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The influence of learning anxiety and involution on motivation among undergraduate English majors in Beijing and Macau

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The aim of this study is to examine how learning anxiety and involution influence students' learning motivation, the interrelationships among anxiety, involution, and the four language skills (listening, speaking, reading, and writing), as well as the potential variations in these relationships among English major students in different educational backgrounds, specifically in Beijing and Macau. This study employed quantitative research methods to collect data on learning anxiety, involution, and motivation levels from university students in both cities. The results indicate that both groups exhibited motivation levels higher than the average, moderate levels of anxiety and involution, and significant effects of anxiety and involution on motivation. Furthermore, interconnections were observed among the four language skills. Moreover, variations in the results were found across different cultural backgrounds. This study holds important theoretical significance in understanding the impact of affect and positive psychology on English learning, as well as exploring the differences in English learning within diverse cultural contexts.

1 Introduction

Socio-emotional factors such as anxiety and motivation have a significant bearing on educational contexts and extend beyond the classroom since they are key factors influencing individual growth and development. These factors play an important role in students' learning as well as their emotional well-being (Pollack et al., 2021). However, little is known about the interrelationship between anxiety, evolution, and motivation when it comes to foreign language learning. However, by utilizing this knowledge, barriers to learning can be minimized and potential mechanisms of affective factors investigated. Researchers and educators can enhance the learning experience of a language by acknowledging and examining the unique and multifaceted roles of emotional factors. Therefore, a comprehensive study to measure the influences of learning anxiety and involution on motivation among college students, as well as the relationship between the four domains of learning anxiety and involution is in need, as this provides researchers with the opportunity to collect quantitative data on a variety of psychological variables.

Macau, a special administrative region of China, has a significantly different educational system and language of instruction than mainland China (Lee et al., 2020). A number of important national education organizations and many top universities are located in Beijing, the capital of China. Although Macau and Beijing have considerable sociocultural distances,

there have been very few studies examining the affective factors of Macau and Beijing students. The purpose of this study is to explore these factors among undergraduate students majoring in English in Beijing and Macau. In addition to comparing findings across different cultural contexts, researchers can also develop a more comprehensive understanding of how to motivate students.

2 Literature review

2.1 Emotion and positive psychology

Although emotional factors play a crucial role in language learning and instruction, their significance has not been adequately acknowledged in applied linguistics research over the past few decades. Emotions, which can be considered central to language education, function as fundamental processes that influence a wide range of aspects of language development. They are inextricably linked to both language acquisition and proficiency, shaping how learners engage with and internalize new languages (MacIntyre and Vincze, 2017). Traditionally, research in language learning has concentrated predominantly on the negative emotion of anxiety in foreign language classroom settings (Li et al., 2021; Dewaele, 2007; Horwitz et al., 1986; MacIntyre, 1999), often overlooking the complex interplay between various emotional states that can either hinder or foster language development. However, reducing positive emotions to mere opposites of negative ones fails to capture their unique contributions, highlighting the necessity of adopting a more comprehensive perspective on emotions in language education. In response to this limitation, Imai (2010) advocates for a more nuanced approach that recognizes the synergistic effects of both positive and negative emotions on promoting foreign language acquisition. By acknowledging and understanding the distinctive and interactive roles that diverse emotional states play, educators and researchers are better equipped to create a holistic and effective learning environment.

The concept of "positive psychology" was first introduced by Maslow (1954) in his publication, laying the foundation for a new field that emphasizes the importance of focusing on positive human qualities and resources (Schui and Krampen, 2010). The emergence of positive psychology as a legitimate field of study has significantly increased attention and research on the distinctions between positive and negative emotions (MacIntyre and Vincze, 2017). Psychiatrists have studied the factors that make life worthwhile and the human strengths that enable individuals to cope with challenges, respect others, and perceive daily experiences as meaningful (Dunn and Dougherty, 2005). For instance, Shafiee Rad and Jafarpour (2022) suggested implementing positive emotion interventions has the potential to yield benefits: not only can these interventions enhance emotional well-being, but they may also enhance academic performance among learners. Positive emotions are not only capable of expanding individuals' perspectives and enhancing their personal strengths, according to Alrabai (2022), but they are also capable of mitigating the residual effects of negative emotions. Classroom social climate and foreign language enjoyment significantly predict student engagement, with the latter emerging as the more influential factor (Mohammad Hosseini et al., 2022). In addition, these results demonstrate the value of positive psychology in second language (L2) pedagogy, emphasizing the importance of fostering positive emotional experiences as well as developing a conducive learning environment for students.

2.2 Involution in education

Goldenweiser (1936) first used the term "involution," and was used by Geertz (1963) to describe the adaptation of Javanese peasant society to a colonial system in which land, labor, produce, and money taxes were extracted from the village economy. Geertz argues that many centuries of increasing wet-rice cultivation in Indonesia had produced greater social complexity without significant technological or political change, a process he refers to as involution. He describes in particular the process of "agricultural involution" in Java, where both the external economic pressures of the Dutch rulers and internal pressures due to population growth led to intensification rather than change (White, 1983).

As applied to education, it refers to the competition among peers to devote more effort to compete for limited resources, resulting in a decrease in the individual's benefit-effort ratio. The translated Chinese term "neijuan (内卷)" has become popular among contemporary Chinese tertiary educational contexts, with individuals employing it to represent their present emotional state of anxiety and competition among Chinese college students (Wang et al., 2023). It is typically perceived as an unproductive and unreasonable struggle for superior resources. However, most of the relevant discussions have been based on social review articles, which lack the powerful support of specific data analyses, and their definitions of involution remain in conformity with the definition of "neijuan" in the network context (Yi et al., 2022). Many researchers have dedicated their efforts to examining the intricate structure of competitive psychology, as well as the various factors that influence it (Liu et al., 2022). For example, Wang et al. (2023) developed a reliable and valid measurement scale, that is, the Academic Involution Scale for College Students in China (AISCSC), to assess Chinese college students' competitive psychology. The Competition Psychology Scale for College Students (CPS-CS) was developed (Liu et al., 2022), which consists of a reliable and valid 6-item scale encompassing four dimensions: hypercompetitive attitude, competitive motivation, personal development, and competitive interpersonal relationships. In terms of the relationship between involution and anxiety, Yi et al. (2022) indicated that the involution behavior exhibited by Chinese college students can be categorized into three types: passive involution, reward-oriented involution, and achievement-motivated involution. Among these, college students' passive involution displayed a significant and positive predictive effect on their anxiety, while achievement-motivated involution was found to have a substantial and negative predictive effect. Involution in education appears to have been studied since 2022, and it suggests that insufficient efforts have been made to analyze the impact of involution on motivation and how involution is related to anxiety.

2.3 Foreign language anxiety and affective filter

Foreign Language Anxiety (FLA) has been a focus of research within foreign language education since the early 1970s. High-anxious

learners frequently underperform their low-anxious counterparts, and they tend to speak more concisely or even inaudibly (Liu and Huang, 2011). FLA can be characterized as "the apprehension and adverse emotional response elicited during the learning or utilization of a second language" (MacIntyre, 1999). The inaugural definition of Foreign Language Classroom Anxiety (FLCA) illuminates the multifaceted nature of the construct: "a unique configuration of self-perceptions, beliefs, emotions, and behaviors associated with classroom learning that stems from the distinctive nature of the language learning process" (Horwitz et al., 1986). The first set of language-specific anxiety measures were integrated within Gardner's Attitude-Motivation Test Battery (AMTB) (Gardner, 1985; Gardner, 2010), which comprised assessments of French classroom and French use anxiety.

Krashen (1982) proposed the existence of an "affective filter" in language learners that modulates "the degree to which the acquirer is "open" (p. 9). Negative emotional states, as asserted by Krashen, prompt learners to elevate their filters, consequently hindering their comprehension and processing of language input. It is recommended that educators adopt strategies to stimulate learners' interest, establish low-anxiety environments, and enhance self-esteem as a means of reducing the affective filter and facilitating a smoother language acquisition process.

Several scholars have examined foreign language anxiety from different perspectives, for example, Alberth (2022) demonstrated that women were more anxious than men. However, Rasool et al. (2023) concluded that learners' writing anxiety exhibits no significant relationship with their gender, but rather is influenced by a diverse array of factors, including linguistic challenges, apprehension of negative evaluation, diminished self-confidence, and adverse experiences in the past. Furthermore, anxiety not only affects writing, but also speaking and even brain activity. For example, Xu et al. (2023) report that foreign language speaking anxiety adversely impacts brain regions associated with language and theory of mind. The findings provide further insight into the neural synchronization that contributes to foreign language anxiety and verbal interaction, as well as a theoretical basis for alleviating foreign language speaking anxiety and enhancing foreign language communication quality. Aside from that, empirical evidence suggests that anxiety also adversely affects reading processes. In Chan et al. (2024), the influence of foreign language anxiety on English word reading was examined and cognitive-linguistic abilities were assessed as mediating factors in this relationship. Students' reading comprehension in a second or foreign language is significantly influenced by anxiety, according to Liu and Dong (2022). As for speaking, it is confirmed that the categorization of foreign language listening anxiety definitions into psychological, social, and situation-specific categories (Ji et al., 2022). Li et al. (2023) have contributed to the understanding of foreign language listening anxiety (FLLA) by distinguishing between general listening anxiety and listening test anxiety. By distinguishing between FLLA types, we have been able to better comprehend the unique effects of FLLA types on self-perceived listening performance and the intensity variations in listening anxieties experienced by English and non-English majors.

2.4 Motivation

According to extensive research, motivation has been established as a crucial affective factor influencing second language (SL) and foreign language (FL) learning significantly (Gardner, 1985; Dörnyei, 2005; Gong et al., 2020). This suggests that researchers should explore the interconnectedness of motivation and emotions to gain a deeper understanding of the way they influence SL/FL learning.

The central tenets of motivation-focused theories posit that motivation is significantly shaped by students' attitudes towards a foreign language, and motivation, particularly integrative or intrinsic motivation, bolsters SL/FL learning and sustains learners' efforts to master the language. In addition, motivation is dynamically intertwined with self-confidence, language anxiety, self-efficacy, SL competence, and a wide array of other factors (Ehrman, 1996).

From previous reviews, it is evident that many scholars have investigated the relationship between positive psychology and foreign language anxiety and motivation. However, there is a scarcity of research on the relationship between anxiety and involution, as well as the relationship between learning anxiety and involution. While some studies have explored the impact of anxiety and involution on the skills of listening, speaking, reading, and writing, few have examined the interplay among these four skills. Furthermore, there is limited research comparing differences in English learning among students from diverse cultural backgrounds.

In light of this, this study proposes three hypotheses to address the aforementioned research gaps:

Hypothesis H1: Both involution and anxiety significantly influence English learning motivation.

Hypothesis H2: The four domains of English learning, namely listening, speaking, reading, and writing, mutually influence each other in terms of involution and anxiety.

Hypothesis H3: Different cultural and educational backgrounds impact the results of H1 and H2.

3 Materials and methods

3.1 Participants

This study was conducted among adult undergraduate students majoring English at a university in Beijing and Macau, respectively. In May 2022, online questionnaires were distributed to students from these two universities, with a total of 187 questionnaires returned, including 87 from Beijing and 100 from Macau. They will read the questionnaire consent before answering the questions. After removing invalid questionnaires, the final number of valid questionnaires were 84 from Beijing (average age = 19.71; 11 males, 73 females) and 99 from Macau (average age = 18.79; 20 males, 79 females). It was obvious that in these two universities, there is an imbalance in the ratio of male and female, which is also common in other foreign languages schools where there are more female students (Xu et al., 2022). To avoid the influence of gender, the analyses employed T test and it turned out that gender did not significantly influence learning anxiety [Beijing ($t(82) = 1.435$, $p = 0.155$, Cohen's d = 0.86)], [Macau ($t(97) = 1.350$, $p = 0.180$, Cohen's d = 0.92)]; motivation [Beijing ($t(82) = -1.325$, $p = 0.190$, Cohen's d = 0.65)], [Macau ($t(97) = -0.170$, $p = 0.865$, Cohen's d = 0.63)]; and involution [Beijing ($t(82) = -1.114$,

$p = 0.269$, Cohen's d = 0.76)], [Macau ($t(97) = 0.672$, $p = 0.503$, Cohen's d = 0.66)].

3.2 Instruments

Three questionnaires were designed to collect data on learning anxiety, motivation, and involution among students at universities in Beijing, and Macau, respectively.

Anxiety Scale: To figure out students' anxiety, this study employed a Chinese language learning anxiety scale from Xu et al. (2022), originally from Luo (2015), and made some modifications because this study aimed to investigate the influence of learning anxiety on English majors' motivation, the contents of the questionnaires were adjusted accordingly, such as changing "Chinese learning" into "English learning." (See Appendix 1). A total of 16 items were modified to assess participants' English learning anxiety. It has a good reliability ($\alpha = 0.945$, KMO = 0.912). In addition, this paper further divided the scale into four domains of anxiety: speaking anxiety, listening anxiety, reading anxiety, and writing anxiety, which aimed to further explore the relationship between different domains of anxiety and involution.

Involution Scale: This questionnaire aimed to explore the influence of involution on motivation among English majors at universities in Beijing and Macau. A 16-item survey questionnaire was designed ($\alpha = 0.904$, KMO = 0.850) to assess participants' involution, with one example item being "I will use my spare time to practice speaking and gradually surpass my classmates." (See Appendix 2). In addition, this paper further divided the scale into four domains, that is, speaking involution, listening involution, reading involution and writing involution. These four domains were designed to explore the relationship between learning anxiety and different domains of involution. The questionnaires contain English learning anxiety, motivation, and involution and participants were required to answer the questionnaires using a 5-point Likert scale from "1, strongly disagree" to "5, strongly agree." Scoring of the questionnaires underwent double checks by authors and experts, with any questionable responses reviewed by authors.

Motivation Scale: The scale developed by Vallerand et al. (1992) and Noels et al. (2003) was used to investigate the motivation of undergraduate English majors in Beijing and Macau universities. Similarly, the contexts of the questionnaires were adjusted accordingly to better fit for this study, such as changing "Chinese learning" to "English learning." For example, "I study English because I feel happy when learning a second language" (See Appendix 3). To eliminate language barriers that will hinder the understanding of the

questionnaire, the questionnaire was translated into Chinese and back translation was employed to ensure the correctness. A total of 18 items were modified to assess participants' motivation ($\alpha = 0.880$, KMO = 0.779).

4 Results

4.1 Descriptive results

Table 1 presents the scores of participants from Beijing in terms of learning anxiety, motivation, and involution. The motivation scores of participants from Beijing were observed to be above the mid-scale threshold (3) (Mean = 3.0437, SD = 0.65155), reflecting a generally positive motivation level. Similarly, involution scores were above the mid-scale point (Mean = 3.0603, SD = 0.75957). In terms of anxiety, participants in Beijing displayed scores slightly above the mid-scale point (Mean = 3.1652, SD = 0.85727), indicating a moderate level of anxiety. Table 2 presents the scores of Macau participants' learning anxiety, motivation, and involution. The motivation scores of participants from Macau were found to be above the mid-scale threshold (3) (Mean = 3.638, SD = 0.6265), indicating a generally positive motivation level. Additionally, involution scores were also above the mid-scale point (Mean = 3.2689, SD = 0.70215). However, anxiety scores for Macau participants were slightly below the mid-scale point (Mean = 2.8207, SD = 0.92352), suggesting a moderate level of anxiety.

4.2 Results of regression analysis

In order to test the aforementioned hypotheses (H1, H2, and H3), a series of research steps were conducted. The first set of research employed linear regression analysis with motivation as the dependent variable and involution and anxiety as independent variables. Table 2 presents the results of the linear regression analysis conducted in both Beijing and Macau.

In the second set of experiments, matrix scatter plots were generated to examine the relationships among anxiety and involution in the four subdomains of English learning: listening, speaking, reading, and writing, specifically for English major students in Beijing and Macau. Additionally, correlation matrices were computed to assess the relationships between speaking anxiety, listening anxiety, reading anxiety, writing anxiety, as well as speaking involution, listening involution, reading involution, and writing involution.

TABLE 1 Anxiety, motivation, and involution scores of Beijing and Macau participants.

Region	Measured variable	Min	Max	Mean	SD	Skewness	Kurtosis
Beijing	Anxiety	1	5	3.1652	0.85727	−0.089	0.299
	Motivation	0.89	4.44	3.0437	0.65155	−0.484	1.589
	Involution	1	5	3.0603	0.75957	0.041	0.635
Macau	Anxiety	1	4.81	2.8207	0.92352	−0.339	−0.41
	Motivation	1.28	5	3.638	0.6265	−0.427	1.536
	Involution	1.31	5	3.2689	0.70215	−0.118	0.527

TABLE 2 Linear regression analysis of motivation.

Region	Model	B	Std. Error	Beta	t	p
Beijing	(Constant)	1.74	0.291	–	5.974	<0.001
	Anxiety	−0.128	0.064	−0.169	−2.019	0.047
	Involution	0.559	0.072	0.652	7.784	<0.001
Macau	(Constant)	2.504	0.280	–	8.931	<0.001
	Anxiety	−0.182	0.054	−0.269	−3.346	0.001
	Involution	0.504	0.072	0.565	7.037	<0.001

Dependent variable: motivation.

Tables 3, 4 provide the correlation matrix results for anxiety and involution subdomains in Beijing and Macau, respectively.

Regarding the first hypothesis, the influence of anxiety and involution on motivation, the results showed that anxiety had a negative impact on motivation for both Beijing and Macau undergraduate English majors, as evidenced by Beijing participants' learning anxiety ($\beta = -0.169$, $p = 0.047$) and Macau students' learning anxiety ($\beta = -0.269$, $p = 0.001$). That is, increased anxiety levels led to lowered learning motivation. Additionally, involution had a significant positive impact on motivation for both Beijing and Macau undergraduate English majors, as evidenced by Beijing students' involution ($\beta = 0.652$, $p < 0.001$) and Macau students' involution ($\beta = 0.565$, $p < 0.001$). That is, increased involution levels led to enhanced motivation. What's more, the influence of anxiety is less when compared with involution. MacIntyre and Vincze (2017) found out that a consistent and strong positive correlation can be observed between positive emotions and motivation-related factors, whereas the relationships between negative emotions and motivation-related variables are less robust and less uniform.

The linear regression equations for the models are:

$$Beijing : motivation = 1.74 - 0.128 \, learning \, anxiety + 0.559 \, involution$$

$$Macau : motivation = 2.504 - 0.182 \, learning \, anxiety + 0.504 \, involution$$

According to the scatter plots depicted in Figures 1, 2, both Beijing English majors and Macau English majors exhibit a normal distribution in terms of anxiety and involution across listening, speaking, reading, and writing. Overall, the normal distribution of involution in the four language skills is significantly more obvious than that of anxiety for students in both regions. On a specific level, regarding anxiety, among Beijing English majors, significant strong normal distributions are observed for listening anxiety and speaking anxiety, writing anxiety and speaking anxiety, while significant moderate normal distributions are observed for reading anxiety and speaking anxiety, reading anxiety and listening anxiety, and writing anxiety and reading anxiety. A weak significant normal distribution is found for

writing anxiety and listening anxiety. On the other hand, for Macau English majors, apart from the strong significant normal distribution between listening anxiety and speaking anxiety, the remaining distributions are relatively weak in significance. In terms of involution, both Beijing English majors and Macau English majors exhibit a strong significant normal distribution across listening, speaking, reading, and writing.

According to the results of the correlation matrix presented in Table 3, significant positive correlations ($p < 0.01$) are observed among speaking anxiety, listening anxiety, reading anxiety, and writing anxiety for English majors in both Beijing and Macau. Specifically, for Beijing English majors, significant positive correlations are found between speaking anxiety and listening anxiety ($r = 0.549$, $p < 0.01$), speaking anxiety and reading anxiety ($r = 0.744$, $p < 0.01$), speaking anxiety and writing anxiety ($r = 0.666$, $p < 0.01$), listening anxiety and reading anxiety ($r = 0.686$, $p < 0.01$), listening anxiety and writing anxiety ($r = 0.447$, $p < 0.01$), and reading anxiety and writing anxiety ($r = 0.714$, $p < 0.01$). In terms of Macau English majors, significant positive correlations are observed between speaking anxiety and listening anxiety ($r = 0.671$, $p < 0.01$), speaking anxiety and reading anxiety ($r = 0.562$, $p < 0.01$), speaking anxiety and writing anxiety ($r = 0.675$, $p < 0.01$), listening anxiety and reading anxiety ($r = 0.679$, $p < 0.01$), listening anxiety and writing anxiety ($r = 0.713$, $p < 0.01$), and reading anxiety and writing anxiety ($r = 0.724$, $p < 0.01$).

Based on the results from Tables 3, 4, as well as the correlations between involution in listening, speaking, reading, and writing, and anxiety in listening, speaking, reading, and writing, the following path diagram is constructed (see Figure 3).

Based on the results of the correlation matrix for involution in listening, speaking, reading, and writing, both Beijing and Macau English majors demonstrate significant positive correlations ($p < 0.01$). Specifically, for Beijing English majors, significant positive correlations were found between speaking involution and listening involution ($r = 0.817$, $p < 0.01$), speaking involution and reading involution ($r = 0.792$, $p < 0.01$), speaking involution and writing involution ($r = 0.736$, $p < 0.01$), listening involution and reading involution ($r = 0.871$, $p < 0.01$), listening involution and writing involution ($r = 0.735$, $p < 0.01$), and reading involution and writing involution ($r = 0.805$, $p < 0.01$). For Macau English majors, the significant positive correlations were as follows: speaking involution and listening involution ($r = 0.703$, $p < 0.01$), speaking involution and reading involution ($r = 0.596$, $p < 0.01$), speaking involution and writing involution ($r = 0.626$, $p < 0.01$), listening involution and reading involution ($r = 0.753$, $p < 0.01$), listening involution and writing involution ($r = 0.745$, $p < 0.01$), and reading involution and writing involution ($r = 0.821$, $p < 0.01$).

Regarding the relationships between English learning anxiety and English learning involution, the results showed that for Beijing undergraduate English majors, speaking anxiety and listening involution were significantly positively correlated ($r = 0.236$, $p < 0.05$), while writing anxiety was significantly negatively correlated with speaking involution ($r = -0.246$, $p < 0.05$) and writing involution ($r = -0.223$, $p < 0.05$). For Macau undergraduate English majors, only listening anxiety and listening involution showed a significant positive correlation ($r = 0.187$, $p < 0.05$), and other relationships were not significant.

TABLE 3 Matrix of anxiety correlations.

City	Anxiety domain	Speaking anxiety	Listening anxiety	Reading anxiety	Writing anxiety
Beijing	Speaking anxiety	–			
	Listening anxiety	0.549**	–		
	Reading anxiety	0.744**	0.686**	–	
	Writing anxiety	0.666**	0.447**	0.714**	–
Macau	Speaking anxiety	–			
	Listening anxiety	0.671**	–		
	Reading anxiety	0.562**	0.679**	–	
	Writing anxiety	0.675**	0.713**	0.724**	–

**$p < 0.01$.

TABLE 4 Matrix of involution correlations.

City	Involution domain	Speaking involution	Listening involution	Reading involution	Writing involution
Beijing	Speaking involution	–			
	Listening involution	0.817**	–		
	Reading involution	0.792**	0.871**	–	
	Writing involution	0.736**	0.735**	0.805**	-
Macau	Speaking involution	–			
	Listening involution	0.703**	–		
	Reading involution	0.596**	0.753**	–	
	Writing involution	0.626**	0.745**	0.821**	–

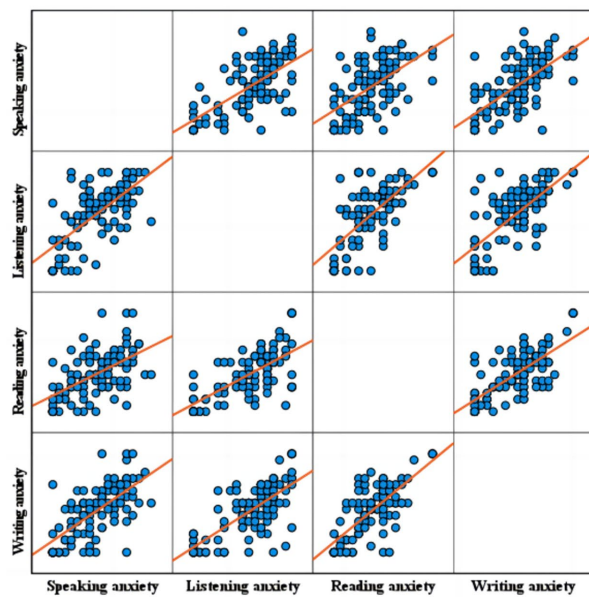**$p < 0.01$.

FIGURE 1
Scatter plot of Beijing matrix.
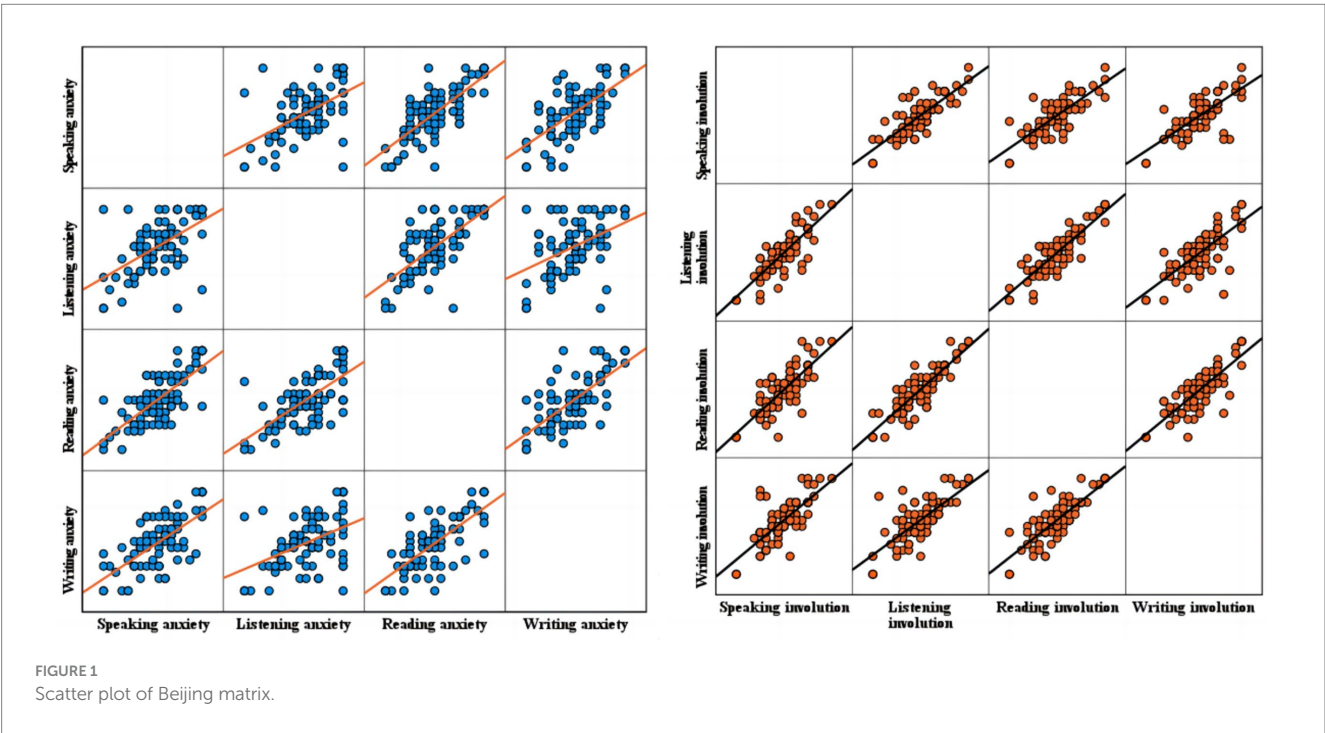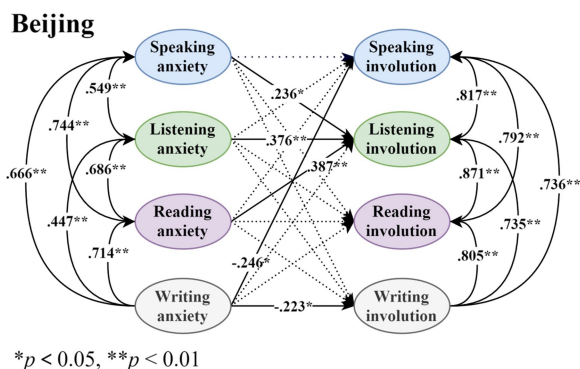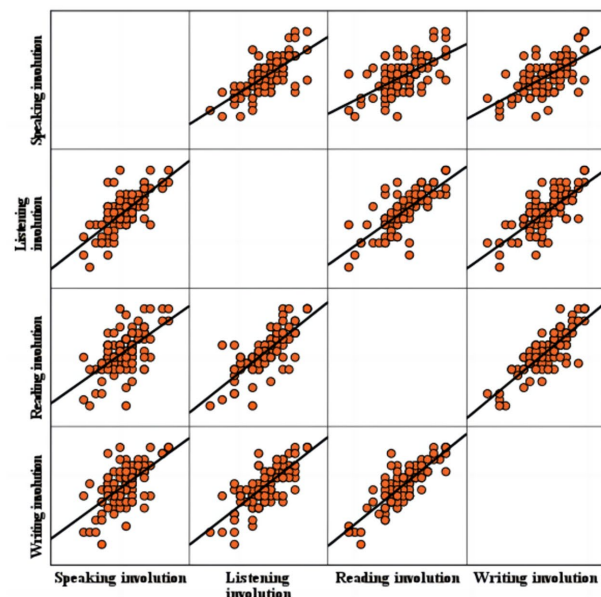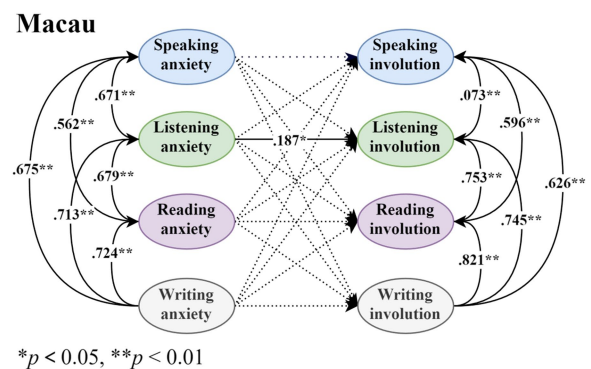
FIGURE 2
Scatter plot of Macau matrix.

FIGURE 3
Path diagram.

5 Discussion

5.1 The influence of learning anxiety and involution on motivation intrinsic, altruistic, and extrinsic motivations

While some studies have observed positive effects of anxiety on English learning (Liu and Huang, 2011; Chan et al., 2024; Li et al., 2023), learning anxiety was significantly detrimental to motivation in this study. In their English learning activities, participants from both Beijing and Macau generally demonstrated moderate levels of anxiety (Table 1). This is consistent with other scholars' findings regarding writing anxiety among English majors (Zhang and Lai, 2023; Qashoa, 2014; Arindra and Ardi, 2020), reading anxiety (Miao and Vibulphol, 2021), speaking anxiety (Vural, 2019) and listening anxiety (Liu and Xu, 2021), or combined (Zhang et al., 2020). This is also significantly

consistent with past research regarding English learners, including Chinese students (Liu and Huang, 2011), European students (Ahmetović et al., 2020) and Korean students (Basco and Han, 2016). In order to reduce students' anxiety and improve their motivation, teachers may consider incorporating a number of strategies, including expanding cultural investigations, promoting peer-to-peer communication in the target language, and implementing engaging activities (Li et al., 2018).

On the other hand, participants generally exhibited moderate involution levels (Table 1) in their English learning. This phenomenon can be explained by China's socio-cultural context (Gan, 2023). While multiple studies (Li, 2021; Jiang, 2022) have mentioned the negative impacts of involution, Liu and Dong (2022) discussed the inextricable links between involution and competition. Additionally, Burguillo (2010) and Zhou (2023) explored the positive impacts of competition on motivation. This is consistent with the conclusion of this paper,

which finds a significant positive correlationship between involution and motivation. According to the findings of this study, H1 posits that involution and anxiety significantly influence English learning motivation. Further evidence supports H1, indicating that both involution and anxiety are significantly associated with English learning motivation.

According to the regression analysis, both learning anxiety and involution significantly influence the motivation of English major students in Beijing and Macau, but the relationships between these factors differ between the two educational contexts. Among Beijing students with higher levels of learning anxiety, there was a lower level of motivation, which aligns with Krashen's (1982) affective filter hypothesis regarding anxiety as a debilitating factor in language learning. On the other hand, higher levels of involution were associated with higher levels of motivation. This can be explained by understanding that involution in Beijing may be seen as a driving force to strive harder to outcompete rivals, thus boosting learning motivation. For Macau students, however, higher learning anxiety was also associated with lower motivation, while higher involution was associated with lower motivation. This points to a different relationship between involution and motivation in Macau, where involution may be perceived as an ineffective competition, leading to stress and diminished motivation. This study further validates H3, which indicates that different cultural and educational backgrounds have an influence on the results of H1 and H2.

The findings of this study provide additional support for H3, indicating that cultural and educational backgrounds have an impact on the results of H1 and H2. These findings highlight the differences in how emotional factors such as anxiety and involution affect learning motivation across different cultural and educational contexts. Additionally, it challenges the existing view that anxiety, involution, and motivation have a simple relationship. Education must take into consideration these differences in order to improve student motivation.

5.2 Interrelationships among language skills in English learning

While previous studies have examined the impact of anxiety on listening, speaking, reading, and writing (Xu et al., 2023; Liu and Dong, 2022; Ji et al., 2022), few have systematically explored the interrelationship between anxiety and involution. Additionally, it has been established that there are associations among listening, speaking, reading, and writing (Chauvin et al., 2020). To address this gap, this study conducted a comprehensive analysis by examining the relationship between anxiety and involution in the following four domains, that is, listening, speaking, reading, and writing. The findings demonstrated that among undergraduate English majors in Beijing, speaking anxiety exhibited a significant positive correlation with listening involution (r = 0.236, $p < 0.05$). Furthermore, writing anxiety displayed significant negative correlations with both speaking involution and writing involution ($r = -0.246$, $p < 0.05$; $r = -0.223$, $p < 0.05$). In contrast, among undergraduate English majors in Macau, only listening anxiety exhibited a significant positive correlation with listening involution ($r = 0.187$, $p < 0.05$), while the relationships with other factors were not significant. These findings align with the conclusion of Yi et al. (2022) that involution does not necessarily correlate positively with anxiety.

Moreover, significant positive correlations were observed among involution in listening, speaking, reading, and writing for English majors in both Macau and Beijing. Similarly, significant positive correlations were found among anxiety in listening, speaking, reading, and writing. These results validate H2 of this study, which suggests that the four aspects of listening, speaking, reading, and writing in English learning mutually influence each other. Using the correlation matrix, we provide insight into the interrelationship between specific domains of learning anxiety and involution. In Beijing, speaking anxiety positively correlated with listening and reading involution, suggesting students who were anxious about speaking skills were more likely to practice listening and reading in order to improve their overall language proficiency. Additionally, reading anxiety was positively correlated with listening and reading involution, indicating that students who were anxious about reading practiced listening and reading more extensively. Macau, however, did not display this pattern. It was found that speaking and writing involution was negatively correlated with writing anxiety, implying that students who actively engaged in speaking and writing were less likely to experience writing anxiety. As a result of differences in how students in the two contexts perceive and cope with different emotional states, other domains of anxiety and involution in Macau do not appear to be closely related. These results demonstrate the complexity of the relationships between different forms of anxiety and involution. They also emphasize the importance of taking specific emotional variables into account instead of focusing solely on overall constructs. Therefore, this further validates H3 of this study.

5.3 Participants from Beijing and Macau

There is a significant difference between the social and cultural environments in Beijing and Macau, which is reflected in the contrasting relationships between involution and motivation. Beijing represents mainland China's most traditional and examination-oriented education system, in which academic competition and involution are perceived as necessary drivers of success as a result of its capital status. Consequently, involution could motivate students to work harder, thereby enhancing their motivational levels. In comparison, Macau, which was once a Portuguese colony and is now a Special Administrative Region of China, has a unique multicultural heritage. Macau is a multifaceted and evolving region, characterized by significant impact and rapid transformation (Li et al., 2014). In order to foster a more internationalized and diverse learning environment, its educational system blends Eastern and Western influences. As a result of excessive involution and peer competition, students may be viewed as unproductive and detrimental to holistic development, negatively impacting their motivation.

The dynamic interplay of local, national, and global influences is evident in the sociolinguistic milieu of Macau, as well as in the language education (Yan, 2016). Endowed with a high level of autonomy under the guiding principle of "One Country, Two Systems," Macau has experienced a noteworthy enhancement in tertiary education. Over the last two decades, Macau's tertiary education sector has progressively garnered international acclaim (Wang et al., 2022). Therefore, it is necessary to compare the differences of these two cities.

In this study, although learning anxiety had a significant negative impact on motivation for both Beijing and Macau students, differences were observed between Beijing students' anxiety ($\beta = -0.169$, $p = 0.047$) and Macau students' anxiety ($\beta = -0.269$, $p = 0.001$), with the effect being more significant for Macau students. Previous research explored factors like historical backgrounds (Young, 2006) and personal aspects (Cao and Wei, 2019) that may further explain Macau students' learning anxiety levels. Regarding involution, involution showed significant positive correlations with motivation for both Beijing and Macau undergraduate English majors. As internationalized cities (Wang et al., 2011; He et al., 2023), this aligns with the perspective of geography's influence of involution on motivation (Mulvey and Wright, 2022). The negative impact of learning anxiety on motivation was stronger for undergraduate English majors from Macau compared to Beijing. For students from Beijing, the relationships between anxiety types and involution were more varied. For example, speaking anxiety was positively correlated with listening involution, while writing anxiety showed significant negative correlations with speaking involution and writing involution. Whereas for students from Macau, only listening anxiety was significantly positively correlated with listening involution.

Considering Macau's distinctive socio-cultural background, its future development trajectory in education is noteworthy. With its multicultural strengths and global outlook, Macau is well positioned as a burgeoning international education hub (Xu and Sukjairungwattana, 2022). In order to cultivate a learning environment that nurtures intrinsic motivation while reducing unhealthy forms of involution, Macau must promote educational internationalization, cultural exchange, and innovative pedagogical approaches. Moreover, Macau's unique position as a bridge between Chinese and Western cultures offers opportunities for developing educational models that harmonize diverse perspectives. The implementation of such initiatives could pave the way for more balanced and holistic approaches to student development, where motivation is a genuine passion for learning rather than excessive competition among peers. The findings of this study underscore the significance of fostering positive emotional environments and addressing cultural nuances in student motivations as Macau continues to evolve its educational landscape. In order to create a future where involution is replaced by a culture of collaborative growth, and where students are empowered to pursue knowledge driven by intrinsic motivation and a shared love for learning, Macau must embrace its distinctive identity and capitalize on its multiculturalism.

6 Conclusions and limitations

In this study, undergraduate English majors from Beijing and Macau were examined for the effects of learning anxiety and involution on motivation and the relationship between anxiety and involution. The results were as follows: Beijing and Macau students' motivation levels were both above the average level, while anxiety and involution scores were moderate. Both groups will be negatively affected by anxiety, while motivation will be improved by involution. In Macau undergraduates, anxiety appeared to have a stronger negative impact on motivation. Speaking anxiety was positively correlated with listening involution in Beijing students, and writing anxiety was negatively correlated with speaking and writing involution in Beijing students. The listening anxiety of Macau students was positively correlated with the listening involution. According to these differences

in the impact of affective factors on motivation and their interconnections, English learning experiences differ across educational contexts. With the results of this study, we expect that practical recommendations can be made on how to increase students' motivation for English learning. For over two decades, Macau has been incorporated into the nation as a distinctive special administrative region of China. As a Portuguese colony for more than a century, Macau has a very different educational framework than mainland China (Lee et al., 2020). Consequently, this study can shed light on the differences between Macau and Beijing foreign language learning. However, there are some limitations to this study. First, the present study did not consider students' learning outcomes. An in-depth analysis of the impact of affective factors on students' learning outcomes is required in the future. The sample size should also be enlarged to include more universities from Beijing and Macau to make the results more generalizable and representative. In addition, future studies might employ qualitative methods in order to gain a deeper understanding of the reasons for students' learning anxiety and motivation.

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 approval was not required for the studies involving humans because as it involved the collection of anonymous survey data from adult participants, with no sensitive personal information being gathered. All participants provided informed consent before completing the questionnaires, and the study adhered to widely accepted ethical guidelines for educational research. Additionally, the research posed no foreseeable risk to participants and was conducted by standard protocols for non-invasive, questionnaire-based studies. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements because Written informed consent was not required for this study as participants provided implied consent by voluntarily completing the online questionnaires. Before participation, all respondents were informed about the study's purpose, the voluntary nature of their involvement, and the confidentiality of their responses. Since the study collected anonymous data and posed minimal risk to participants, this approach was consistent with ethical standards for survey-based research in educational settings.

Author contributions

PS: Methodology, Formal analysis, Validation, Writing – review & editing. WX: Conceptualization, Formal analysis, Investigation,

Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing. DD: Conceptualization, Investigation, Resources, Validation, Writing – original draft. FL: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Validation, Visualization, Writing – original draft, Writing – review & editing.

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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.

Generative AI statement

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2025.1523205/full#supplementary-material

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