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Article

Enjoyment and boredom in GenAI-mediated informal L2 speaking practices: The impact of gender, L2 proficiency, personal innovativeness, and GenAI competence

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Abstract: The use of conversational GenAI tools for informal second language (L2) speaking practice has become increasingly popular, offering learners immersive interaction experiences. Enjoyment and boredom are key emotions influencing L2 performance and are closely tied to individual differences. This study examines how two traditional individual factors—gender and L2 proficiency—and two GenAI-related factors—personal innovativeness and GenAI competence—affect L2 learners' enjoyment and boredom in GenAI-mediated informal speaking practices. A survey was conducted with 308 L2 majors from 18 Chinese universities who used conversational GenAI tools. The analysis, based on Partial Least Squares-SEM, revealed that male learners experienced higher levels of boredom, although gender did not affect enjoyment. Contrary to prior studies, L2 proficiency was found to have no impact on either enjoyment or boredom. Personal innovativeness positively predicted enjoyment and negatively predicted boredom, while GenAI competence only predicted enjoyment. These findings provide valuable pedagogical insights for L2 learners and teachers.

Keywords: informal GenAI-mediated L2 speaking practice; enjoyment; boredom; individual differences

1. Introduction

Oral proficiency plays a vital role in second language (L2) acquisition, as it directly demonstrates a learner's capability to apply the target language in real-world communication [1]. However, limited oral proficiency remains a prevalent challenge for many L2 learners, primarily due to the absence of native L2 speakers in their linguistic environment. This limitation restricts students' opportunities for authentic language use beyond the classroom, thereby impeding the development of their spoken L2 abilities. Given these constraints, generative artificial intelligence (GenAI) offers a potential solution [2]. Based on advanced natural language processing technologies, conversational GenAI tools like Sora and Doubao are designed to simulate human conversation through real-time understanding of user input and contextually relevant responses. Its strong interactivity makes it an effective solution for overcoming the limited opportunities for speaking practice in informal learning.

In addition to limited practice opportunities, emotional experiences also significantly influence L2 oral performance. Anxiety has been shown to disrupt speech, limit vocabulary use, and introduce grammatical errors, thereby undermining learners' confidence and oral proficiency [3]. Nevertheless, other emotions, like enjoyment and boredom, are also significant factors that influence L2 performance [4]. These emotional experiences are closely connected to individual differences, which are relatively stable characteristics that vary from person to person [5]. Previous research

has explored the relationship between anxiety and individual difference factors such as age, gender, and proficiency [6–8]. However, studies on the role of these factors in shaping emotional experiences in GenAI-mediated informal L2 speaking practice contexts are scarce. Moreover, besides these traditional factors, personal innovativeness [9] and GenAI competence [10] are particularly relevant in GenAI-assisted contexts.

Accordingly, this study aims to explore how individual difference factors, including gender, L2 proficiency, personal innovativeness, and GenAI competence, influence college L2 learners' perceived enjoyment and boredom in GenAI-mediated informal speaking practices. Through a comprehensive survey and rigorous statistical analysis, the study seeks to determine the extent to which these individual differences predict emotional states and contribute to the design of more effective and engaging learning environments.

2. Literature review

2.1. Informal digital second language speaking practice

In recent years, informal digital L2 learning has become a widely embraced trend [11]. Unlike traditional classroom instruction, informal digital L2 learning occurs mainly through platforms like the internet, social media, and mobile apps. This approach frees learners from fixed class schedules and locations, offering them the flexibility to learn whenever and wherever they wish, based on their own interests and needs [12]. The flexibility and interactivity of this learning environment allow learners to enhance their language abilities more effectively [13]. For instance, by watching foreign films, participating in discussions on global social platforms, or joining multilingual learning communities, learners can access a wide range of language materials, improving both their language skills and cultural awareness [14]. Research indicates that activities like online communication, language exchanges, video tutorials, and blogging provide learners with opportunities to practice their language skills in authentic settings, enhancing their self-expression and fostering better cross-cultural communication [15,16].

A key aspect of informal digital L2 learning is the freedom it gives learners to choose their content and pace. This personalized approach enables learners to select resources or activities that align with their interests and needs [17]. Within the theoretical framework of AI-mediated informal digital learning of English (AI-IDLE), this learner autonomy is further enhanced by the transformative role of GenAI [18]. AI-IDLE research highlights how AI technologies, such as GenAI, empower learners by offering personalized learning pathways and fostering greater learner agency [19].

With the addition of GenAI, learners can receive tailored exercises and real-time feedback according to their language proficiency and specific requirements [20]. For example, GenAI can correct mistakes as learners progress, helping them improve their speaking and listening abilities more efficiently (through tools like Typebot and Doubao; see **Figure 1**). This aligns with findings from AI-IDLE studies, which demonstrate that AI-driven personalization not only enhances learning outcomes but also supports learners in taking ownership of their learning process [21]. This

interactive method not only allows learners to enhance their language skills but also builds their confidence in using the language without the pressure of formal settings.

Moreover, GenAI can recommend relevant learning resources, helping learners focus on the areas they need to improve [22]. Such capabilities reflect the core principles of AI-IDLE, which emphasize the role of AI in creating adaptive, learner-centered environments that cater to individual needs and preferences. As a result, informal digital L2 learning not only strengthens learners' independence but also increases the effectiveness and enjoyment of their learning experience [23]. By integrating insights from AI-IDLE literature, this study underscores how GenAI-mediated learning environments can redefine learner autonomy and transform the landscape of informal L2 education.

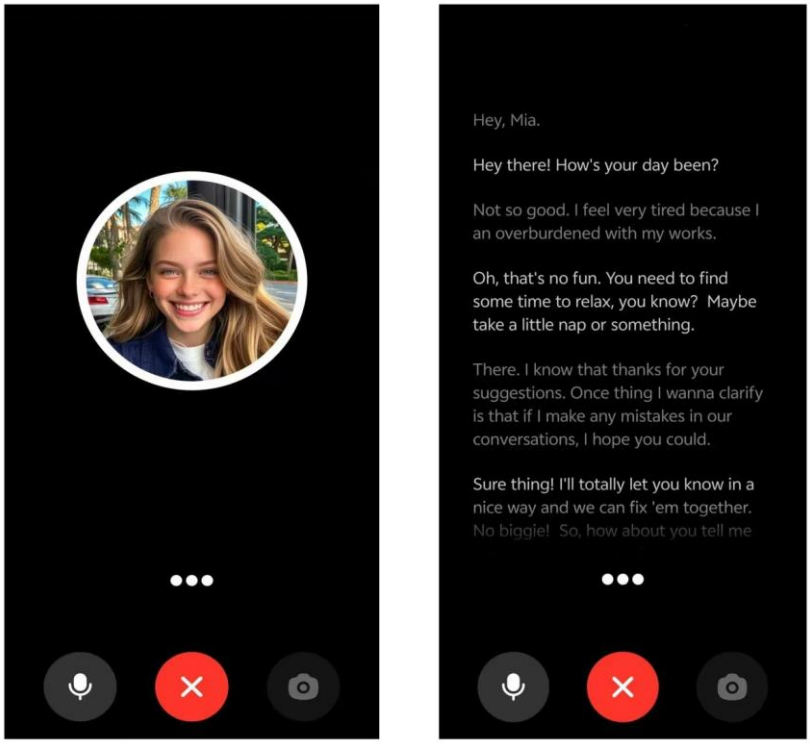

Figure 1. The example for practicing oral English with Doubao.

Note: The girl in the left photo is generated by Doubao, while the right photo shows the subtitles of their conversation.

2.2. Enjoyment in second language learning

According to Dewaele and Macintyre [24], enjoyment is described as a multifaceted emotion that involves the interplay between challenge and perceived ability, reflecting the human desire for success in the face of difficult tasks. They suggest that enjoyment arises when individuals not only meet their needs but also surpass them, achieving something new or unexpected. In essence, enjoyment is not just about simple pleasure but is a more lasting and fulfilling experience. Pioneers in investigating enjoyment within applied linguistics, Dewaele and Alfawzan [25] highlighted its dual impact on L2 classrooms, emphasizing that enjoyment influences both learner motivation and performance. In recent years, research has expanded to explore its antecedents and outcomes, moving beyond initial definitions. In their meta-analysis, Botes et al. [26] explored the relationships between enjoyment and factors

such as anxiety, willingness to communicate, academic performance, and self-assessed success. Their results showed that enjoyment was negatively related to anxiety and positively associated with the other three factors. Additionally, Zeng [27] analyzed 17 studies on enjoyment from 2014 to 2021, noting that its expression varies across different teaching and cultural settings and interacts with various L2 learning factors.

Recent research has focused on understanding how enjoyment develops in different learning environments and its lasting effects on learning outcomes [28,29]. For example, Zhang and Gao [30] investigated the connection between enjoyment and emotion regulation in the context of a 21-week online L2 learning course. Their findings indicated that both enjoyment and group-level emotion regulation increased throughout the semester, with stronger connections between enjoyment and socially shared regulation. Similarly, Wu [31] used a pseudo-longitudinal approach to analyze how enjoyment evolved over time and how it interacted with independent variables, including learner-related and teacher-centered factors, within a higher education L2 setting. The results showed that both doctoral and undergraduate students experienced higher levels of enjoyment, highlighting the dynamic relationship between enjoyment and predictor variables based on learners' academic levels.

As technology advances, GenAI-assisted L2 learning has become a growing trend in modern education [32]. While traditional learning methods have their strengths, they often lack personalization and interactivity, which can lead to disengagement and boredom. GenAI, however, provides new opportunities to enhance L2 learning, particularly by increasing learner enjoyment [33]. Research shows that enjoyment is critical for boosting motivation, improving outcomes, and fostering long-term engagement [4,34]. Therefore, exploring enjoyment in GenAI-assisted L2 learning is essential for advancing the field and maximizing its potential.

2.3. Boredom in second language learning

Research on boredom in education dates back to the mid-20th century. Hill and Perkins [35] were among the first to introduce a model of boredom, defining it as a negative emotion resulting from a lack of stimulation and challenge. Larson and Richards [36] expanded on this idea by examining boredom among middle school students, highlighting the roles of both students and schools in the emergence of this emotion. These early works laid the groundwork for further investigations into boredom, particularly in L2 learning. Although research in this area began later, it has gained significant traction over time. Pekrun [37] developed the control-value theory (CVT), suggesting that boredom arises when both control and value are low. Pekrun et al. [38] further explored the factors that lead to boredom and its subsequent effects in achievement settings, finding that boredom negatively correlates with learning performance. Building on the CVT framework, Li [39] described boredom in L2 learning as a negative emotion characterized by a very low level of activation or arousal, which results from activities that are either too challenging or not challenging enough.

In recent years, the study of boredom in L2 learning has gained momentum [40–42]. Pawlak et al. [43] conducted several studies investigating the trajectories and

factors contributing to boredom among university L2 learners. They identified variables such as task difficulty, repetitiveness, teacher involvement, and classroom organization as key triggers for boredom. Kruk [44] examined boredom in online L2 learning settings and discovered that students were more likely to experience boredom when interacting with unengaging partners or topics. The growth of online education has highlighted boredom in these environments as a key area of study. Chen et al. [45] examined the structure and sources of boredom in online learning, pointing out that boredom in online settings differs from that in traditional classrooms. Kruk et al. [46] carried out a longitudinal study to explore the causes of boredom in online L2 classrooms, emphasizing that repetitive teaching methods and insufficient interaction were significant factors contributing to this issue.

Currently, the integration of GenAI in education is a hot topic [47]. Studying boredom in informal L2 learning through the lens of GenAI offers valuable insights into how GenAI impacts learners' emotions. It also offers fresh insights and empirical data that contribute to the theoretical advancement of GenAI in educational settings. Understanding the factors that influence boredom in GenAI-assisted informal L2 learning can help design more engaging and interactive content and activities, ultimately improving L2 learners' outcomes.

2.4. Individual differences and emotional experiences in second language learning

For decades, research on L2 learning has primarily focused on identifying the mechanisms underlying commonalities among learners, such as vocabulary acquisition and retrieval, as well as syntactic development [48]. Despite these significant insights, L2 learning remains a formidable challenge for many learners, with numerous individuals encountering obstacles that lead to abandoning their studies midway through the process. However, a subset of learners achieves a high level of proficiency, often comparable to that of native speakers, and are thus classified as "successful L2 learners" [49,50]. This observation has prompted researchers to investigate a range of individual differences, such as age, gender, proficiency, and personality. As positive psychology has gained prominence, recent research has investigated how these factors influence the emotional experiences of L2 learners. However, since the participants in this study were all college students of similar ages, age was not considered as a variable. Instead, I focused on the other individual difference factors mentioned above.

L2 research has consistently confirmed gender differences in learners' emotional experiences. For example, Öztürk and Gürbüz [51] examined the influence of gender on speaking anxiety and discovered that female students tended to experience higher levels of anxiety compared to their male counterparts when speaking in the classroom. This finding was also confirmed by Park and French [52]. Additionally, Dewaele and Macintyre [53] reported that female L2 learners experienced both higher anxiety and greater enjoyment than their male counterparts. However, Jiang and Dewaele [6] found no significant gender differences in anxiety levels across different situations. These opposing results indicate that the effect of gender on L2 learners' emotional experiences is multifaceted and may differ depending on the specific learning context.

Gender may trigger higher levels of anxiety or enjoyment in certain situations, but it does not have a decisive impact in all cases. Despite these studies, research on enjoyment and boredom remains limited. To my knowledge, no study has explored potential gender differences in enjoyment and boredom in GenAI-mediated informal L2 speaking practice contexts.

Moving on to L2 proficiency, Dewaele and Macintyre [53] found that the overall level of L2 proficiency (from low intermediate to advanced) is significantly related to enjoyment and anxiety. While differences between low intermediate and intermediate levels are minimal, enjoyment significantly increases and anxiety significantly decreases among higher-level learners. Jiang and Dewaele [6] also found that L2 proficiency significantly reduces anxiety in various speaking scenarios, such as talking to friends, classmates, and strangers; speaking on the phone; and speaking in public settings. In other words, highly proficient L2 learners are less likely to experience anxiety in L2 speaking. Amini Farsani and Seyedshoja [8] further confirmed that more proficient L2 learners experience less anxiety. However, research on enjoyment is relatively rare. Only Piechurska-Kuciel [54] found that higher proficiency in L2 learners correlates with greater enjoyment in L3 speaking. When it comes to boredom, very few studies have investigated the potential influence of L2 proficiency, particularly in informal L2 speaking practice contexts mediated by GenAI.

Earlier L2 studies have mainly concentrated on how the Big Five personality traits influence predictions of anxiety [55–57] and enjoyment [58], particularly in speaking contexts. However, in GenAI-mediated L2 learning contexts, personal innovativeness has garnered significant attention [9,59]. Introduced by Agarwal and Prasad [60], personal innovativeness refers to a person's inclination to embrace and explore new and developing information technologies. It reflects a person's willingness to embrace novel technological advancements, which can vary depending on their personal traits, experiences, and comfort with technological changes. While it is clear that highly innovative individuals are more likely to engage with and integrate new technologies into their learning, the extent to which personal innovativeness influences L2 learners' emotional experiences, particularly enjoyment and boredom, in GenAI-mediated informal learning contexts remains unclear. Additionally, in this context, L2 learners' GenAI competence is another potential individual difference factor that should be considered [10].

The review of the above literature indicates that research on the link between individual differences, enjoyment, and boredom, particularly in GenAI-mediated contexts, is very limited. Therefore, this study aims to examine the impact of four individual difference factors—gender, L2 proficiency, personal innovativeness, and GenAI competence—on the enjoyment and boredom experienced by Chinese college L2 learners in GenAI-mediated informal L2 contexts. Specifically, this exploratory study addresses the following research question:

RQ: Can the four personal individual difference factors (gender, L2 proficiency, personal innovativeness, and GenAI competence) serve as a significant predictor of enjoyment and boredom? If so, to what extent can it explain the variance in these emotional experiences?

3. Methodology

3.1. Participants

To increase the diversity of our participant pool, I applied a convenience sampling method. Working with colleagues who teach L2s, I distributed surveys to a wide range of individuals who use conversational GenAI tools to practice their L2s. As a result, L2 majors from 18 universities across Henan, Shanxi, Jiangsu, Jilin, Hunan, and Zhejiang took part in an online survey hosted on the Wenjuanxing platform. Given that conversational GenAI is still a relatively new tool in China, only 308 validated questionnaires were collected.

For these participants, GenAI provides a range of scenarios for L2 speaking practice, including: 1) Everyday conversations such as shopping, asking for directions, or ordering food at a restaurant to practice common language and expressions; 2) selecting topics of interest like travel, movies, or music and engaging in in-depth discussions to expand vocabulary and improve communication skills; 3) mock interview practice, where GenAI takes on the role of the interviewer to help participants become familiar with the process and typical questions; and 4) role-playing exercises that simulate social situations, such as business meetings or casual gatherings, to enhance language use in various contexts.

Table 1 provides a comprehensive overview of the participants' demographic details. The self-reported scales utilized in this research were meticulously translated and modified for the L2 learning context by a group of three bilingual researchers [61]. To verify the accuracy and consistency of the translations, a professional translator evaluated the scales. All participants completed the Chinese version of the questionnaire and gave informed consent by signing a consent form prior to participation. Ethical approval for the study was obtained from the Ethics Committee of Hunan Normal University.

Table 1. Participant demographic details (n = 308).

	Category	Frequency	Percentage
Gender	Male	56	18.18%
	Female	252	81.82%
Age	18–20	254	82.47%
	21–24	54	17.53%
Grade	Freshman	128	41.56%
	Sophomore	85	27.60%
	Junior	54	17.53%
	Senior	41	13.31%

3.2. Instruments

3.2.1. Enjoyment and boredom

The participants' enjoyment and boredom were assessed using two 4-item scales modified from Bieleke et al. [62], with responses measured on a 6-point Likert scale

from 1 (strongly disagree) to 6 (strongly agree). A higher score indicates a greater level of enjoyment or boredom.

3.2.2. Personal innovativeness

Participants' personal innovativeness was assessed using a 4-item scale modified from Agarwat and Karahanna [63], with responses rated on a 6-point Likert scale from 1 (strongly disagree) to 6 (strongly agree). A higher score reflects a greater level of personal innovativeness.

3.2.3. L2 proficiency

Due to the participants coming from various provinces across China, each with different schedules, and the fact that most were not willing to participate in L2 tests, it was difficult to assess their L2 proficiency using standardized methods. As a result, we chose to use a self-reported approach to evaluate their L2 proficiency. The statement "my self-reported L2 proficiency" served as the criterion. A 6-point Likert scale was employed, with 1 representing "very poor" and 6 signifying "very good", where higher scores indicated higher proficiency in L2.

3.2.4. GenAI competence

As there is no existing scale in the literature designed to assess GenAI competence, we opted for a self-reported method to evaluate such competence. The statement "my self-reported GenAI competence" was used as the criterion. A 6-point Likert scale was applied, with 1 denoting "very poor" and 6 denoting "very good", where higher scores indicated greater competence in GenAI.

3.3. Data analysis

This study used Partial Least Squares Structural Equation Modeling (PLS-SEM) for data analysis, which is particularly well-suited for exploratory research due to its flexibility and adaptability. Exploratory studies often lack a clear theoretical framework and aim to uncover potential relationships and variables rather than test existing hypotheses [64]. PLS-SEM does not require researchers to establish a strict theoretical model in advance, making it ideal for handling complex constructs and relationships that are not yet fully developed, which gives it an advantage over covariance-based SEM in exploratory contexts [65]. Moreover, PLS-SEM focuses on the predictive power of variables, an important feature for exploratory research where the emphasis is on predicting new phenomena rather than validating established theories. PLS-SEM also requires smaller sample sizes compared to CB-SEM, making it more suitable for the data collection phase of exploratory studies. Its ability to manage multiple latent variables and path relationships further supports its use in complex and dynamic model designs. Therefore, I chose PLS-SEM to evaluate both the measurement and structural models using Smart PLS 4 software.

4. Results

4.1. Common method bias test

Common method bias (CMB) refers to the distortion in measurement results that arises from the particular technique used for data collection, rather than from the actual

construct or variable being assessed [66]. CMB can arise in cross-sectional surveys, which rely on responses from a single type of respondent. To address this potential issue, I examined the variance inflation factor (VIF) values for each item, which ranged from 1.429 to 2.618, all below the threshold of 3.3 [67]. As a result, I found no evidence of CMB. It is important to note that variables such as gender, L2 proficiency, and GenAI competence, which each consisted of only one item, were not included in the analysis for testing CMB or the subsequent measurement model, except for the discriminant validity test.

4.2. Measurement model test

Construct validity refers to how well a measurement accurately represents the theoretical concepts it is intended to assess [67]. To assess the construct validity of the model, I conducted a confirmatory factor analysis. It is suggested items with loadings below 0.7 should be removed. Hence, item PI3 was excluded due to its factor loading of 0.573 (< 0.7). Once this item was removed, I re-executed the PLS algorithm to generate the updated loadings, which are detailed in **Table 2**. The findings revealed that all the remaining items for each construct displayed robust loadings, further supporting the construct validity of the model.

Table 2. The results of confirmatory factor analysis.

Construct	Item	Loadings	AVE	CR
Personal innovativeness	PI1	0.882	0.698	0.874
	PI2	0.898		
	PI4	0.713		
Enjoyment	EJ1	0.871	0.711	0.872
	EJ2	0.820		
	EJ3	0.875		
	EJ4	0.805		
Boredom	BO1	0.748	0.679	0.850
	BO2	0.891		
	BO3	0.803		
	BO4	0.848		

Convergent validity is assessed using two key indicators: Average Variance Extracted (AVE) and Composite Reliability (CR). AVE measures the proportion of variance explained by a construct in its associated items, with values above 0.5 indicating a strong correlation [67]. CR, on the other hand, evaluates the internal consistency of the construct, with values greater than 0.7 suggesting high reliability [68]. Convergent validity is confirmed when both AVE > 0.5 and CR > 0.7 are achieved, indicating that the construct effectively captures its measurement items [69]. In this study (see **Table 2**), the AVE values ranged from 0.679 to 0.711, all exceeding the 0.5 threshold. Additionally, the CR values ranged from 0.850 to 0.874, surpassing the 0.7 threshold. These results confirm the convergent validity of the constructs.

Discriminant validity is commonly assessed using the Heterotrait-Monotrait Ratio (HTMT), which compares the average correlations between different constructs

(heterotrait) to the average correlations within the same construct (monotrait) [67]. To establish strong discriminant validity, the HTMT value should typically be below 0.85 [70], indicating that the constructs are sufficiently distinct from each other. The HTMT ratios for the variables measured in this study are presented in **Table 3** (all values < 0.85). There were no concerns regarding the discriminant validity of the constructs.

Table 3. The results of heterotrait-monotrait ratio.

	1	**2**	**3**	**4**	**5**	**6**
1. Enjoyment	-					
2. GenAI competence	0.521	-				
3. Gender	0.111	0.323	-			
4. L2 proficiency	0.064	0.181	0.055	-		
5. Personal innovativeness	0.075	0.157	0.357	0.082	-	
6. Boredom	0.407	0.499	0.152	0.072	0.297	-

4.3. Structural model test

I proceeded to evaluate the structural model by utilizing bootstrapping to test the significance of the path estimates. The results are provided in **Table 4**. **Figure 2** illustrates the R^2 values and the effect sizes of the four individual difference factors on enjoyment and boredom. In this way, RQ was answered.

Table 4. The results of the consistent PLS-SEM.

Pathway	***β***	**SD**	***t***	***p***	R^2
Gender → Enjoyment	0.069	0.061	1.138	0.256	-
Gender → Boredom	0.136	0.119	1.146	0.000	0.018
L2 proficiency → Enjoyment	−0.055	0.056	0.992	0.322	-
L2 proficiency → Boredom	0.042	0.060	0.700	0.484	-
Personal innovativeness → Enjoyment	0.425	0.051	8.346	0.000	0.180
Personal innovativeness → Boredom	−0.383	0.067	5.710	0.000	0.147
GenAI competence → Enjoyment	0.263	0.066	3.991	0.000	0.069
GenAI competence → Boredom	0.069	0.061	1.138	0.256	-
Total R^2 for enjoyment	0.281				
Total R^2 for boredom	0.142				

Note: Male = 1, female = 0; β = standardized effect size; SD = standard deviation.

The analysis revealed that gender was a positive predictor of boredom ($\beta = 0.136$, $p < 0.001$), but it had no significant effect on enjoyment ($\beta = 0.069$, $p > 0.05$). L2 proficiency showed no significant influence on either enjoyment ($\beta = -0.055$, $p > 0.05$) or boredom ($\beta = -0.055$, $p > 0.05$). Personal innovativeness was found to have a significant positive effect on enjoyment ($\beta = 0.425$, $p < 0.001$) and a significant negative effect on boredom ($\beta = -0.383$, $p < 0.001$). Furthermore, GenAI competence was a positive predictor of enjoyment ($\beta = 0.263$, $p < 0.001$) but did not significantly predict boredom ($\beta = 0.069$, $p > 0.05$).

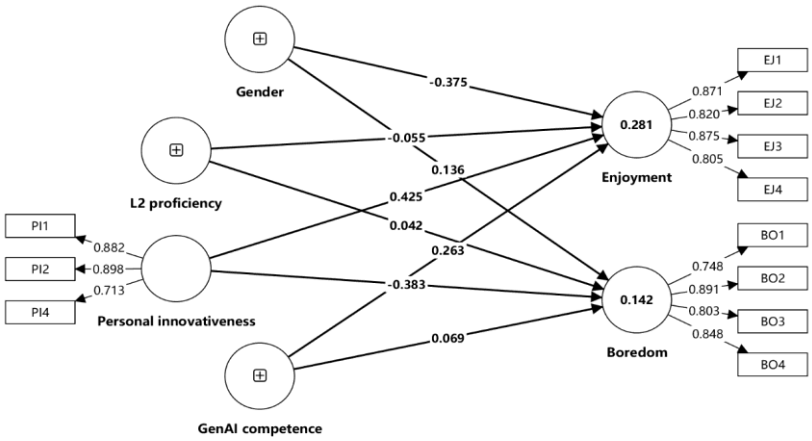

Figure 2. The results of the consistent PLS-SEM.

Additionally, gender, personal innovativeness, and GenAI competence together explained 28.1% of the variance in enjoyment, with 14.2% of this variance being attributed to the three significant predictors. Specifically, personal innovativeness accounted for 18.0% of the variance in enjoyment, while GenAI competence explained 6.9%. For boredom, gender explained 1.8% of the variance, and personal innovativeness explained 14.7%.

5. Discussion

This study aimed to investigate how individual differences—specifically gender, L2 proficiency, personal innovativeness, and GenAI competence—affect the emotional experiences of enjoyment and boredom among Chinese college L2 learners in GenAI-mediated informal speaking practice contexts. The findings provide valuable insights into how these factors influence learners' emotional states in this particular setting.

Personal innovativeness was found to have a significant positive effect on enjoyment while negatively influencing boredom. This aligns with existing research suggesting that learners who are more open to adopting new technologies tend to experience greater satisfaction in their learning processes [9,60]. In contrast, GenAI competence positively influenced enjoyment but had no significant impact on boredom. Boredom is often linked to task repetitiveness, lack of challenge, or insufficient personal interest. While GenAI competence can enhance interactivity in the learning experience, boredom may be more strongly influenced by the content of the learning tasks, their design, and personal interest [40]. For example, even if L2 learners possess high GenAI competence, they may still experience boredom if the speaking tasks are unappealing or overly repetitive. In informal L2 speaking practice, GenAI tools offer interactive and adaptive learning experiences that can boost learner engagement [71]. Therefore, promoting a culture of innovation and digital literacy is essential for maximizing the benefits of GenAI in informal learning contexts.

The study also revealed that gender was a positive predictor of boredom, with male students reporting higher levels of boredom compared to female students in GenAI-mediated informal L2 speaking practice. This finding is consistent with prior psychological studies, which suggest that males generally experience more boredom

than females, potentially due to differences in personality traits or their susceptibility to boredom [72]. For example, males are often characterized by higher extroversion and a preference for novelty, which may lead them to feel bored more easily when faced with repetitive or insufficiently stimulating tasks [72]. In the context of GenAI-mediated learning, the environment may sometimes lack sufficient novelty or challenge, leading males to experience boredom more easily.

However, gender did not influence enjoyment, which contrasts with Dewaele and Macintyre's study [53], where female L2 learners reported higher enjoyment. This discrepancy may arise because their study focused on traditional L2 learning settings, where social interactions and teacher-student dynamics are central. In contrast, informal GenAI-mediated contexts offer a more controlled environment with fewer social pressures, allowing both male and female learners to engage without the typical anxieties of being judged. This could explain the similar enjoyment levels between genders in this study.

Contrary to expectations, L2 proficiency did not significantly predict either enjoyment or boredom in GenAI-mediated informal L2 speaking practice. Previous research has found a negative correlation between proficiency and anxiety, and a positive correlation with enjoyment [6,53,73]. This discrepancy can be attributed to several factors specific to the unique characteristics of GenAI-mediated informal learning environments. GenAI tools can adapt to the learner's proficiency level in real-time, offering appropriate challenges and support [22]. This adaptability may reduce the anxiety typically associated with proficiency gaps and foster a greater sense of competence, regardless of a learner's initial proficiency level. Consequently, the relationship between proficiency and enjoyment or boredom may be less pronounced. Furthermore, in informal GenAI-mediated contexts, learners are often driven by intrinsic motivation rather than external pressures [11,15]. This intrinsic motivation may diminish the typical influence of proficiency on enjoyment, as even less proficient learners can still find the experience enjoyable due to their personal goals and interests.

This study offers new insights into how individual differences and emotional experiences interact in GenAI-mediated informal L2 speaking practice, within the broader AI-IDLE framework. It highlights the role of personal innovativeness in predicting enjoyment and reducing boredom, emphasizing that openness to technology adoption is key to positive learning outcomes. The study also shows that gender affects boredom but not enjoyment, suggesting that GenAI can mitigate traditional gender differences in emotional experiences. Additionally, it challenges assumptions about L2 proficiency, revealing that factors like adaptability and intrinsic motivation in GenAI reduce the impact of proficiency on emotions. By focusing on emotional experiences like enjoyment and boredom, the study expands the AI-IDLE framework, offering a more holistic understanding of how AI tools influence learners' affective states in informal L2 learning.

The findings of this study offer actionable recommendations for improving GenAI-mediated L2 learning environments. For educators, the results underscore the importance of fostering personal innovativeness among learners, as it significantly boosts enjoyment and mitigates boredom. Educators can promote personal innovativeness by incorporating technology-driven activities, offering opportunities for learners to explore innovative tools, and encouraging creativity in language use.

Tailoring instruction to support students' interest in new technologies can also enhance their intrinsic motivation and engagement.

For GenAI developers, the study highlights the need to design tools that cater to diverse learner profiles, addressing individual differences such as gender and L2 proficiency. In particular, developers should focus on creating adaptive, personalized learning experiences that can adjust to varying proficiency levels. This adaptability can be achieved by integrating dynamic task difficulty, content variation, and personalized feedback based on learner performance, which can help reduce anxiety and support learners at all proficiency stages.

Moreover, the study suggests that GenAI tools should prioritize engaging, challenge-based tasks that appeal to learners' interests to counteract boredom, particularly for male learners who may be more susceptible to boredom. These tasks should offer variety and encourage autonomy to maintain learner motivation. By focusing on these areas, educators and developers can create more engaging, inclusive, and effective GenAI-mediated learning experiences, ensuring that the tools support a broad range of learners and foster positive emotional outcomes such as enjoyment and intrinsic motivation.

While this study offers valuable insights, it has some limitations. First, the reliance on self-reported data may introduce bias. Future studies could incorporate objective measures, such as standardized tests for L2 proficiency and performance-based assessments for GenAI competence, to enhance data reliability. Second, the focus on Chinese university students may limit generalizability. Future research should explore similar patterns in diverse cultural and educational contexts to examine potential variations. Third, the cross-sectional design restricts causal conclusions. Longitudinal approaches could better capture how emotional experiences and individual differences evolve over time in GenAI-mediated learning. Additionally, while personal innovativeness and GenAI competence were significant predictors, other factors like creativity [74] or cultural background could also shape emotional experiences. Future studies could investigate their roles in influencing enjoyment and boredom. Lastly, the use of single-item measures for L2 speaking performance and GenAI competence may limit accuracy. Multi-item scales or standardized tests could provide more precise evaluations in future research.

6. Conclusion

This study offers important perspectives on how individual differences affect enjoyment and boredom in GenAI-mediated informal L2 speaking practice. The results emphasize the key influence of personal innovativeness, GenAI competence, and gender in determining learners' emotional responses. Understanding these factors can help educators and developers create more engaging and effective GenAI tools, ultimately improving the learning experience. Further studies should investigate the intricate relationship between individual differences and emotional responses to contribute to the growth of GenAI-enhanced L2 education.

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