her environment, the three main sources being family, friends and significant others (Zimet et al., 1988). Some examples of items are: "My family gives me the help and emotional support I require"; "I can talk about my problems with my friends"; "When I need help, I know there is someone who can give me support." The scale has adequate psychometric properties: $\alpha = 0.903$ (Family), $\alpha = 0.928$ (Friends), and $\alpha = 0.864$ (Significant Others). The score is based on averaging the answers to the 12 items that make up the scale, where the highest scores indicate a greater perception of received social support. The analysis of the measurement model showed good fit indices for a three factor structure [$\chi^2 = 207.430$, $p < 0.001$; RMSEA = 0.055 (90% IC: 0.047–0.063; CFI = 0.957; TLI = 0.945; RSMR = 0.030)] as well as reliability $\omega = 0.891$ (Family), $\omega = 0.923$ (Friends), and $\omega = 0.851$ (Significant Others).

2.2.2. Cognitive and behavioral social self-efficacy questionnaire

The Cognitive and Behavioral Social Self-Efficacy Scale (Grieve et al., 2014) was employed that is validated for Chilean universities (López-Angulo et al., 2021). It measures students'

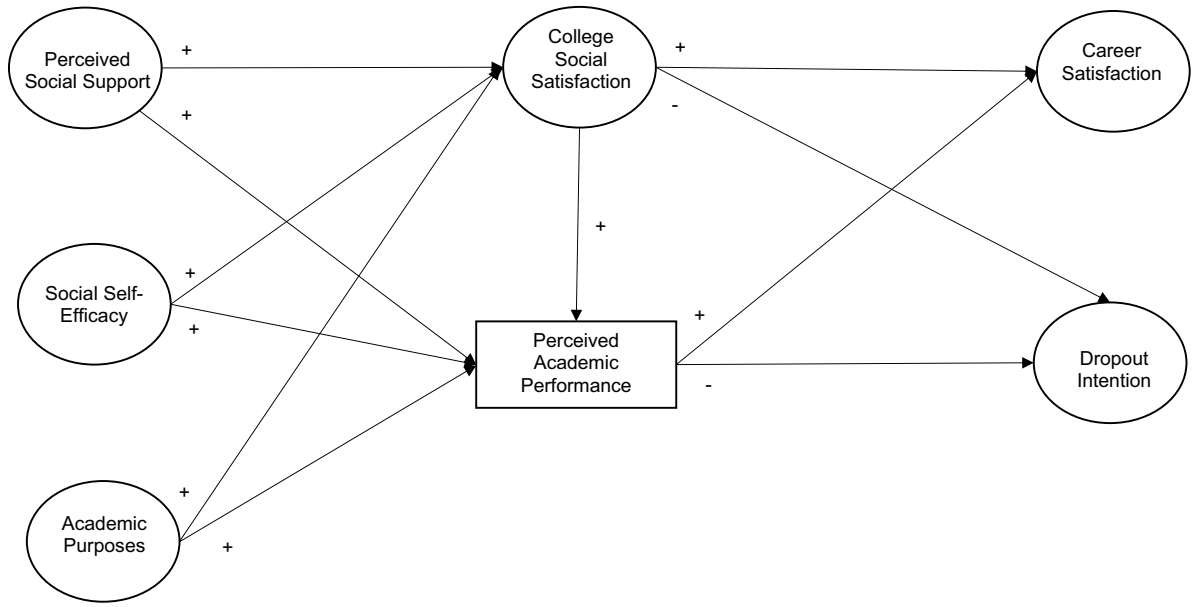

FIGURE 1
Hypothetical predictive model of dropout intention.

TABLE 1 Description of participants according to area of knowledge, sex, and age.

OECD* Area	*n*	Men	Women	Other's	Age	SD
Health and medical sciences	129	61	68		18.63	1.02
Natural sciences	52	27	25		19.37	1.03
Social sciences	432	162	268	2	19.03	1.29
Engineering and technology	343	250	93		18.6	1.09
Total	956	500	454	2	18.78	1.19

*Organization for economic co-operation and development.

beliefs, perceptions and expectations regarding their skill sets for easily establishing social contact and developing interpersonal relationships in the university context (Gecas, 1989; Smith and Betz, 2000), as well as the perceived ability, self-confidence and capacity for grasping and predicting social situations, expressed through behavior (Grieve et al., 2014). The inventory comprises 18 items. In each item the respondent is asked to give a numeric response as to how sure they are that they can achieve what is described in each item, with "1" meaning "Not at all sure" and 5 meaning "Very sure." The instrument for measuring social self-efficacy is configured by three interrelated dimensions, which in turn configure a global construct. A second-order factorial model was confirmed, consisting of 15 items, in which factor 1 measures aspects related to the capacity to predict others' behavior, factor 2 refers to cognitive elements related to the perceived capacity to understand others' feelings, and factor 3 captures behaviors related to perceived ability and self-confidence in social situations, and which are expressed through the individual's behavior and are indicative of fitting into social situations. A sample item: "In interactions with others in the study program, I can: 'Anticipate the behavior of other persons', 'Understand the feelings of other persons', and 'Easily adapt to social situations'." The fit indices of the academic commitment scale were: χ^2 (83) = 452.500, $p < 0.001$; CFI = 0.963; TLI = 0.954; RMSEA = 0.066 (0.060–0.072), SRMR = 0.035. This scale has adequate psychometric properties: $\alpha = 0.811$ (Prediction), $\alpha = 0.816$ (Cognitive), $\alpha = 0.824$ (Behavioral), and $\alpha = 0.870$ (General). The score is based on the average of the answers, with the highest scores indicating more social self-efficacy. The analysis of the measurement model showed good fit indices for a three factor structure [$\chi^2 = 452.500$, $p < 0.001$; RMSEA = 0.066 (90% IC: 0.060–0.072; CFI = 0.963; TLI = 0.954; RSMR = 0.035)] as well as reliability $\omega = 0.812$ (Factor 1), $\omega = 0.816$ (Factor 2), and $\omega = 0.828$ (Factor 3).

2.2.3. Student adaptation to college questionnaire

To measure university social satisfaction, career satisfaction and academic purposes, subscales validated in Chilean universities (López-Angulo, 2021; López-Angulo et al., 2021) of the Student Adaptation to College Questionnaire (SACQ; Rodríguez et al., 2012) were used. The university social satisfaction scale is comprised of 7 items configuring a first-order model that enable measuring student satisfaction with social activities at university. Sample items are: "I think I fit in well in my university"; "I'm content with my

participation in the social activities offered by the university" $\alpha = 0.806$. Satisfaction with the study program was measured with a subscale of the dimension of academic fit. This scale is comprised of 4 items: "I'm satisfied with the number and variety of my subjects"; "I'm very satisfied with the teachers that I have this year." Academic purposes were measured with a subscale of the dimension of academic fit. This scale is made up of 4 items. Sample items: "My academic objectives and intentions are well defined." "I know why I'm in college and what I want to get out of it." $\alpha = 0.798$. For all the subscales, a response scale of 7 alternatives was used (from 1 = Totally disagree to 7 = Totally agree). The score was obtained through the average of the responses to each factor. A higher score indicates that the student has better-defined academic purposes. The analysis of the measurement model showed good fit indices for all factors. For factor structure social satisfaction [$\chi^2 = 43.396$, $p < 0.001$; RMSEA = 0.047 (90% IC: 0.031–0.063; CFI = 0.977; TLI = 0.996; RSMR = 0.026)] and reliability ($\omega = 0.814$). Also, for the career satisfaction [$\chi^2 = 103.239$, $p < 0.001$; RMSEA = 0.047 (90% IC: 0.037–0.058; CFI = 0.964; TLI = 0.951; RSMR = 0.042)], as well as reliability ($\omega = 0.824$); and the academic purposes [$\chi^2 = 2.282$, $p < 0.001$; RMSEA = 0.012 (90% IC: 0.000–0.067; CFI = 0.000; TLI = 0.999; RSMR = 0.009)], as well as reliability ($\omega = 0.814$).

2.2.4. Perception of academic performance

The perception of academic performance was obtained through the grade reported by the students, which responded to their self-evaluation of their performance during the current semester. The item read: Mark with an x the box that best fits your academic performance. The Chilean grading system was used, of a continuous variable that goes from 1 = Very deficient, to 7 = Excellent. Academic performance was classified as low for grades lower than 3.0, average in the range of 3.1 to 5.9, and high between 6.0 and 7.0.

2.2.5. Dropout intention

Dropout intention was measured using 3 *ad hoc* items that sought to detect whether a student had any intention or wish to discontinue his or her studies (Díaz-Mujica et al., 2019). They were the following: "I'm thinking of leaving the program," "I'm thinking of applying to the same program in a different university," "I'm thinking of attending another university and applying to a different degree program." A response scale of 7 alternatives was used (from 1 = Totally disagree to 7 = Totally agree). The score was calculated based on the average of the responses to the 3 items. The correlations were statistically significant between items 1 and 2 ($r = 0.420$; $p < 0.001$), 1 and 3 ($r = 0.545$; $p < 0.001$) and items 2 and 3 ($r = 0.544$; $p < 0.001$) as well as the reliability ($\omega = 0.765$).

2.3. Procedure

In order to access the sample, the authorities of the different faculties were contacted to obtain the appropriate permissions and carry out the study. The selection of participants was based on convenience and accidental sampling. The survey takers coordinated with the teachers and a space was designated that students were invited to go to in order to take part in the study. The students' informed consent was obtained beforehand that considered the ethical principles established by the Singapore Declaration and the National Research and Development Agency of Chile. Reference was also made to data protection and the use of the data solely for research purposes. Following this, the students who volunteered to participate answered the questionnaires in the classrooms with pencil and paper. The application of the questionnaires was carried out in the first semester.

2.4. Analysis plan

The study's objective was to evaluate a predictive model that would consider the mediation of social satisfaction and the perception of academic performance (mediating variables) in the relationship of perceived social support, social self-efficacy and academic purposes (predictor variables) to career satisfaction and dropout intention among university students (criterion variables). The research objectives were tested by means of structural equation modeling (SEM), which, as a multivariate statistical method, combines factor analysis and multiple regression to simultaneously examine relations of interdependence between the observed and latent variables, as well as between the latent variables (Hair et al., 2014). The structural model was evaluated after the measurement model was accepted. Firstly, analysis was carried out of the measurement model, second, the analysis of the structural model, and third, the mediation analysis through the Sobel test.

For the SEM, the five steps recommended in the literature for the analysis of structural equations were applied: specification, identification, estimation, evaluation and modification of the model (Bollen and Long, 1993; Kline, 2015). Specification consisted of formulating an initial hypothetic model based on the theory and empirical findings reviewed. Identification concerned the examination of whether there was enough information to enable contrasting the model. When calculation of the degrees of freedom was done, it was observed that these were greater than zero (df = 921), exactly as the literature suggests. An "over-identified" model was thus observed, whose fit can be submitted statistically to verification. Estimation was done with the ML estimator (Maximum Likelihood Estimation), considering that the variables were ordinal, measured on a Likert scale of up to 7 points, and, thus, treated as continuous measures (Sass et al., 2014). Specifically, the MLR (Maximum Likelihood Estimation Robust) was used, given the robustness it offers with a multivariate data distribution that is not so similar to a normal distribution, and given the possibility of visualizing the standard errors.

An evaluation was done of the factorial structure underlying a matrix of correlations for each latent variable through the

CFA. Based on the literature, the fit indices of the proposed model are useful for determining an optimal model: (1) Non-significant Chi-values $\left(X^2\right)$ $p \geq 0.05$ (Tabachnik and Fidell, 2007), (2) root mean square error of approximation (RMSEA) values less than 0.07 (Hu and Bentler, 1999; Steiger, 2007), (3) comparative fit index (CFI) and non-normalized fit index (TLI) should be greater than 0.94 (Hair et al., 2014), and (4) item factor loadings should be significant equal to or greater than 0.30 (Field, 2013), preferably greater than 0.40 (Hair et al., 2014; Lloret-Segura et al., 2014).

Mediation effects were verified with the Sobel Test, which uses the multivariate delta method to calculate the standard error of the indirect effect (Sobel, 1982). The bootstrap method is preferred over other as it does not impose the assumption of normality of the sampling distribution of indirect effects, has a lower type I error rate, and has greater power to detect mediation (MacKinnon et al., 2002). Total indirect effect is the mediation effect of the set of mediators. Specific indirect effect is the unique mediator effect of a mediator above and beyond other mediators in the model. Bias-corrected bootstrapped 95% confidence intervals of the indirect effects were derived from 5,000 resamples. If the interval does not include zero, a mediated effect is considered significant. Mplus software version 8.4 (Muthén and Muthén, 1998/2017) was used for all analyses.

3. Results

3.1. Preliminary analyses: Descriptive statistics

The students' scores for most of the variables were moderate: they answered that they slightly agreed with regard to the social support they received from family, friends and significant others; they were slightly satisfied, they fit in academically and socially to the demands of the university; and their academic purposes were moderately defined. They perceived their level of academic achievement as moderate/sufficient, and as for social self-efficacy in relationships with others, they felt undecided and unsure about socially interacting with other students in the study program. Finally, the students reported low intentions of dropping out, see Table 2.

Considering the scores in the "high" category (≥ 6), "median" (≥ 3.1 and ≤ 5.9) and "low" (≤ 3), it was observed that 44.7% reported having high perceived levels of social support, 27.2% had high levels of social self-efficacy, 22.1% had high perceptions of academic performance, 54.7% stated they had well-defined academic purposes, 15% high social satisfaction at university, 35.3% were highly satisfied with the degree program, and 4.9% evaluated their academic performance as of a high level. While these scores do not point to many the students rating their levels as "low," there is definitely a significant percentage of students with median scores. For example: career satisfaction 59.8%, evaluation of academic performance 78.8%, social satisfaction at university 77.7%, academic purposes 43.1%, social support 49.4%, social self-efficacy 68.6%, and perception of academic performance 54.5%.

TABLE 2 Descriptive statistics of the scores of the variables.

Variables	Min	Max	*M*	*SD*
Perceived social support	1.08	7.00	5.600	1.131
Academic purposes	1.67	7.00	5.774	0.9132
Social self-efficacy	1.00	5.00	3.620	0.5933
Social satisfaction	1.43	7.00	5.013	0.9787
Perceived academic performance	1.00	7.00	4.800	1.09
Career satisfaction	1.00	7.00	5.339	1.097
Dropout intention	1.00	7.00	1.681	1.141

As shown in Table 3, the results indicate the presence of correlations (i.e., statistically significant relationships) between the predictor and dependent variables. Such relationships are an essential prerequisite for verifying a predictive model. The items with the highest relation to dropout intention were academic purposes ($r = -0.338$) and university social satisfaction ($r = -0.314$). Evaluation of academic performance presented significant correlations with the perception of academic performance ($r = 0.542$) and university social satisfaction ($r = 0.371$). Satisfaction with the study program presented a medium correlation with academic purposes ($r = 0.318$) and university social satisfaction ($r = 0.360$).

Regarding the degree of correlation between the predictor variables, no extremely high relationship is observed (i.e., more than 0.80 or 0.90) between the variables of social support, social self-efficacy and academic purposes, that would indicate multicollinearity (Field, 2013).

3.2. Predictive model of dropout intention and career satisfaction: Structural equation modeling

The study's objective was to evaluate a predictive model that would consider the mediation of social satisfaction and the perception of academic performance in the relationship of perceived social support, social self-efficacy and academic purposes to career satisfaction and dropout intention among university students.

The model evaluation involved analyzing the results of the estimated fit, based on the absolute and incremental fit indices obtained. As can be seen, the chi-squared is significant and contrary to expectations. However, its sensitivity to erroneous specifications in large models is well known (Saris et al., 2009). Therefore, the comparative indicators or the lack of fit were evaluated to verify the model's results. The RMSEA ≤ 0.07 (Hu and

TABLE 3 Correlations between model variables.

Variables	1	2	3	4	5	6	7
Perceived social support	1						
Social self-efficacy	0.258**	1					
Academic purposes	0.270**	0.264**	1				
Social satisfaction	0.419**	0.491**	0.429**	1			
Perceived academic performance	0.261**	0.152**	0.242**	0.363**	1		
Career satisfaction	0.211**	0.184**	0.318**	0.360**	0.250**	1	
Dropout intention	−0.163**	−0.095**	−0.338**	−0.314**	−0.247**	−0.261**	1

**Correlation is significant at the 0.01 level (bilateral).

Bentler, 1999; Steiger, 2007) is adequate, likewise the SRMR <0.08 (Hair et al., 2014). The CFI and TLI indices did not show optimal adjustments, since their values ought to be ≥0.94 (Hair et al., 2014).

The 20.5 and 22.5% variance in dropout intention and career satisfaction, respectively, were explained upon evaluating the model's explicative capacity through the determination coefficient (R^2). The percentage explanation indicates a low effect size; therefore, the modification or re-specification of the structural model was proposed, with the aim of adding or eliminating parameters that would facilitate obtaining a parsimonious model, one that would explain, to a greater extent, career satisfaction and dropout intention.

For model re-specification, the routes indicated by Mplus were considered through the analysis of the modification indices, and relations were added only considering their theoretical meaning. In this way, direct relationships were added among some of the predictor and the dependent variables. This was done, on the one hand, with the dropout intention, specifying the routes: social self-efficacy → dropout intention; academic purposes → dropout intention. On the other hand, career satisfaction was specified with the routes: social self-efficacy → university social satisfaction, and academic purposes → career satisfaction. In addition, the following residuals were correlated: DI2 and DI3 (IM = 50.698), FAM8 and FAM11 (IM = 49.551), SO1 and SO2 (IM = 37.487), y CS43 and CS62 (IM = 39.441). The wording of these pairs of items alludes to dropout intention, support from the family, from significant others, from friends, and career satisfaction, respectively. The correlations of residuals were included based on the inspection of modification indices. A model with adequate fit indices was thus obtained (Table 4, graphical representation in Figure 2), as well as significant relationships, standardized regression weights (β), variances and factor loadings.

As can be observed in Figure 2, social support relates positively to university social satisfaction ($\beta = 0.174$; $p \leq 0.001$), which, in turn, relates positively to career satisfaction ($\beta = 0.456$; $p \leq 0.001$), but relates negatively to dropout intention ($\beta = -0.330$; $p \leq 0.001$). In addition, social support is positively related to perceived academic performance ($\beta = 0.118$; $p \leq 0.05$), which, in turn, is negatively related to dropout intention ($\beta = -0.088$; $p \leq 0.05$). Social self-efficacy has a positive relationship to university social satisfaction ($\beta = 0.511$; $p \leq 0.001$) and dropout intention ($\beta = 0.227$; $p \leq 0.01$), and relates negatively to career satisfaction ($\beta = -0.195$; $p \leq 0.05$) and with perceived academic performance ($\beta = -0.184$; $p \leq 0.05$). Academic purposes relate positively to university social satisfaction ($\beta = 0.325$; $p \leq 0.001$), career satisfaction ($\beta = 0.201$; $p \leq 0.001$) and relate negatively to dropout intention ($\beta = -0.453$; $p \leq 0.001$). In addition, no significant relationship was found between career satisfaction and dropout intention ($\beta = -0.014$; $p = 0.775$), between perception of academic performance and career satisfaction ($\beta = 0.070$; $p = 0.097$), neither between academic purposes and perceived academic performance ($\beta = 0.013$; $p = 0.814$).

After evaluating the explicative capacity of the model presented through the determination coefficient (R^2), it was observed that the model specified explained 38.9 and 27.4% of the total variance of dropout intention and program satisfaction, respectively.

3.3. Analysis of direct and indirect effects: Mediation analysis

As observed in Table 5, the total indirect effects of social self-efficacy, and academic purposes on dropout intention were significant in the Sobel Test and the 95% bootstrapping did not contain zero. This result, coupled with a significant direct link, indicated that social satisfaction mediated the social self-efficacy and academic purposes whit dropout intention relationships.

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4. Discussion

This section presents the analysis of the main findings yielded by the study's proposed objectives; the study's limitations and implications; future lines of research and conclusions.

TABLE 4 Fit indices of the predictive model of career satisfaction and dropout intention.

Models	X^2	Df	RMSEA	90% CI	SRMR	CFI	TLI
Hypothesized model	2484.574**	926	0.042	0.040–0.044	0.061	0.903	0.896
Final model	2099.779**	914	0.037	0.035–0.039	0.055	0.926	0.920

Df, degrees of freedom of the model; RMSEA, root mean square error of approximation; (90% CI), 90% confidence interval for RMSEA; SRMR, standardized root mean square error of approximation; CFI, comparative fit index; TLI, Tucker-Lewis index; $^{**}p < 0.001$.

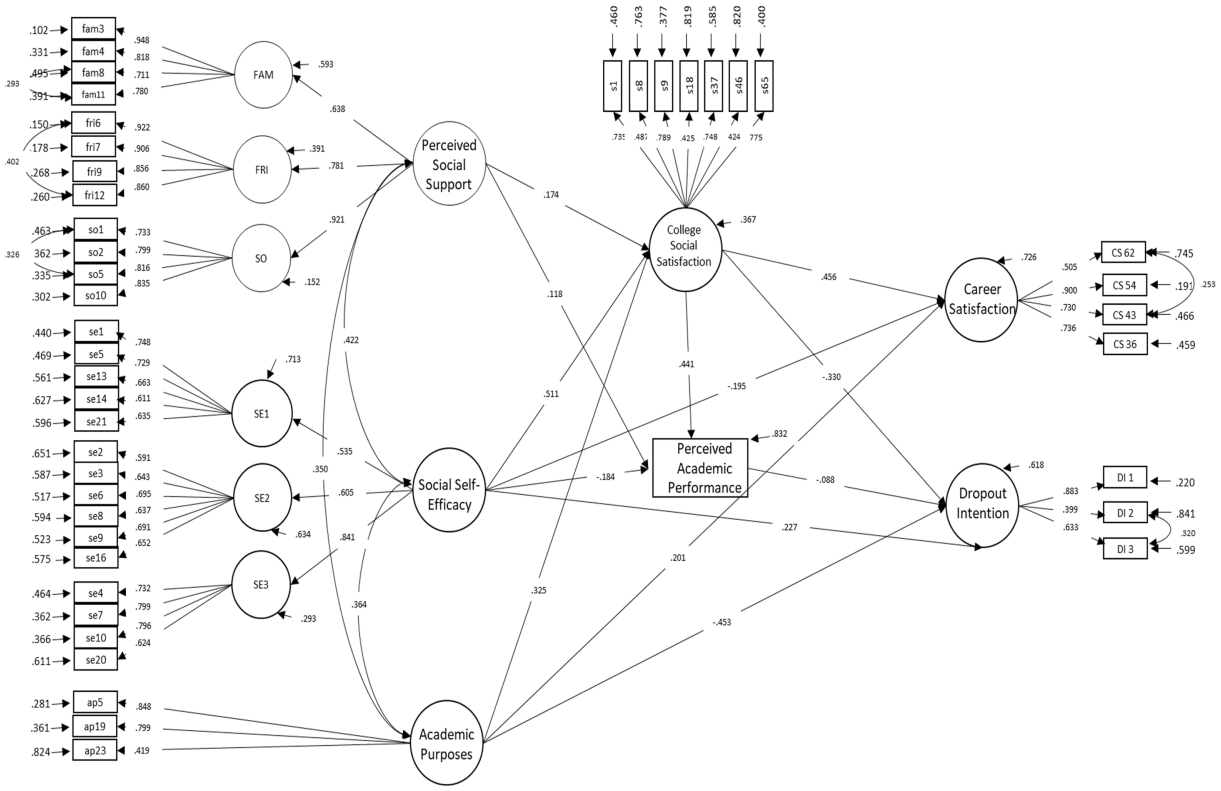

FIGURE 2
Predictive model of the dropout intention of Chilean university students.

4.1. Perceived social support, university social satisfaction, perception of academic performance with career satisfaction and dropout intention

The study's results did not show statistically significant indirect effects of social support on career satisfaction and on dropout intention through university social satisfaction nor perceived academic performance; therefore, hypothesis

> *H1:* There is an indirect relationship of perceived social support with career satisfaction and intention to drop out through social satisfaction perceived academic performance, was not confirmed.

Even if it is true that there are several variables that interact to predict dropout intention, many studies have observed direct effects between the different variables, but not the mediating effects between them and dropout intention (Bernardo et al., 2022). The model results showed that social support relates positively to university social satisfaction ($\beta = 0.174$; $p \leq 0.001$) and relates negatively to dropout intention ($\beta = -0.330$; $p \leq 0.001$). In addition, social support is positively related to perceived academic performance ($\beta = 0.118$; $p \leq 0.05$), which, in turn, is negatively related to dropout intention ($\beta = -0.088$; $p \leq 0.05$). This result indicates that social support could directly influence on dropout intention thus showing to the importance of support from family, friends and significant others for students in the first years. The finding is consistent with that of prior studies, that perceived social support from family, friends and fitting into university (academically, socially) are predictive of the transition during first year (Rodríguez et al., 2017; De Oliveira-Nunes et al., 2020). The support received from teachers, classmates, and good relationships at university contribute to permanence (Esteban-García et al., 2016; Motl et al., 2018).

The present study confirmed the relationship between perceived social support and the perception of academic performance, as prior research has done (Abdullah et al., 2014;

TABLE 5 Confidence intervals of standardized total, total indirect, specific indirect, and direct effects for the final model.

Model routes	Effects total	Effects total indirect	Effects direct	Effects indirect specific
Perceived Social Support → Social Satisfaction → Dropout Intention	−0.022 [−0.108, 0.062]	−0.076 [−0.118, −0.044]	0.054 [−0.032, 0.137]	–
Social Self-efficacy → Social Satisfaction → Dropout Intention	0.054 [−0.040, 0.142]	−0.173 [−0.312, −0.083]	0.227* [0.101, 0.387]	−0.168 [−0.309, −0.077]
Academic Purposes→ Social Satisfaction→ Dropout Intention	−0.579* [−0.666, −0.486]	−0.126 [−0.195, −0.077]	−0.453* [−0.560, −0.343]	−0.107 [−0.187, −0.058]
Social Satisfaction→ Perceived Academic Performance → Dropout Intention	−0.375* [−0.557, −0.235]	−0.046 [−0.096, 0.001]	−0.330* [−0.535, −0.176]	–
Perceived Academic Performance→ Dropout Intention	−0.089 [−0.159, −0.014]	−0.001 [−0.010, −0.004]	−0.088 [−0.160, −0.012]	–
Career Satisfaction → Dropout Intention	−0.014 [−0.089, −0.075]	0.000 [0.000, 0.000]	−0.014 [−0.089, 0.075]	–
Perceived Social Support → Social Satisfaction → Career Satisfaction	0.104* [0.028, 0.178]	0.093 [0.057, 0.137]	0.011 [−0.069, 0.092]	–
Social Self-efficacy → Social Satisfaction→ Career Satisfaction	0.041 [−0.046, 0.130]	0.236* [0.128, 0.381]	−0.195* [0.363, −0.038]	0.233* [0.126, 0.379]
Academic Purposes → Social Satisfaction → Career Satisfaction	0.360* [0.273, 0.442]	0.159 [−0.110, 0.225]	0.201* [0.105, 0.292]	0.148* [0.098, 0.219]
Social Satisfaction→ Perceived Academic Performance → Career Satisfaction	0.487* [0.339, 0.663]	0.031 [0.003, 0.065]	0.456* [0.299, 0.642]	–
Perceived Academic Performance→Career Satisfaction	0.070 [−0.003, 0.141]	0.000 [0.000, 0.000]	0.070 [−0.003, 0.141]	–

CI, confidence interval. *The 95% CI does not go through 0.

González-Chong, 2017; Rodríguez et al., 2017; Alipio, 2020). The fact that perception of academic performance and social satisfaction had not mediated the relationship between social support and intention of drop out and career satisfaction can be explained by the large number of variables included in the model. This is in contrast with other studies that limit the analysis to pure relations or to a small number of strongly related variables. The above result may also be indicative of a contrary relationship; i.e., that even if the student may be dissatisfied with the program or have low social satisfaction, he/she may have a high perception of academic performance; at least in the first semester of the academic year in which the measurements in this study were taken.

4.2. Social self-efficacy, university social satisfaction, perceived academic performance with career satisfaction and dropout intention

The results showed statistically significant indirect effects of social self-efficacy on satisfaction with the career and on dropout intention through satisfaction university social. However, perceived academic performance did not prove to be a mediating variable; therefore, hypothesis

> *H2:* There is an indirect relationship of social self-efficacy with career satisfaction and intention to drop out through social satisfaction and perceived academic performance, was partially confirmed.

This finding show up of the importance of beliefs, confidence and the perceived ability to understand and predict social situations that facilitate establishing social contact and developing interpersonal relationships in the university context. Worthy of note is the correlation between social self-efficacy and university social satisfaction. Social Cognitive Theory provides confirmation and can explain the value of social interactions in the immediate context of human development, which in this case is the university as the locus of students' formative period. Some researches confirm this result (Meng et al., 2015; Matsushima, 2016).

The reciprocal determinism put forth by Albert Bandura explains how students function through the triadic causal structure of individual, environment, behavior. They are influenced by context, which, in turn, influences the individual and his or her behavior, and, at the same time, the student can influence both context and behavior (Bandura, 2012). Therefore, the interactions, influences, experiences in the university community as what can provide students with models, ideas and sequences of events that can generate a chain of learned behaviors, such that they feel and believe themselves competent to carry out academic activities and successfully meet the varied demands of the context.

These results confirm the findings of a study on how personal and cognitive factors mediate the relationship between students and

their environment, aside from emphasizing the importance of social interactions for developing human capabilities (Medrano, 2011). However, in this research there was no verification of the mediating effect of perceived academic performance on the relationship of social self-efficacy to career satisfaction and dropout intention.

In this respect, ever since Bandura's postulates and the empirical testing performed in several studies (Castellanos-Páez et al., 2017), the positive impact of beliefs on personal efficacy cognitive, motivational and academic performance variables has become widely known. The same is true for theoretical studies (Casas and Blanco, 2016) on the link between self-efficacy and academic performance in different areas and at different levels of educational endeavor. It would seem that the type of self-efficacy, or better yet, the specific domain of self-efficacy, is important for understanding the loci of the student's beliefs, perceptions and assurance of success. In this regard, Bandura (2006) and Bandura (2012) drew attention to the need for instruments measuring self-efficacy to cover specific domains of performance and the context in which behavior is deployed. It may be inferred that, while social self-efficacy is important for socially fitting into the context, the perception of academic performance is not a variable that mediates the relationship between social self-efficacy, dropout intentions and career satisfaction.

It should be pointed out that 68.6% of the study participants obtained average scores in social self-efficacy. With respect to levels of social self-efficacy vis-à-vis educational attainment, statistically significant differences were detected in favor of second year students, which is possibly associated with the latter's higher motivation to establish social relationships (Gazo et al., 2020). Regarding to this point, Bandura (2012) has indicated that people with high self-efficacy have more flexible strategies for managing their environment: they gather more knowledge, are motivated to achieve goals and perform complex tasks, in contrast to persons with low self-efficacy, who tend to avoid such tasks.

It can be inferred from these results that students who possess high social self-efficacy can more easily initiate and maintain relationships or social contacts, implying a better degree of socialization in the study program and on campus. This can equip them for developing adaptive attributes, such as understanding rules and university culture, enjoying activities and spaces, forming groups to carry out academic activities and the desire to stay at the university.

4.3. Academic purposes, perception of academic performance with career satisfaction and dropout intention

The results indicated an indirect relationship of academic purposes with career satisfaction and dropout intention, mediated by university social satisfaction. However, the perception of academic performance did not mediate these relations; therefore, hypothesis

> *H3:* There is an indirect relationship of academic purpose with career satisfaction and intention to drop out through social satisfaction and perceived academic performance, was partially confirmed.

Based on these results and considering that 22.1% of the study sample presented high perceptions of academic performance and 54.7% presented well-defined academic purposes, it can be deduced that students who are aware of why they are in university and what they wish to obtain from their studies do not perceive academic performance as being a core aspect for the achievement of their academic purposes. They can imagine themselves carrying out academic activities, consciously defining goals and aspirations, minimizing dropout ideations.

The variable of academic purposes presented a positive direct effect on university social satisfaction. This means that students attribute importance to their fitting in and satisfaction with the university's social activities, and to having close personal relationships and being actively involved in university life. This correlation seems cogent because it is understood that intentions allow one to define aims, objectives, and develop behaviors that imbue academic life with meaning, and thus enable one to persevere in the face of adversity (Steger et al., 2006). On the other hand, as social beings, students' adaptation process to university unfolds in the interaction with another (whether an acquaintance, classmate, friend or teacher), and thus it stands to reason that they assign value to social relationships in the university context. These aspects increase the likelihood that students will not show any dropout intentions.

One of the most valuable findings of this research is the moderate correlation between academic purposes and dropout intention ($r = -0.453$; $p \leq 0.05$). As described in the theoretical section, there is vast empirical evidence from studies of life purpose as mobilizer and developer of personality. However, there have been few such studies carried out on the university domain or context. The present research confirms the positive impact of having academic purposes, as supporting and guaranteeing permanence in university studies. These results coincide with those of Xerri et al. (2017) that a sense of purpose is a motivating factor of student participation in academic activities and social relationships, and thus constitute confirmation of the importance of effective teacher-student relationships.

4.4. A model of university career satisfaction and dropout intention in university students

This study's findings showed to a large extent an adequate fit to the data, and most of the foreseen trajectories were significant. An explicative model of career satisfaction and dropout intention was designed and applied with high percentages of explanation in Social Sciences (Field, 2013). Said model is optimal for the explanation of career satisfaction and dropout intention in first year university students. Therefore, the hypothesis

> *H4:* Social satisfaction and perceived academic performance mediate the relationship between perceived social support,

> social self-efficacy and academic purposes with career satisfaction and intention dropout of university students, constituting a predictive model of the relationships between these variables, as have showed in Figure 1; was confirmed.

The results confirm and emphasize the importance of aspects of the academic and social system relative to the dropout model of Tinto (1987), such as the interactions with peers and with teachers, and social integration in general, given the importance of the others to cushion the impact of the changes implied by adaptation to university. Tinto (2017) suggests certain central variables through which the educational institution can favor the students' persistence until completion of their studies. He points out the importance of motivation, personal goals, self-efficacy, of involvement or a sense of belonging (i.e., feeling that one is part of the community: the faculty, professors, students), the perception of social support and the perception of the curriculum. The present study confirms the need to reinforce students' interactions and bonding with their peers and with their teachers. A study in German university students showed the relevance of social and academic integration for decision making regarding staying or dropping out of university; they found that academic and social integration predict dropout intention, with academic interest in their field of study, and social integration with peers, being the most relevant subdimensions (Piepenburg and Beckmann, 2021).

From the students' perspective, goals and motivation are important for persevering in their university studies (Tinto, 2017). The meaningfulness of this approach is made apparent upon observation of the significant correlation between academic purposes and dropout intention in this research model. Academic purposes as long-term projects give meaning and direction to the students' academic life, enabling them to persist despite diverse challenges and adversities and, as well, lead them toward strategically delimiting the goals, objectives and behaviors necessary for materializing said intentions.

The model that has been designed and applied contributes toward explaining university dropout intention in Chile. Given the current lack of explicative, mediation and complex analysis models, it fills a gap and sheds light on the role of certain cognitive and motivational variables that can be modified in teacher-student interactions. This thesis provides information on the Chilean context and complements the results of other studies (Díaz-Mujica et al., 2019; Fourie, 2020). One of the strengths of this research is that it focused on first year students (Credé and Niehorster, 2012).

Regarding amount of explained variance, previous studies (Lozano-Medellín, 2010; Fisher, 2014; Respondek et al., 2017; Bäulke et al., 2018; Jeno et al., 2018; Díaz-Mujica et al., 2019; Bumbacco and Scharfe, 2020; Fourie, 2020; Jimenez-Rodriguez et al., 2021; López-Aguilar and Álvarez-Pérez, 2021; Bernardo et al., 2022; Maluenda-Albornoz et al., 2022), have evidenced significant relationships, and explained percentages of variance averaging 21%. This indicates the need for further research to understand or explain the phenomenon of dropout intention more deeply or with greater variance. In this research, 38.9% was obtained, which is considered high percentage in the area of Social Sciences and represents a higher percentage of explanation compared to that reported in similar models. Among the factors that these previous studies have identified as most relevant for predicting dropout, metacognition and self-regulation (Jimenez-Rodriguez et al., 2021), academic burnout and self-efficacy expectations (López-Aguilar and Álvarez-Pérez, 2021), burnout, disengagement, and attachment anxiety (Bumbacco and Scharfe, 2020) were found. Most studies address variables related to academic motivation, mental health, sociodemographic, academic engagement, satisfaction of basic needs, and academic achievement. Although scarce, studies exploring motivational cognitive variables were identified: (a) Díaz-Mujica et al. (2019) addressed motivation, performance, self-efficacy, self-regulation, and career satisfaction; the variables with the strongest relationships were career satisfaction ($d = 0.645$) and intrinsic motivation ($d = 0.249$); (b) Bäulke et al. (2018) found that the most relevant variables were academic procrastination ($R^2 = 0.16$), and motivation regulation ($R^2 = -0.38$); (c) Bernardo et al. (2022) reported that career satisfaction and expectations ($d = 0.70$) and career engagement ($d = 0.17$) were the most predictive variables of dropout intention; and (d) Nemtcan et al. (2020) found that variables such as academic skills ($\beta = -0.074$), academic self-efficacy ($\beta = -0.434$), and students' integration ($\beta = -0.287$) were the most relevant.

This study is also pertinent as it addresses the issues of intent, ideation, or the possibility of academic dropout among university students. It was decided that the study should focus on intention due to the link between this phenomenon and the Theory of Reasoned Action (Ajzen and Fisbein, 1980) and its complement, the Theory of Planned Behavior (Ajzen, 1991; Mc Eachan et al., 2011). Emphasis was placed on the fact that intention is a predictor of behavior, since it is an indicator of predisposition. The intention to deploy behavior arises from three elements: the individual's attitude toward the behavior, the subjective norm, and the perception of control.

Given the need to take measures in order to facilitate fitting into the university and avoiding dropout intention, changes can be implemented *via* three intervention modalities: promotion, prevention and correction. Attention can also be given to covering needs for social, psychological and educational support to ensure students' success and completion of their first year courses (Gomes-de Barros and Almeida, 2021). There are alternatives that universities can implement to structure first-year students' campus life. In this regard, innovation and creativity are important and should consider the characteristics of the context (Gómez-de Salazar and Álvarez-Gil, 2020).

The contribution of the study with respect to previous literature is the identification of variables that allow us to delve into the study of dropout intention that confirms the relevance of the social variables over the academic ones, especially in the first semesters higher education. A particularity of these variables consists of the possibility of change them in the classroom through the teaching-learning process and social relationships among peers. From the psychometric perspective, this study provides

researchers in the Latin American region with a valid and reliable scale to measure the variables: perceived social support, social self-efficacy, academic and social university satisfaction. At a theoretical level, it proposes a new model that helps to progress in research on the influence of cognitive-motivational and social variables and their influence on dropout. Especially considering that there are multiple studies that address the influence of affective-motivational variables on the intention to drop out, but there are few studies that address the relationship between cognitive variables and their influence on the intention to drop out (Nemtcan et al., 2020).

The study of dropout in Latin American context is relevant, the university dropout rate ranges between 20 and 30% (SIES, 2014, 2019), which is very high; and despite initiatives to mitigate dropout and its negative social causes, they remain to be few Latin America. There are gaps in the quality of education related to the IVE (vulnerability index), with technological advancement and infrastructure that account for an education system with significant precariousness. Inequalities in access to digital resources such as Internet or computers; inequalities among private, elite public, or traditional state offers, as well as gaps between rural and urban areas (Esper et al., 2022).

4.5. Limitations and future research proposals

One limitation was that the issue of variable changes over time was not addressed. This was due to the cross-sectional design employed in which data was obtained from a single time period; due to the cross-sectional design, inferences regarding causality should be made with caution. A considered second limitation was the social desirability bias that may have influenced the measurement of perceived academic performance (Imose and Barber, 2015).

Future research could employ longitudinal designs which will enable accounting for the possible trajectories of certain variables vis-à-vis dropout intention and consummate dropout. Other types of designs (i.e., qualitative) will enable in-depth exploration of the relationship between social self-efficacy and academic performance. Explicative models can be tested and estimated considering careers of different knowledge areas. It would likewise be desirable to conduct research on a more heterogeneous sampling, such as considering the types of degree programs in underrepresented universities. Another potential area of future study is the analysis of how sociodemographic and personal variables can function as moderators of existing relationships between the model's variables, and contrasting the differences between perceived academic performance and semestral academic performance. Other research studies could explore the differences among universities belonging to the CRUCH (Council of Rectors of Chilean Universities) or not, given that our findings come from a sample of first year university students from different Chilean universities, although we are aware that the number is not large enough to consider that these findings can be generalized. For this reason, we plan to increase this sample in future studies. Regarding the analyses, future studies could use machine learning algorithms to evaluate the robustness of the results, for example, k-fold cross validation.

Regarding the dropout intention construct, it is necessary to draw attention to the way it is measured, an issue in which there is still a long way to go psychometrically. A systematic review on dropout intention in university students showed that there are few investigations that employ scales with adequate psychometric properties for the measurement of dropout intention (Sáez-Delgado et al., 2019). Another research (Meyer et al., 2022) found three aspects that could explain career change in first-year students: individual achievement in secondary education, a (mis) fit between individual occupational interests and study contents, and the social expectations of parents and peers regarding initial subject choice. It is suggested to pay special attention to the type of dropout intention that is intended to be measured. Conceptually, the intention to drop out can be considered as a general construct that accounts for the intentions to leave the university definitively; a more specific analysis involves specifying whether the student is thinking of leaving the university for a while and then returning or abandoning his or her career and studying at another university, or whether he or she wants to study another major at the same university. On the other hand, the analysis of critical variables in the first year, such as academic performance, could be useful. Previous literature shows that complete university dropout and change to another university or major program underlie different decision-making processes.

5. Conclusion

The present study findings and the above discussion yield the following conclusions: (a) motivational-cognitive variables are an effective channel for understanding the phenomenon of dropout intention, as it could be modified in the teacher-student interaction, the study did not show that the teacher-student interaction was modified; (b) the obtained model showed that 38.9% of the variance of dropout intention and 27.4% of the variance of career satisfaction are due to predictor variables: perceived social support, social self-efficacy, academic purposes, university social satisfaction, and perceived academic performance; (c) social self-efficacy favors social satisfaction at university, which, in turn, positively impacts on academic satisfaction and low dropout intention; (d) university social satisfaction is the most important mediating variable in relations of social self-efficacy, academic purposes, career satisfaction and dropout intention; (e) the perception of academic performance has less influence on dropout intention and on career satisfaction among first-year students; and (f) academic purposes are, to a large extent, association of dropout intention.

In conclusion, it is a fact that raising the quality of teaching and learning processes requires proactive behavior on the part of teachers and students. This means that universities are required to

design and develop teaching interventions that will enable educators to generate personal resources for promoting and supporting the variables, as this study has demonstrated, that impact critically on dropout intention, and, consequently, are key for preventing students' definitive disengagement from university.

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 Ethics Committee of the Universidad de Concepción, Chile. The patients/participants provided their written informed consent to participate in this study.

Author contributions

YL-A contributed to the literature systematic review, to the design, as well as the data extraction, data analysis, abstract, the writing of the manuscript, and full-text review. FS-D contributed to the design of the study, abstract, full-text review, and the writing of the manuscript. JM-N abstract, full-text review, and the writing of the manuscript. AB and AD-M contributed to the interpretation of the results, the writing of the manuscript, and full-text review. 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.

Publisher's note

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You and me versus the rest of the world: the effects of affiliative motivation and ingroup partner status on social tuning

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Bandura argues that individuals are more likely to engage in social learning when they identify with a social model and when they are motivated or rewarded. Therefore, in the present work, we investigate how these two key factors, perceived similarity and affiliative motivation, influence the extent to which individuals engage in social tuning or align their views with an interaction partner—especially if their partner's attitudes differ from the larger social group. Experiment 1 (170 participants) explored the role of perceived similarity through group membership when needing to work collaboratively with a collaboration partner whose climate change beliefs differed from a larger social group. Experiment 2 (115 participants) directly manipulated affiliative motivation (i.e., length of interaction time) along with perceived similarity (i.e., Greek Life membership) to explore if these factors influenced social tuning of drinking attitudes and behaviors. Experiments 3 (69 participants) and 4 (93 participants) replicated Experiment 2 and examined whether tuning occurred for explicit and implicit attitudes towards weight (negative views Experiment 3 and positive views Experiment 4). Results indicate that when individuals experience high affiliative motivation, they are more likely to engage in social tuning of explicit and implicit attitudes when their interaction partner belongs to their ingroup rather than their outgroup. These findings are consistent with the tenets of Social Learning Theory, Shared Reality Theory, and the affiliative social tuning hypothesis.

KEYWORDS

perceived similarity, ingroup identification, affiliative motivation, social tuning, shared reality, social consensus, implicit attitudes

Introduction

According to Albert Bandura (1969), individuals learn how to navigate their social worlds by imitating those whom they identify with (i.e., their social models) through a process known as social learning. In other words, social learning and the people who serve as social models are important conduits in transmitting essential information about social environments. Moreover, Bandura (1969) contends that identification with those who serve as social models, as well as motivation or rewards, increase the likelihood that social learning will occur. This is because these factors make the thoughts and behaviors of the social model more "determinative cues" and increase the likelihood that individuals will match their response with their social models (Bandura, 1969, p. 217). Based on this conceptualization, it can be argued that one of the most important elements of social learning is social interactions with others. Therefore, the current work examines social learning in social interactions using a social tuning framework. More specifically, the current work examines the roles that perceived identification (or similarity) of an interaction partner (e.g., ingroup or outgroup member) and the desire to get along with someone (i.e., affiliative motivation) play in the alignment of one's attitudes with an interaction partner, or social tuning.

Shared Reality Theory, from which the social tuning framework stems, posits that successful social interactions rely on developing a mutual understanding, or shared reality, with an interaction partner (Hardin and Higgins, 1996; Hardin and Conley, 2001). One reason that individuals may be motivated to experience shared reality is because this mutual understanding limits awkward social interactions. In other words, interaction partners, under the right conditions, may unconsciously align their views with an interaction partner—or social tune. Past research demonstrates that social tuning, like social learning, facilitates the transmission of beliefs and knowledge (Higgins and Rholes, 1978; Echterhoff et al., 2005; Sinclair and Lun, 2006; Weisbuch et al., 2009).

One factor that might facilitate social tuning is affiliative motivation, or the desire to get along with an interaction partner. More specifically, the affiliative social tuning hypothesis (Sinclair et al., 2005a,b) predicts that higher levels of affiliative motivation should increase the likelihood of engaging in social tuning to meet the goals of developing shared reality. Research corroborates that affiliative motivation leads to social tuning as those with higher affiliative motivation were more likely to tune towards an interaction partner than those with lower affiliative motivation (Sinclair et al., 2005a,b). Affiliative motivation increased the tuning of automatic racial and gender attitudes, and it also increased the likelihood of self-stereotyping (Sinclair et al., 2005a,b). While Bandura's (1969) work did not look at affiliative motivation in this same way, he argued that interpersonal motivations and rewards could be catalysts for social learning.

Bandura (1969) also argued that identification, or perceived similarity, with another person was a key factor in social learning, as he states: "under certain circumstances, modeling can also be significantly influenced by real or assumed similarity between the observer and the model" (p. 244). Research on perceived similarity and interpersonal relationships shows that individuals are more attracted to targets that are similar than dissimilar (Newcomb, 1956; Jones and Daugherty, 1959; Byrne, 1961; Byrne et al., 1966; Tsui and O'Reilly, 1989; Glaman et al., 1996; Chen and Kenrick, 2002). Additional research demonstrates that individuals will perceive similarity with another person based on a number of different shared (or perceived to be shared) characteristics, such as race, gender, college affiliation, hometown, hobby, or even similar dress (Tajfel et al., 1971; Tajfel and Turner, 1979; Taylor and Moriarty, 1987; Dovidio et al., 1995; Ashburn-Nardo et al., 2001; Zebrowitz et al., 2007). Research has also found that individuals are more likely to match expressions with ingroup members more than outgroup members (Blocker and McIntosh, 2017).

In addition, intergroup relations research demonstrates that individuals evaluate one's own group more positively in relation to other groups resulting in ingroup favoritism or an ingroup bias (Aberson et al., 2000; Spears et al., 2001). The ramifications of perceived similarity of ingroup membership does not stop at positive evaluations of a group but extends to interpersonal relationships and prejudice as well. For instance, in employment situations, gender similarity increases the likelihood of building a relationship with one's supervisor (Kammeyer-Mueller et al., 2011). Similarly, when individuals recategorize outgroup members as part of a larger superordinate group, then prejudice and discrimination towards this former outgroup dissipate (Gaertner et al., 1993; Gaertner and Dovidio, 2000). In addition, research also shows that ingroup consensus on racial attitudes exerted more influence on a person's own racial attitudes than outgroup consensus (Stangor et al., 2001). Thus, identification through perceived similarity influences who we want to get along with, how we evaluate and treat others, and when are likely to adjust our own attitudes.

Applying this work to a social tuning perspective, this should translate into being more likely to engage in social tuning with someone who is perceived to be more similar, rather than dissimilar, because it will be easier to develop shared reality with someone who shares things in common than someone who does not. However, to date, perceived similarity of the interaction partner has received little attention in the social tuning literature. One study conducted had small groups of participants encounter either a White or Black experimenter in front of their classroom (Sinclair et al., 2005a). The experimenters wore a plain t-shirt (expressing no views) or an "Eracism" t-shirt (expressing egalitarian racial attitudes). Participants then completed a paper and pencil version of the Race Implicit Association Test (IAT; Greenwald et al., 1998, 2003). This study found that participants automatic racial attitudes were more associated with the shirt worn by the experimenter than the race of the experimenter. While these findings imply that perceived similarity through group membership might not influence social tuning, this experiment was run in small groups so it is unclear of whether the identities of the group members also played a role in the social tuning process or if the results would be different in a one-on-one interaction.

In addition, past work has not investigated the effects that social consensus has on the social tuning process. Past work by Stangor et al. (2001) found that learning about ingroup social consensus towards a racial group influenced participants own racial attitudes more than learning about outgroup social consensus. It is unclear what effect social consensus, especially ingroup social consensus, might have when interacting with a partner whose views are inconsistent with the ingroup social consensus.

Thus, in the current work, we investigate two key factors that are relevant to social learning: identification through perceived similarity and the motivation to get along with another person. More specifically, we are interested in the role perceived similarity and affiliative motivation play in the social tuning process. Given the role that ingroup social consensus can play in individuals own attitudes (Stangor et al., 2001), we also explore how ingroup social consensus influences in social tuning. We present four experiments that examine these factors. In each experiment, participants believe they will interact with an ostensible interaction partner. They also learn about their partner's beliefs and how they differ from the beliefs of their larger social group (ingroup). In Experiment 1, we examine the role of perceived similarity on social tuning when needing to work collaboratively with a collaboration partner whose beliefs about climate change are different than a larger social group (e.g., social consensus). In Experiment 2, we directly manipulate the affiliative motivation that was held constant in Experiment 1 to better understand the role it plays along with perceived similarity on social tuning with an interaction partner whose views do not align with a larger social group. Experiments 3 and 4 extend this work by investigating whether affiliative motivation and perceived similarity also influence the social tuning of implicit attitudes, especially when the interaction partner's beliefs are inconsistent with the larger social group.

Experiment 1

This experiment investigated whether perceived similarity though group memberships influenced the extent to which individuals engaged in social tuning. We also explored the role that social consensus plays in the social tuning process based on past work that shows the ingroup social consensus can influence individual's own beliefs (Stangor et al., 2001). In Experiment 1, we held affiliative motivation constant such that all participants believed they needed to work collaboratively with another person. Participants then learned that their ostensible interaction partner was either similar to them in group membership (i.e., participating through the same platform) or personal preferences (i.e., preferred same animal) or different. To examine the role of social consensus in social tuning, participants learned that their partner believed climate change was a more pressing issue than other participants in the collaborative portal. We predicted that participants would be more likely to engage in social tuning with their partner whose views differ from the larger social group when the partner is part of their ingroup rather than the outgroup. We predicted this because Shared Reality Theory (Hardin and Higgins, 1996; Hardin and Conley, 2001) contends that we seek to develop mutual understanding with an interaction partner to facilitate a smooth interpersonal interaction, and there is likely normative pressure to fit into one's ingroup.

Method

Participants

One hundred and seventy individuals (107 males; 63 females) with the average age of 35 participated for a small monetary reward (Amazon's Mechanical Turk) or for course credit and a chance to win a raffle prize (college participants). Eighty percent of the sample was White (138 White; 8 Black; 7 Asian; 7 Hispanic/Latinx; 1 Middle Eastern/North African; 7 Multi-Racial; 1 Other; 1 Unreported). All participants gave informed consent. Nine participants were not fully engaged in the experiment (e.g., did not complete it, completed it in less than 5 min, or wrote they did not care), and six participants did not believe they would collaborate with anyone. These participants were removed from the analyses. Therefore, the analyses are based on 155 participants (94 males; 127 White).

Design and materials

To study the effects of group membership on social tuning, this experiment utilized a 2 (Partner Platform Membership: Same Platform or Different Platform) x 2 (Partner Animal Preference: Same Preference or Different Preference) between-participants design on attitudes towards climate change.

Affiliative motivation

We held affiliative motivation constant in this experiment by telling participants that we were piloting a new collaboration portal and that after doing some independent tasks they would meet their partner and complete a collaborative task in the portal and provide feedback on the collaborative portal.

Partner group membership manipulations

We manipulated perceived similarity with the partner in two different ways. Participants learned that their partner was either participating through the same or different platform (e.g., Amazon's Mechanical Turk or their college participant pool). In creating their supposed profile for the collaboration portal, participants indicated whether they preferred cats or dogs. While reviewing their partner's ostensible profile, they learned their partner preferred the same or different animal. Thus, we used similarities in group memberships to determine ingroup status and differences to determine outgroup status.

Perceived views of the partner and larger social group

To see if participants engaged in social tuning with their partner when their views differ from the larger social group, participants were led to believe that their partner believed climate change was an important issue and supported sustainable efforts. To do this, participants saw that their ostensible partner selected green leaves as their icon and read a short bio that said: "In my free time, I like to read. I think climate change is a really important topic today. I try to be 'green' and I volunteer with a local organization that promotes sustainable living!"

To show participants how their partner's views compared to a larger social group, the supposed collaboration portal showed them a graphic depicting how their partner compared to others who had completed profiles in the system. Participants always learned that there were a relatively equal number of people from each platform and an equal number of people preferred each type of animal. However, when they saw the graphic about the hot topic preferences, it was clear that most people in the portal did not believe that climate change was as important as their partner did.

Social tuning measure

To measure social tuning, we measured participants' self-reported climate change attitudes using the 15-item Climate Change Attitude Scale (1 = strongly disagree; 7 = strongly agree; Christensen and Knezek, 2015). Participants indicated their beliefs on climate change, such as: "I believe our climate is changing"; "The actions of individuals can make a positive difference in global climate change"; "We cannot do anything to stop global climate change." Five items were reverse scored, and items were averaged together. Higher numbers indicate beliefs that climate change needed attention (see Appendix A for items and reverse scoring).

Follow-up and demographics

To increase believability that we were interested in different hot topics and not just climate change, participants also completed a questionnaire about the legalization of marijuana. We assessed their memory for the platform their partner was participating through, their partner's animal preference, the hot topic that their partner thought was important, and inquired into their thoughts how the interaction would go. We also collected basic demographic information, such as gender and ethnicity, and asked participants about any suspicions they had while taking the experiment.

Procedure

Participants believed they were participating in a study piloting a new collaboration portal and that we were seeking feedback on the portal. Participants learned they would provide information about themselves to create their profile and then the portal would randomly match them with another participant, and they would get to see their partner's profile. To create this supposed profile, participants indicated whether they were participating through Amazon's MTurk or their college's participant pool. Participants also specified if they preferred cats or dogs and wrote a short bio to share with their partner. Participants than indicated from a list of seven hot topics the one that interested them the most and wrote a few sentences on why they chose this hot topic. Participants also rated each hot topic on how important they believed it was. The hot topics were Immigration, Same Sex Marriage, Abortion, Climate Change, Legalization of Marijuana, Animal Rights, and Vaccinations.

After providing this information, participants completed some filler tasks (e.g., math problems, category sorting, etc.) to seemingly allow the collaboration portal time to create their profile and match them with a partner. Participants then "matched" with an ostensible partner. This partner was always described as "Sam M.," but participants learned that no real names were being used to protect everyone's privacy. Participants saw Sam's supposed profile which featured a green leaf icon, indicated the platform they were using, their animal preference, and their short bio. All participants learned that Sam believed that climate change was an important topic and they volunteered at a local organization focused on sustainability. Participants also learned that Sam was either participating on the same platform as them or the other platform (Partner Platform Membership Condition), and that Sam either preferred the same animal as them or a different animal (Partner Animal Preference Condition). In addition, participants learned how Sam compared to others through a graphic that showed that there were equal numbers of participants from both platforms and animal preferences. However, they saw that Sam's beliefs about climate change were much more important to Sam than to others in the system. This was done so participants knew how their partner's attitude compared to the larger social group's attitude.

After viewing this information, participants were led to believe that we wanted to provide time in between learning about their partner and their collaboration, so they answered some questions regarding the portal and more detailed beliefs on a few hot topics. Participants were assured that their feedback on the portal and their beliefs on the hot topics would *not* be shared with their partner. Participants completed the 15-item Climate Change Attitude Scale (Christensen and Knezek, 2015) and 10-items on the legalization of marijuana. The Climate Change Scale was our measure of social tuning, as those engaging in social tuning should endorse similar attitudes towards climate change as their partner (i.e., that climate change needs attention). Participants then completed a final questionnaire that assessed their memory for partner-relevant information, demographic information including gender and ethnicity, and any suspicions about the study. After completing these measures, participants learned there would be no collaboration with a partner. They were thanked for their participation, debriefed, and awarded monetary compensation (MTurk) or course credit (college).

Results and discussion

To examine the effects of group membership on social tuning, analyses used a 2 (Partner Platform Membership: ingroup vs. outgroup) x 2 (Partner Animal Preference Membership: ingroup vs. outgroup) ANOVA. Since all participants learned that their partner believed climate change was a very important topic, higher scores indicate more social tuning with the interaction partner rather than the larger social group. Participants' ratings of the importance of climate change as a hot topic prior to learning their partner's stance was unsurprisingly highly correlated with, and a significant predictor of, their beliefs on climate change ($r = 0.733$, $p < 0.001$; F (1, 150) = 173.79, $p < 0.001$, $R^2 = 0.54$, $R^2_{adjusted} = 0.53$, 95% CI [0.65, 0.79]). Therefore, we covaried out this self-rating for analyses.

There was no main effect for Partner Animal Preference ($p = 0.641$) nor was there an interaction between the two partner group memberships ($p = 0.700$). However, there was a significant main effect for Partner Platform Membership, F (1, 147) = 5.88 $p = 0.017$, $\eta_p^2 = 0.04$, 95% CI [0.06, 0.59] (see Figure 1). When

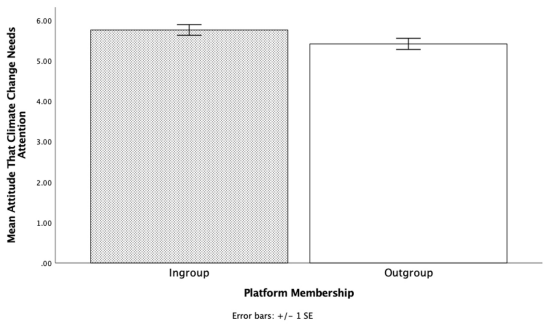

FIGURE 1
The effects of partner group membership through belonging to same or different group (MTurk or coolege) on beliefs that climate change needs attention in Experiment 1.

participants believed that their partner was from the same platform/ingroup member ($M = 5.74$, SD = 1.15) they reported that climate change needed more attention than when they believed their partner was from a different platform/outgroup member ($M = 5.43$, SD = 1.24). A bootstrap analysis with 1,000 samples replicated this main effect ($p = 0.018$).

Thus, the results show that individuals were more likely to engage in social tuning with their partner when they believed this partner was part of their ingroup compared to the outgroup. Moreover, the results suggest that sharing a membership in a group maybe more important than sharing a preference towards something. These results also indicate sharing multiple things in common does not necessarily increase the likelihood of engaging in social tuning.

Experiment 2

Experiment 1 provides evidence that individuals who perceived similarity in a group membership with an interaction partner are more likely to engage in social tuning that those who are dissimilar with their partner. This occurred even though the interaction partner's views differed from the larger social group. One limitation of Experiment 1 is that it held affiliative goals constant, and it is, therefore, unclear how affiliative motivation influences social tuning with an ingroup or outgroup partner whose views differ from the larger social group. Therefore, in Experiment 2, we directly test the role of affiliative motivation and perceived similarity (through group membership) on social tuning when the partner's views differ from the larger social group.

Method

Participants

One hundred and fifteen individuals (69 males; 45 females; 1 unreported) from a private institution in the northeast United States participated for course credit and a chance to win a raffle prize. Sixty-two percent of the sample was White (71 White; 5 Black; 10 East Asian; 9 South Asian; 6 Multiracial; 13 Other; 1 unreported). Participants were from all undergraduate years (20% First Year, 27% Second Year, 25% Third Year, 27% Fourth Year, 1% Unreported). All participants gave informed consent. One participant did not complete the study and was removed from analyses. The analyses are based on 114 participants (68 males; 71 White).

Design and materials

This experiment utilized a 2 (Affiliative Motivation: high or low) x 2 (Partner Group Membership: ingroup or outgroup) between-participants design.

Affiliative motivation manipulation

Adapting from past research (Sinclair et al., 2005a), we manipulated affiliative motivation through the length of time the participants believed they would interact with an ostensible partner: 5 min (low affiliative motivation) or 30 min (high affiliative motivation).

Partner group membership manipulation

We used the participants' membership in Greek life to determine whether the ostensible interaction partner was part of their ingroup or outgroup. Prior to participating in any experiments, participants completed a pre-screening that included a question about whether they belonged to any Greek life organizations. If randomly assigned to the ingroup condition, then the ostensible partner was similar to the participant in Greek life affiliation (e.g., if the participant belonged to Greek life, the ostensible partner belonged to Greek life). If randomly assigned to the outgroup condition, then their ostensible partner was different than them in Greek life affiliation (e.g., if the participant belonged to Greek life, then the ostensible partner did not belong to Greek life).

To make the participants aware of the partner's Greek life status, participants first wrote a short (few sentences) self-description for their partner to read regarding aspects about themselves such as group memberships, major, and activities. After completing their self-description, participants believed the computer was sending their description to their partner and that they would see their partner's self-description. Participants then saw a partner description that read either: "I am a member of Greek life. I am still figuring out my major. I enjoy hanging out with friends." or "I am a not a member of any Greek life organizations. I am still figuring out my major. I enjoy hanging out with friends."

At the end of the study, participants also indicated whether they belonged to Greek life. We cross-checked this information with the pre-screening information as it was possible that a participant's Greek Life membership could have changed from pre-screening to participating (e.g., joined a Greek Life organization). If there was a discrepancy, the group membership condition relied on the information the participant provided at the end of the study. Overall, 30% of the participants belonged to Greek life and 70% did not belong to Greek life. This is generally reflective of the student body at this institution as 37% belong to Greek life.

Perceived views of the partner and larger social group

Participants were led to believe that their partner held negative views towards drinking alcohol and this view was not held by other students at the same institution. To create this, participants viewed a list of scales and were told that the computer would randomly select a scale for them to complete and a scale for their partner to complete. The computer always asked participants to complete the Need for Closure Scale (Webster and Kruglanski, 1994), and it always led the participant to believe that the partner had been randomly selected to complete an Attitudes Towards Drinking Scale. After completing the Need for Closure Scale, participants thought their results on the Need for Closure scale were being sent to their partner and their partners results for the Attitudes Towards Drinking Scale were being sent to them. After a few minutes of the computer pretending to calculate the scores, participants learned that their ostensible partner's score indicated that they had *less* favorable attitudes towards drinking than others who had previously taken the scale at their institution.

Social tuning measure

We measured participants' self-reported drinking attitudes and behaviors to assess social tuning. We used 20 items from the College

Drinking Attitudes Scale that utilized a 5-point Likert-Type scale (1 = very unlikely; 5 = very likely; Gonzalez, 1990). Participants indicated how likely they were to engage in different drinking-related activities, such as: "Always use alcohol as an addition to an activity rather than as the primary focus of attention"; "Set limits on how many drinks you are going to have on a night out or at a party"; "Drink alcohol to primarily get drunk." Fifteen items were reverse scored to make higher numbers indicate *less* responsible drinking behaviors. The items were then averaged together, and the scores were standardized.

We also examined self-reported drinking behaviors. Items were adapted from the Student Alcohol Questionnaire (Engs, 1977). In this scale, participants indicated how often, on average, they drank beer, wine, or liquor on a 5-point Likert-Type scale (1 = "Every Day"; 2 = "Once a week" 3 = "Once a month"; 4 = "Every few months"; 5 = "Once a year"). Participants also reported the quantity of beer, wine, and liquor that they consumed in one setting on a 5-point Likert-Type scale (1 = "More than 6"; 2 = "5–6"; 3 = "3–4"; 4 = "1–2"; 5 = "less than 1"). All six items were reverse scored such that higher numbers meant more frequent drinking and more items consumed. The items were averaged together and standardized.

We created an Overall Drinking Attitudes and Behavior measure by averaging the standardized Attitudes Towards Drinking Scale, the Frequency of drinking beer, wine, and liquor, and the Quantity of beer, wine, and liquor consumed. Higher positive numbers indicate *less* responsible drinking attitudes and behavior (see Appendix B for all items and reverse scoring).

Follow-up and demographics

Participants also completed a questionnaire that they believed was a pre-interaction questionnaire. We assessed their memory for the scale their ostensible partner completed and their score, inquired into any suspicions they had during the study, and collected basic demographic information such as gender, ethnicity, year in school, and current Greek life status.

Procedure

Participants believed they were participating in a study investigating what happened when people interacted with someone after hearing random pieces of information about them. Participants learned that they would first complete some tasks on the computer without their partner and then later in the study they would interact with their partner. Half the participants learned verbally that they would interact for 5 min (low affiliative motivation condition), and half the participants learned they would interact for 30 min (high affiliative motivation condition). This information was reiterated on the computer screen.

In the first task, participants briefly, in a few sentences, described themselves for their partner, including factors such as any group memberships (e.g., Greek life, clubs), major, hobbies, personality traits, etc. The computer program pretended to send their description to their ostensible partner and generate their partner's self-description for them to review. Participants were randomly selected to view one of two possible self-descriptions: "I am a member of Greek life. I am still figuring out my major. I enjoy hanging out with friends" or "I am not a member of any Greek life organization. I am still figuring out my major. I enjoy hanging out with friends." Hence, participants either learned their partner was part of their ingroup (e.g., they both belonged to Greek life or did not) or their outgroup (e.g., one belonged to Greek life and the other did not).

After reading their partner's self-description, the experimenter informed participants that the computer would randomly select a questionnaire for them to complete, and their partner would also complete a randomly selected questionnaire. The experimenter also told participants that after completing their scale, the computer would generate and display their partner's score on the scale they completed. Participants then saw a list of all the possible scales, but the computer always "randomly" selected the Need for Closure Scale (Webster and Kruglanski, 1994) for the participant. After completing the Need for Closure Scale, the computer displayed the list of scales again with the Attitudes towards Drinking Scale highlighted to indicate it was completed by the partner. The computer then generated the partner's score. Participants always learned that their partner held *less* favorable attitudes towards drinking than the other participants in the same institution who had taken the same scale in our experiment. After learning their partner's score in relation to the larger population, participants learned that their responses on any remaining scales would *not* be shared with their partner. Participants then answered questions about their attitudes towards drinking and frequency of drinking behavior, i.e., College Drinking Attitude Scale by Gonzalez (1990) and Student Alcohol Questionnaire by Engs (1977). This was our measure of social tuning. Participants also indicated their memory for partner-relevant information, any suspicions they had about the study, and demographic information including gender, ethnicity, year in school, and Greek life status. After completing these measures, participants learned there would be no interaction with a partner. They were thanked, debriefed, awarded course credit, and entered into a raffle.

Results and discussion

To examine the effects of affiliative motivation and group membership on social tuning, analyses used a 2 (Affiliative Motivation: high vs. low) x 2 (Partner Group Membership: ingroup vs. outgroup) ANOVA. Since all participants learned that their partner held less favorable attitudes towards drinking, less frequent drinking behaviors indicates more social tuning with the interaction partner. All participants correctly remembered the scale their ostensible partner completed as well as their score on this measure. Participant gender had no effect on drinking attitudes and behaviors ($p > 0.7$).

There were no main effects for affiliative motivation ($p = 0.922$) or group membership ($p = 0.146$). However, there was a significant interaction between affiliative motivation and group membership, $F(1, 110) = 3.90$ $p = 0.051$, $\eta_p^2 = 0.03$ (see Figure 2).

Simple effects analyses showed that when participants had high affiliative motivation (interacting for 30 min), those who learned their partner was part of their ingroup ($M = -0.17$, SD = 0.59) engaged in social tuning by reporting more responsible drinking attitudes and behaviors (i.e., drinking less) than those who learned their partner was part of their outgroup ($M = 0.18$, SD = 0.50), $F(1, 110) = 6.25$, $p = 0.014$, $\eta_p^2 = 0.05$, 95% CI [0.07, 0.62]. This pattern held when a bootstrap analysis with 1,000 samples was applied ($p = 0.020$). However, participants with low affiliative motivation (i.e., interacting for 5 min) did not engage in social tuning regardless of whether their partner was in the ingroup ($M = 0.02$, SD = 0.53) or outgroup ($M = -0.03$,

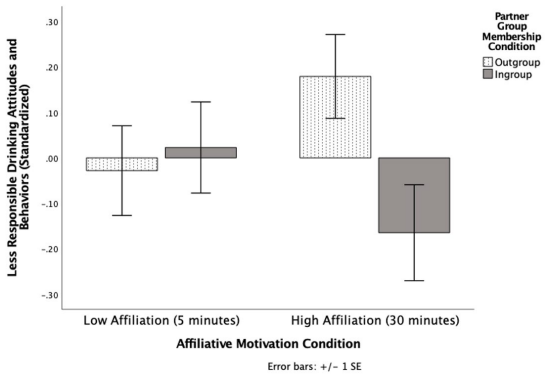

FIGURE 2
The effects of affiliative motivation and partner group membership on self-reported drinking attitudes and behavior (standardized) in Experiment 2.

SD = 0.50), $p = 0.727$, $\eta_p^2 = 0.00$, 95% CI [−0.24, 0.34]. This pattern held bootstrapped with 1,000 samples ($p = 0.710$).

When the partner was part of the ingroup, affiliative motivation did not influence social tuning ($p = 0.180$, $\eta_p^2 = 0.02$, 95% CI [−0.09, 0.46]). This pattern held when a bootstrap analysis of 1,000 samples was applied ($p = 0.208$). When the partner was part of the outgroup, affiliative motivation did not influence social tuning ($p = 0.152$; $\eta_p^2 = 0.02$, 95% CI [−0.08, 0.49]). This pattern held when a bootstrap analysis with 1,000 samples was applied ($p = 0.120$).

An exploratory look at the means indicates that if these analyses would have been significant, interacting with an ingroup member with high affiliative motivation ($M = -0.17$ SD = 0.59) would have been more likely to endorse more responsible drinking than interacting with an ingroup member with low affiliative motivation ($M = 0.02$, SD = 0.53). However, the mean pattern looks different for outgroup partners, and, if anything, suggests potential anti-tuning. Interacting with an outgroup member with high affiliative motivation ($M = 0.18$, SD = 0.50) would have been less likely to endorse responsible drinking than interacting with an outgroup member with low affiliative motivation ($M = -0.02$, SD = 0.50). Overall, the results indicate that when participants had high affiliative motivation, they were more likely to engage in social tuning with their partner when the partner was part of their ingroup compared to the outgroup.

Experiment 3

The results, thus far, show that an interaction partner's views are more influential on an individual's own beliefs than the larger social group, but only when the individual has the desire to get along with that partner and the partner is part of their ingroup. In Experiment 3, we seek to extend these studies by examining if these findings extend to implicit attitudes. Attitudes towards overweight individuals was chosen because the stigma towards overweight individuals is pervasive among men and women and even health professionals (Crandall, 1994; Teachman and Brownell, 2001; Wang et al., 2004; Brown, 2006; Brochu and Morrison, 2007). Furthermore, research consistently finds that overweight individuals do not exhibit any ingroup favorability towards other overweight individuals; therefore, participant's own weight should not play a role in their expression of explicit or implicit attitudes (Crandall, 1994; Teachman and Brownell, 2001).

Method

Participants

A total of 69 individuals (24 females and 45 males) from a private institution in the northeastern United States participated and received course credit their participation. Seventy-eight percent of the sample was White (54 White; 1 Black; 4 East Asian; 3 South Asian; 3 Hispanic/Latino; 3 Multiracial; 1 Other). Participants were predominantly first- or second-year undergraduates (33% First Year, 33% Second Year, 19% Third Year, 15% Fourth Year). Three participants reported believing that their partner expressed favorable attitudes towards overweight individuals. Since they had incorrect perceived views, their data was removed from the analysis. Thus, the results are based off 66 participants. All participants gave informed consent.

Design and materials

As in Experiment 2, this experiment utilized a 2 (Affiliative Motivation: high or low) x 2 (Partner Group Membership: ingroup or outgroup) between-participants design. In Experiment 3, we measured implicit and explicit attitudes towards the overweight.

Affiliative motivation manipulation

We used the same affiliative motivation manipulation as in Experiment 2 (length of interaction time).

Partner group membership manipulation

Participants learned their partner was part of their ingroup by being a student at the same school or their outgroup by being a student a different school in the same town.

Perceived views of the partner and larger social group

As in Experiments 1 and 2, participants always learned about their ostensible partner's attitudes and how this compared to the larger social group. The ostensible partner's score indicated that they held more negative or unfavorable attitudes towards overweight individuals than the other students at their school.

Social tuning measures

Explicit attitudes

We measured participant's explicit views towards overweight people using Crandall's (1994) Anti-fat Attitudes Scale. This scale consists of 10 questions that measure overall attitudes towards overweight individuals and includes questions such as: "I do not have many friends that are fat," "Fat people tend to be fat pretty much through their own fault," and "I worry about becoming fat." The responses were measured on a 5-point Likert-type scale (1 = strongly disagree; 5 = strongly agree). Higher positive numbers indicate more negative attitudes towards overweight individuals (see Appendix C for all items).

Implicit attitudes

We measured implicit attitudes using the Overweight Implicit Association Test (IAT; Greenwald et al., 1998). In this IAT, participants focused on the center of the screen and categorized words as being "pleasant" or "unpleasant" (e.g., "happy" or "rotten") and pictures as being "normal" or "overweight" as quickly as possible (all materials used in this IAT were from Nosek et al., 2007). Participants first categorized one attribute-pair (e.g., pleasant/unpleasant or overweight/normal). Then, they completed trials for the second attribute-pair. After categorizing each attribute-pair individually, participants completed trials where they categorize both attribute-pairs at the same time (e.g., pleasant/normal; unpleasant/overweight). The reaction times of the categorizations were used to compute the strength of the association between the different pairings (see Greenwald et al., 2003). The category positions were counterbalanced across participants. Higher negative scores indicate more negative/unpleasant associations towards overweight individuals.

Follow-up and demographics

As in Experiments 1 and 2, we assessed memory for the scale the partner completed and score, inquired into any suspicions, and collected basic demographic information such as gender, ethnicity, and year in school.

Procedure

The procedure was very similar to Experiment 2. Participants learned the study investigated social interactions that occur when individuals have different information about each other and that they would complete several initial tasks and then work with a partner. Half the participants were randomly selected to learn that that their partner was from the same school (ingroup), and the other half learned their partner was from a different, though local, school (outgroup). This served as the partner group membership manipulation. As in Experiment 2, participants believed they would be working with their partner for either 5 min (low affiliative motivation) or 30 min (high affiliative motivation). The computer "randomly" assigned all participants to complete the Need for Closure Scale (Webster and Kruglanski, 1994). Participants believed that the ostensible partner completed a Body Attitudes scale, and that their partner's score indicated that they had more unfavorable towards overweight individuals than others from their school. After learning this information, participants completed the Overweight Implicit Associations Test (IAT, Greenwald et al., 1998), Crandall's (1994) Anti-fat Attitudes Scale, and a final questionnaire that assessed memory for partner-relevant information, demographic information (e.g., gender, ethnicity), and any suspicions. Participants learned there would be no interaction, were thanked, debriefed, and awarded credit.

Results and discussion

To examine the effects of affiliative motivation and group membership on social tuning, analyses used a 2 (Affiliative Motivation: high vs. low) x 2 (Group Membership: ingroup vs. outgroup) ANOVA. Since all participants learned that their partner held more unfavorable views of overweight individuals than other students at their school, more unfavorable attitudes indicate more social tuning with the interaction partner. Participant gender did not influence the results, $ps > 0.1$.

Explicit attitudes

Descriptive analyses showed a moderate positive skew in explicit measure. We applied a square root transformation to adjust for this skew (Howell, 2007). Higher positive numbers indicate more stereotypic attitudes towards overweight individuals. There was no main effect found for affiliative motivation, $p = 0.785$, $\eta_p^2 = 0.00$. However, there was a main effect for group membership F (1, 62) = 6.81 $p = 0.011$, $\eta_p^2 = 0.10$, 95% CI [0.03, 0.24]. Those paired with ingroup partners ($M = 1.76$, SD = 0.23) tuned more towards their partners prejudiced attitudes than those paired with outgroup partners ($M = 1.63$, SD = 0.20). This main effect is qualified by a significant interaction between affiliative motivation and group membership, F (1, 62) = 5.48, $p = 0.022$, $\eta_p^2 = 0.08$ (see Figure 3).

Simple effects analyses showed that when participants had high affiliative motivation, they were more likely to tune towards the prejudiced attitudes of their partner when the partner was part of their ingroup ($M = 1.84$, SD = 0.27) as opposed to part of their outgroup ($M = 1.58$, SD = 0.18), F (1, 62) = 11.46, $p = 0.001$, $\eta_p^2 = 0.16$, 95% CI [0.11, 0.41]. The pattern held when a bootstrap analysis with 1,000 samples was applied ($p = 0.006$). For ingroup partners, participants with high affiliative motivation ($M = 1.84$, SD = 0.27) marginally tuned towards the prejudiced attitudes of their interaction partner than those with low affiliative motivation ($M = 1.70$, SD = 0.18), F (1, 62) = 3.04, $p = 0.086$, $\eta_p^2 = 0.05$, 95% CI [−0.02, 0.29]. This remained marginal/not significant bootstrapped with 1,000 samples ($p = 0.142$).

However, when participants had low affiliative motivation, there was no difference in explicit attitudes when their partner was from their ingroup ($M = 1.70$, SD = 0.18) than the outgroup ($M = 1.69$; SD = 0.21), $p = 0.845$, 95% CI [−0.13, 0.16]. The pattern held when a bootstrap analysis with 1,000 samples was applied ($p = 0.831$). Also, when the partner was an outgroup member, there was no difference in explicit attitudes when the participant had high affiliative motivation ($M = 1.58$; SD = 0.18) compared to low affiliative motivation

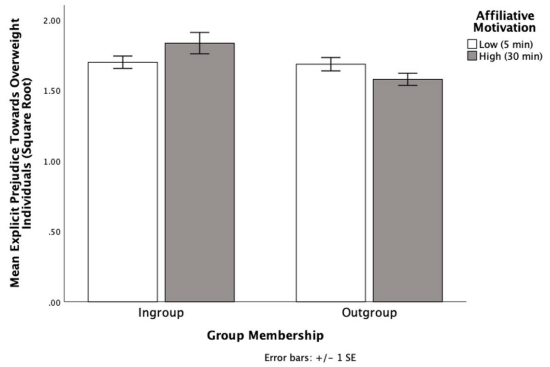

FIGURE 3
The effects of group membership and affiliative motivation on explicit attitudes towards overweight individuals in Experiment 3.

($M = 1.69$; SD = 0.21), $p = 0.123$, 95% CI [−0.03, 0.24]. This pattern held when bootstrapped with 1,000 samples ($p = 0.095$).

Implicit attitudes

Looking at implicit attitudes, higher negative numbers (i.e., −1, −2) indicate more stereotypic attitudes towards overweight individuals and higher positive numbers indicate more egalitarian attitudes towards overweight individuals. There were no main effects for affiliative motivation ($p = 0.763$) or group membership ($p = 0.407$). But there was a significant interaction between affiliative motivation and group membership on implicit attitudes, F (1, 61) = 6.78, $p = 0.012$, $\eta_p^2 = 0.10$ (see Figure 4).

Simple effects analyses showed that of the participants with high affiliative motivation, those who learned their partner was part of their ingroup ($M = -0.86$, SD = 0.32) tuned more towards the prejudiced attitudes of their interaction partner than those who learned their partner was part of the outgroup ($M = -0.52$; SD = 0.37), F (1, 61) = 5.32, $p = 0.025$, $\eta_p^2 = 0.08$, 95% CI [0.05, 0.63]. The pattern held when a bootstrap analysis with 1,000 samples was applied ($p = 0.010$). When participants learned their partner was a member of their ingroup, those with high affiliative motivation ($M = -0.86$, SD = 0.32) tuned more towards the prejudiced attitudes of their interaction partner than those with low affiliative motivation ($M = -0.57$, SD = 0.54), F (1, 61) = 3.99, $p = 0.050$, $\eta_p^2 = 0.06$, 95% CI [0.00, 0.57]. This effect became marginal when a bootstrap analysis with 1,000 samples was applied ($p = 0.071$).

However, when participants had low affiliative motivation, there was no difference in implicit attitudes when their partner was from their ingroup ($M = -0.57$; SD = 0.54) than the outgroup ($M = -0.75$; SD = 0.25), $p = 0.189$, 95% CI [−0.09, 0.44]. This held after a bootstrap analysis with 1,000 samples ($p = 0.210$). Also, when the partner was an outgroup member, there was no difference in implicit attitudes when the participant had high affiliative motivation ($M = -0.51$; SD = 0.37) compared to low affiliative motivation ($M = -0.75$; SD = 0.25), $p = 0.099$, 95% CI [−0.04, 0.50]. This effect became marginal when a bootstrap analysis with 1,000 samples was applied ($p = 0.056$), indicating a potential anti-tuning effect where when interacting with an outgroup member, participants expressed *less* implicit prejudice when they had high affiliative motivation ($M = -0.52$, SD = 0.37) compared to low affiliative motivation ($M = -0.75$; SD = 0.25).

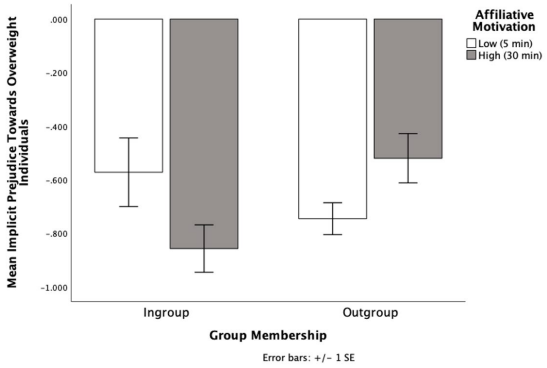

FIGURE 4
The effects of group membership and affiliative motivation on implicit attitudes towards overweight individuals in Experiment 3.

Experiment 4

Experiment 4 uses the same methodology as Experiment 3 but investigates whether affiliative motivation and group membership influence social tuning when the ostensible partner endorses more positive attitudes towards weight than the larger social group.

Method

Participants

A total of 93 individuals (50 females, 40 males, 1 Other, and 1 who did not disclose) from a private institution in the northeastern United States participated and received course credit their participation. Sixty-five percent of the participants were White (24% Asian/South Asian, 4% Latinx, 3% Black, 3% multi-racial, 1 did not report). Participants were predominantly first- or second-year undergraduates (35% First Year, 28% Second Year, 15% Third Year, 20% Fourth Year, 1% Graduate Student, 1% Not in School). All participants gave informed consent.

Design and Procedure

Experiment 4 used the same methods as Experiment 3. The only difference was the perceived views of the ostensible partner which were more positive or favorable towards overweight than other individuals at their school. Thus, participants were randomly assigned to learn that their ostensible partner was from the same school (ingroup) or a different local school (outgroup). Participants believed they would be working with this partner for 5 min (low affiliative motivation) or 30 min (high affiliative motivation). Participants were then "randomly" assigned to complete the Need for Closure Scale (Webster and Kruglanski, 1994), and believed their ostensible partner completed a Body Attitudes scale. However, in Experiment 4, the partner's score indicated that they had more favorable towards overweight individuals than others from their school. Participants then completed the Overweight Implicit Associations Test (IAT, Greenwald et al., 1998), Crandall's (1994) Anti-fat Attitudes Scale, and a final questionnaire that assessed memory for partner-relevant information, demographic information (e.g., gender, ethnicity), and any suspicions. Participants learned there would be no interaction, were thanked, debriefed, and awarded credit.

Results and discussion

As in Experiment 3, analyses used a 2 (Affiliative Motivation: high vs. low) x 2 (Group Membership: ingroup vs. outgroup) ANOVA. Since all participants learned that their partner held more favorable views of overweight individuals than other students at their school, more favorable attitudes indicate more social tuning with the interaction

partner. Participant gender influenced the results ($p > 0.01$); therefore, it was a covariate in the analyses.

Explicit attitudes

Descriptive analyses revealed that the Fear subscale on the Anti-Fat Attitudes Scale (Crandall, 1994) behaved differently than the Dislike and Willpower subscales. The Fear subscale has three items about fears relating to the individual gaining weight [e.g., "I worry about becoming fat"). The Dislike and Willpower subscales are perceptions of overweight individuals (e.g., "Fat people tend to be fat pretty much through their own fault (willpower)" or "Fat people make me feel somewhat uncomfortable (dislike)]." Therefore, we conducted two analyses: one for the group-based beliefs (Dislike and Willpower subscales) and one for self-based beliefs (i.e., Fear subscales).

Group-based explicit attitudes

While there was no main effect for affiliative motivation ($p = 0.675$, $\eta_p^2 = 0.00$), there was a main effect for group membership F (1, 84) = 3.99 $p = 0.049$, $\eta_p^2 = 0.05$, 95% CI [0.00, 0.72]. Those paired with ingroup partners ($M = 2.95$, SD = 0.87) tuned more towards their partners egalitarian attitudes towards overweight individuals than those paired with outgroup partners ($M = 3.34$, SD = 0.89). This main effect held when a bootstrap analysis with 1,000 samples was applied ($p = 0.051$). However, unlike Experiment 3, there was no significant interaction between affiliative motivation and group membership, $p = 0.578$, $\eta_p^2 = 0.00$. See Figure 5.

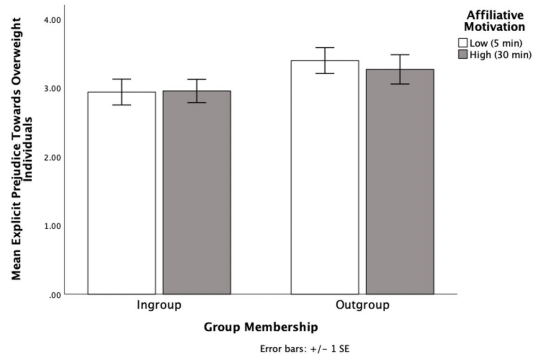

FIGURE 5
The effects of group membership and affiliative motivation on explicit attitudes towards overweight individuals in Experiment 4.

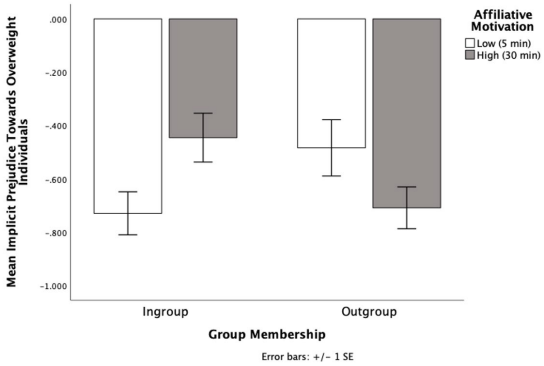

FIGURE 6
The effects of group membership and affiliative motivation on implicit attitudes towards overweight individuals in Experiment 4.

Individual-related explicit attitudes

As for individual-based attitudes, there was no main effect found for affiliative motivation, $p = 0.120$, $\eta_p^2 = 0.03$. However, there was a main effect for group membership F (1, 84) = 3.86, $p = 0.053$, $\eta_p^2 = 0.05$, 95% CI [−0.01, 1.4]. Those paired with ingroup partners ($M = 4.48$, SD = 1.62) expressed more fears about becoming overweight compared to those paired with outgroup partners ($M = 3.74$, SD = 1.70). This main effect became marginal when a bootstrap analysis with 1,000 samples was applied ($p = 0.065$). There was no significant interaction between affiliative motivation and group membership, $p = 0.457$, $\eta_p^2 = 0.01$.

Implicit attitudes

Looking at implicit attitudes, higher positive numbers (i.e., 1, 2) indicate more egalitarian attitudes towards overweight individuals. Analyses revealed four outliers on the IAT which were removed for the analysis. There were no main effects for affiliative motivation ($p = 0.663$) or group membership ($p = 0.990$). But there was a significant interaction between affiliative motivation and group membership on implicit attitudes, F (1, 80) = 7.58, $p = 0.007$, $\eta_p^2 = 0.09$ (see Figure 6).

Simple effects analyses showed that of the participants with high affiliative motivation, those who learned their partner was part of their ingroup ($M = -0.45$, $SD = 0.47$) tuned more towards the egalitarian attitudes of their interaction partner than those who learned their partner was part of the outgroup ($M = -0.71$; SD = 0.33), F (1, 80) = 3.82, $p = 0.05$, $\eta_p^2 = 0.054$, 95% CI [−0.01, 0.50]. The pattern held when a bootstrap analysis with 1,000 samples was applied ($p = 0.049$). When participants learned their partner was a member of their ingroup, those with high affiliative motivation ($M = -0.45$, SD = 0.47) tuned more towards the egalitarian attitudes of their interaction partner than those with low affiliative motivation ($M = -0.72$, SD = 0.40), F (1, 80) = 5.67, $p = 0.020$, $\eta_p^2 = 0.07$, 95% CI [0.05, 0.53]. This effect remained when a bootstrapped with 1,000 samples ($p = 0.016$).

However, when participants had low affiliative motivation, those with an ingroup partner ($M = -0.73$; SD = 0.37) were marginally more likely to anti-tune than those with an outgroup partner ($M = -0.48$; SD = 0.47), F (1, 80) = 3.76, $p = 0.056$, $\eta_p^2 = 0.05$, 95% CI [−0.01, 0.51]. This held after a bootstrap analysis with 1,000 samples ($p = 0.053$). However, when the partner was an outgroup member, there was no difference in implicit attitudes when the participant had high affiliative motivation ($M = -0.71$; SD = 0.33) compared to low affiliative motivation ($M = -0.48$; SD = 0.47), $p = 0.123$, 95% CI [−0.06, 0.48]. This non-significant effect remained after being bootstrapped with 1,000 samples ($p = 0.104$).

General discussion

Across four experiments, the results consistently demonstrated that social tuning with an interaction partner will occur even when the interaction partner's beliefs differ greatly from the larger social

group. More specifically, the results demonstrated that individuals with high affiliative motivation were more likely to divert away from social consensus and engage in social tuning with their ingroup than outgroup partner. This occurred for explicit attitudes (Experiments 1–3) and implicit attitudes (Experiments 3 and 4).

These findings are consistent with the tenets of both Social Learning Theory and Shared Reality Theory as they reiterate that identifying or sharing something in common with another person (e.g., a social model) as well as having a motivation to get along with interaction partners are important factors predicting when individuals are likely to engage in social learning or experience shared reality (XXXBandura, 1969; Hardin and Conley, 2001). The findings are also consistent with the affiliative social tuning hypothesis (Sinclair et al., 2005a,b; Skorinko and Sinclair, 2018) because believing an interaction partner was similar in terms of group membership increased the likelihood of social tuning, especially when affiliative motivation was high.

One caveat to this finding was the explicit weight-based attitudes in Experiment 4 when the partner endorsed positive weight-based attitudes. In this instance, group membership, more so than affiliative motivation encouraged social tuning. More specifically, when interacting with an ingroup member, participants social tuned by expressing more favorable attitudes towards overweight individuals. This finding is similar to Experiment 1 when affiliative motivation was held constant. However, this is not as consistent with Experiments 2 and 3 where those with high affiliative motivation engaged in social tuning of explicit attitudes with an ingroup member more than an outgroup member. An exploratory look at the means shows a similar pattern for group based explicit attitudes Experiment 4; however, it was not significant. Yet, for implicit attitudes, participants in Experiments 3 and 4 engaged in social tuning based on affiliative motivation and group membership, as those who had high affiliative motivation tuned more towards an ingroup than outgroup member. Thus, overall, the pattern of results is similar.

In addition, the type of explicit attitude mattered in Experiment 4 as social tuning did not occur for attitudes related to participant's own body image (e.g., if they gained weight). Rather, individuals interacting with an ingroup member expressed more fears about gaining weight than those interacting with an outgroup member. Yet, in Experiment 3, when the interaction partner endorsed negative weight-based attitudes, there was no differences based on the type of attitude (overweight as a group; self/individual). And, again, social tuning occurred for implicit attitudes as predicted between affiliative motivation and group membership in Experiments 3 and 4.

Experiments 3 and 4 used the same methodology except for the attitude endorsed by the partner towards overweight individuals (negative in Experiment 3 and positive in Experiment 4). However, Experiment 4 had a larger percentage of female participants than Experiment 3 and participant gender was a significant factor in Experiment 4, but not Experiments 1–3. Male participants in Experiment 4 expressed significantly more negative views towards overweight individuals than female participants, but female participants tended to express greater fears in becoming overweight. Therefore, the difference in explicit responses may be due to the pervasive, yet changing, nature of weight-based stigmas (Puhl and Heuer, 2009). Since weight-based stigma is still pervasive it may be expressed explicitly, but you may be more motivated to express such negative sentiments if you have a strong desire to get along with an interaction partner, especially one that is similar to you. However, when the partner expresses positive attitudes towards overweight individuals, it may not require the same level of affiliation to endorse positive/favorable views of others when interacting with someone.

The findings likely reflect the complicated relationship between gender and body image. Past work shows that when women are primed to think about their bodies (e.g., putting on a swimsuit compared to a sweater), they are more likely to engage in self-objectification than men (e.g., Fredrickson et al., 1998; Hebl et al., 2004). Likewise, women exposed to images of celebrities and thin peers on social media platforms are more likely to express more body dissatisfaction than those who saw neutral images (Brown and Tiggemann, 2016). Thus, in the current work, learning that one's partner endorses positive body attitudes may encourage participants to endorse similar views when the interaction partner is similar. However, applying those positive body attitudes to oneself, especially for women, may be harder to do—especially when someone learns their partner is more positive than the general public. This social consensus information may have inadvertently served as a prime about negative societal body image attitudes and in returned acted like a swimsuit or viewing a thin celebrity and increased fears of gaining weight. Therefore, future research should continue to examine social tuning for weight-based stigma in relation to gender identity to further understand and unpack these differences in the findings.

The results from these four experiments contradict the findings from Sinclair et al. (2005b) where they found that group membership (based on experimenter's race) had no influence on social tuning. We do not believe that either result is in error. Rather, we believe different situational mechanisms are at play. In the original study (Sinclair et al., 2005b), participants were run in groups rather than one-on-one interactions. We believe that this is an important distinction because group membership is likely to be much more salient and dominant when an interaction is dyadic in nature, especially in situations where affiliative motivation is high and social tuning is likely to occur. Future research should examine whether group size influences the effects of perceived similarity through group membership on social tuning.

In addition, the original study by Sinclair et al. (2005a) used the experimenter as the interaction partner. Past work consistently finds that participants who have high affiliative or epistemic motivation will tune towards an interaction partner that is an experimenter (Sinclair et al., 2005a,b; Lun et al., 2007; Skorinko and Sinclair, 2018). The findings from the current work suggest that perceived similarity through group membership may also be effective in eliciting social tuning when the interaction partner is a peer rather than in a position of perceived power (e.g., experimenter). Bandura (1969) argues that we are more likely to see those in higher social status or social power (e.g., celebrities, experts, etc.) as social models. Therefore, it is possible that the social status or social power that comes with being an experimenter plays a greater role than perceived similarity in a social interaction, but when interacting with someone who is on a more level playing field status/power wise than perceived similarity becomes a more important factor. Future research should explore how social hierarchies through social status and/or social power influence the likelihood that perceived similarity predicts social learning and social tuning.

In research like the current work, a concern raised is whether the results really represent the construct being measured (i.e., social tuning) or self-presentation. We contend that self-presentation is

unlikely an explanation for the findings for two reasons. First, we took self-presentation into account as we designed our experiments. As such, we made it very clear to participants what information was shared with their partner and what information was not shared. Since participants knew that their responses to the attitude measures would *not* be shared with their partner, their motivation to self-present should be limited. Second, past research shows that social tuning is not due to strategic self-presentation (Sinclair et al., 2005a,b). We see, as in past research, social tuning occurs for implicit attitudes (Experiments 3 and 4) indicating that strategic self-presentation is unlikely to be occurring. It is also possible that the results found are, in part, due to the clarity in which the partner's attitude and the larger social groups attitudes were expressed, as past work has found that clarity in social norms of expression of prejudice influenced individual beliefs (Zitek and Hebl, 2006).

Affiliative motivation is not the only motivation that encourages social tuning to occur. Research also finds that epistemic motivation (e.g., the desire to gain information; see Lun et al., 2007), perspective taking (e.g., putting yourself in the shoes of others; Skorinko et al., 2023), and cultural background/mindset (Skorinko et al., 2015) also predict when social tuning is likely to occur. From both a social learning and a shared reality standpoint, it seems like perceived similarity, especially through group membership, might also play a role when these different motivations are activated as well. For example, if an individual is experiencing epistemic motivation because they want to gain more information about how their partner perceives something or someone, then is also seems likely that the perceived similarity (or lack thereof) with this partner would influence their likelihood to social tune. Thus, future research should examine the role the perceived similarity, especially through group membership, plays when other motivations to engage in social tuning are active. This work should also investigate whether social consensus (Stangor et al., 2001) inhibits social tuning when these different motivations are active as well.

Finally, Bandura (1969) argued that perceived similarity was important to social learning but that it, in and of itself, may not be enough to create identification with a social model and some other factors (such as motivation) may be needed to for social learning to occur. This contention may relate to the difference between sharing a surface- or a deep-level characteristics with someone else (Harrison et al., 1998). Surface-level characteristics include observable cues such as gender, race, and age. Deep-level characteristics include non-observable cues such as attitudes, beliefs, skill sets, and values. While both surface- and deep-level similarity result in attraction toward individuals, surface-level similarities are a weaker predictor of positive evaluations and reducing bias than deep-level similarities (Swim, 1993; Ensher et al., 2002). For instance, one study found that attitudinal similarity was a better predictor of a mentor's satisfaction and support than demographic similarity (Ensher et al., 2002). In the current work, participants learn not only about a surface-level characteristic about their partner (i.e., their group membership) but they also learn about deeper-level characteristics through the attitude they endorse. Other work argues that differences in group types influences the effect they have on a person (e.g., a minimal/less consequential group to a more consequential group; Blocker and McIntosh, 2017). Therefore, future research may want to disentangle the differences between surface and deep-level characteristics and different group types and investigate how these factors influence the social tuning process.

In summary, the current research extends the affiliative social tuning hypothesis by demonstrating that the effects of affiliative motivation on social tuning are amplified when the interaction partner belongs to the ingroup rather than the outgroup. Furthermore, this work provides evidence that the beliefs of an immediate social interaction partner can, at times, be more influential in an individual's personal beliefs, than the larger social groups beliefs. This work aligns with Bandura's Social Learning Theory because it shows that both identification through perceived similarity and the motivation to get along with someone influence whether an individual aligns their views with an interaction partner or the larger social group. These findings have larger implications for the transmission of attitudes, especially intergroup attitudes because these findings imply that the transmission of prejudiced or egalitarian attitudes are likely to be greater when an individual has a desire to interact with an ingroup member.

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 Worcester Polytechnic Institute Institutional Review Board (IRB). The patients/participants provided their written informed consent to participate in this study.

Author contributions

JS led the experimental design, analyses, and manuscript writing. M-SJ and AD assisted in the manuscript writing. The remaining authors all contributed equally to this work. NE, MF, JH, and GG helped design, run, and assisted in analyses for E1. SM, CM, and LR helped design, run, and assisted in the analyses for E2. KHeather helped run and conducted analyses for E2. SS helped design, run, and assisted in the analyses for E3. TJ, DV, AV, MK, MaS, KR, KHeyer, AI, MrS, and KHo helped run and assisted in the analyses for E3. CP and EB conducted E4 and assisted with manuscript writing. 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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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1060166/full#supplementary-material

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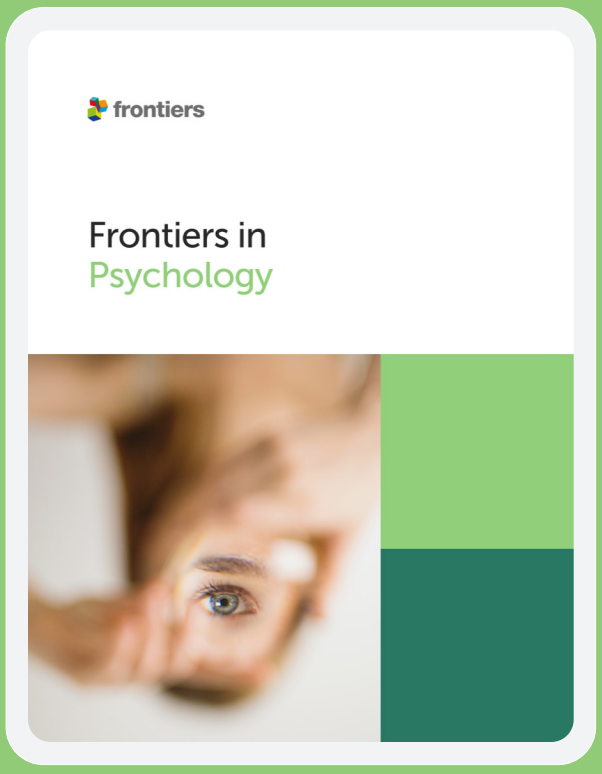

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