Unpacking the relationship between L2 grit profiles and foreign language engagement among Chinese university students

Wei Sun (Corresponding Author)
Huazhong University of Science and Technology, Wuhan, China
Yi Yan
China University of Petroleum-Beijing, Beijing, China

ABSTRACT: This study examines the relationship between L2 grit components, namely, perseverance of effort (PE) and consistency of interest (CI), and foreign language (FL) engagement components (i.e., emotional engagement, behavioral engagement, cognitive engagement, and agentic engagement) using a person-centered approach with a sample of 400 Chinese university students. Results showed that female students reported higher behavioral and emotional engagement, while no gender differences were found in PE or CI. Moreover, PE was more strongly associated with FL engagement than CI. In addition, PE was more related to behavioral engagement than CI, while CI was more related to emotional engagement than PE. Latent profile analysis revealed four L2 grit profiles: high-all, average-all, low-all, and low PE and high CI. Learners in the high-all profile showed the highest FL engagement, while those with low PE and high CI had similar low FL engagement levels to the low-all group. These findings highlight the nonlinear nature of the grit-engagement relationship and emphasize the importance of PE in exam-driven contexts. Pedagogically, the study suggests that developing tailored interventions based on specific L2 grit profiles could improve learner engagement in FL classrooms.
Keywords: L2 grit profiles, FL engagement, latent profile analysis, gender differences

Desglose de la relación entre los perfiles de la perseverancia en L2 y la implicación en lengua extranjera entre estudiantes universitarios chinos

RESUMEN: Este estudio examina la relación entre los componentes de la perseverancia en L2 (la perseverancia en el esfuerzo [PE] y la constancia en el interés [CI]) y el compromiso en lenguas extranjeras. Para ello, se adoptó un enfoque centrado en la persona con 400 estudiantes universitarios chinos. Los resultados mostraron que: 1) Las estudiantes reportaron una mayor participación conductual y emocional, mientras que no se encontraron diferencias de género en PE ni en CI. 2) PE se asoció más con el compromiso que CI. PE se relacionó más con la participación conductual, mientras que CI más con la emocional. 3) El análisis del perfil latente reveló cuatro grupos: alto en ambos componentes, promedio en ambos, bajo en ambos y bajo PE-alto CI. Los estudiantes con perfil alto en ambos mostraron el mayor compromiso, mientras que aquellos con bajo PE-alto CI, similares a los con bajo en ambos

mostraron bajos niveles de compromiso. Estos hallazgos resaltan la naturaleza no lineal de la relación entre perseverancia y compromiso y enfatizan la importancia de la PE en contextos educativos examinocéntricos. Desde el punto de vista pedagógico, el estudio destaca la importancia de desarrollar intervenciones personalizadas basadas en perfiles específicos de perseverancia.

Palabras clave: perseverancia en L2, compromiso en L2, análisis de perfiles latentes, diferencias de género

1. INTRODUCTION

Engagement provides a comprehensive lens of how language learners think, behave, and feel in foreign language (FL) classrooms (Oga-Baldwin, 2019). It plays a pivotal role in FL learning, as active engagement has been consistently linked to learners' improved psychological well-being and language achievement (Dewaele & Li, 2021; Mercer, 2019). Indeed, an engaged FL learner is more likely to focus attention on tasks and the connections between language form and meaning in use (Hiver et al., 2024), aligning with Schmidt's (2001) "noticing" hypothesis, which emphasizes the importance of conscious attention to input in language acquisition. Due to its growing significance, engagement has become a widely examined construct in FL research (Sun et al., 2024; Shi & Sun, 2025a). This rising interest is both timely and necessary, as FL educators worldwide increasingly recognize the challenge of sustaining student engagement in classrooms characterized by numerous distractions (Mercer & Dörnyei, 2020). Given the critical role of student engagement in effective FL learning and high-quality instruction (Hiver et al., 2024), it is essential to identify the factors that predict FL engagement in order to inform targeted pedagogical interventions (Mercer, 2019; Mercer & Dörnyei, 2020).

One promising line of inquiry focuses on learner-internal antecedents of FL engagement (Mercer & Dörnyei, 2020), particularly L2 grit (Sun et al., 2024). According to self-determination theory (SDT), learners with higher internal motivational resources are more likely to engage actively in learning tasks (Reeve, 2012). In line with this framework, a growing body of research has demonstrated the positive predictive role of L2 grit in FL engagement (Li, 2024; Sun et al., 2024). However, much of this research examines L2 grit and engagement using composite scores. The extent to which the two core components of L2 grit, namely, perseverance of effort (PE) and consistency of interest (CI), relate to different dimensions of FL engagement remains insufficiently explored (Zhan & Zhong, 2025). In fact, PE and CI may predict engagement differently, and existing findings on their relationships are mixed and sometimes contradictory (Fan et al., 2024; Jiang & Yu, 2025; Luan et al., 2025). Responding to these inconsistencies, Sun et al. (2024) have called for more fine-grained analyses that distinguish between the components of both constructs. In addition, evidence on gender differences in L2 grit and FL engagement remains inconclusive (Oga-Baldwin & Nakata, 2017; Teimouri et al., 2022), underscoring the need for further investigation.

Moreover, most existing studies have adopted variable-centered approaches such as structural equation modeling (SEM), which assume linear relationships and population homogeneity. Such methods may obscure meaningful interindividual differences and overlook potential nonlinear associations between constructs (Li et al., 2022). However, research

suggests that learners exhibit distinct grit profiles in actual learning contexts (Datu & Fong, 2018; Dehkordi et al., 2021), which may correspond to varying levels of FL engagement. This implies that the relationship between grit and engagement may not necessarily be linear, but rather nonlinear (Datu & Fong, 2018; Dehkordi et al., 2021). Motivated by these rationales, the present study employs a person-centered approach, specifically, latent profile analysis (LPA), to identify subgroups of learners with different combinations of PE and CI, and to examine how these profiles relate to different components of FL engagement. Such a person-centered perspective is particularly suited to uncovering nuanced and nonlinear patterns that may be overlooked by variable-centered methods.

Grounded in SDT, this study aims to: (1) examine gender differences in L2 grit and FL engagement; (2) investigate the specific relationships between PE and CI and various dimensions of FL engagement; (3) identify distinct L2 grit profiles among FL learners using LPA; and (4) determine whether these profiles are associated with different levels of FL engagement. The present study seeks not only to advance theoretical understanding of how individual differences shape engagement in FL learning but also to generate empirically grounded insights for tailoring pedagogical practices to learners' diverse needs. Against this backdrop, the study is guided by the following research questions (RQs):

RQ1: Are there gender differences in L2 grit and FL engagement?
RQ2: What are the specific relationships between L2 grit components and FL engagement dimensions?
RQ3: What L2 grit profiles are represented among Chinese university learners?
RQ4: Do specific L2 grit profiles correspond to varying levels of FL engagement?

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2.1. FL engagement

It has been widely recognized that FL engagement includes at least three core dimensions, namely, behavioral, cognitive, and emotional. Behavioral engagement refers to the amount and quality of learners' active participation in learning; cognitive engagement involves learners' mental effort and activity during the learning process; and emotional engagement reflects learners' affective responses as they participate in target language-related activities or tasks (Hiver et al., 2024). Reeve and Tseng (2011) introduced agentic engagement as a fourth dimension. Agentic engagement is a proactive, intentional, and constructive form of engagement in which learners enrich and personalize the learning experience (Reeve & Tseng, 2011). Engagement is dynamic, malleable, and highly context-dependent (Hiver et al., 2024).

Findings on gender differences in FL engagement are mixed. Some research has shown that female learners generally exhibit higher levels of FL engagement than male FL learners (e.g., Oga-Baldwin & Nakata, 2017), while other studies have reported nonsignificant gender differences (e.g., Sadoughi & Hejazi, 2023). Moreover, these studies have primarily examined overall FL engagement, and the specific gender differences of distinct dimensions of engagement remain unclear.

2.2. L2 grit

Grit has been defined as "perseverance and passion for long-term goals" despite failure and adversity (Duckworth et al., 2007, p. 1087). According to Duckworth et al. (2007), grit comprises two lower-order dimensions: PE, referring to sustained effort over time, and CI, referring to a long-term passion despite setbacks. Grit is considered distinct from related personality traits such as resilience, self-control, and conscientiousness, as it emphasizes both sustained effort and long-term commitment to goals (Duckworth et al., 2007). However, the domain-general grit has faced criticism regarding its theoretical clarity, measurement, and construct and predictive validity (Li & Yang, 2024). In response, FL researchers have increasingly focused on domain-specific grit, namely, L2 grit, which captures learners' perseverance and commitment specifically in the context of FL learning (Teimouri et al., 2022; Sudina & Plonsky, 2021). Indeed, FL research has consistently shown that, compared to domain-general grit, domain-specific measures of L2 grit are more strongly and positively associated with FL learners' motivation, emotions, and language achievement (Demir, 2024; Shi & Sun, 2025b; Teimouri et al., 2022). Given that L2 grit is dynamic and malleable (Sudina & Plonsky, 2021), targeted classroom practices can help strengthen learners' perseverance and passion for FL learning (Shi & Sun, 2025b).

When it comes to the predictive effects of the two sub-components of L2 grit (i.e., PE and CI) on FL outcomes (e.g., FL achievements, enjoyment), both show consistently positive predictive effects, although PE tends to have a stronger predictive power than CI (for a review, see Fernández-González & Ledo, 2025). Relevant to this study, the predictive powers of PE and CI on FL engagement are also different, and empirical findings are inconclusive, although L2 grit consistently and positively predicts FL engagement (Derakhshan & Fathi, 2024; Jin, 2024; Khajavy, 2021; Li, 2024; Sun et al., 2024). Some studies suggest that PE is a stronger predictor of FL engagement, with CI showing either marginal or nonsignificant effects (Fan et al., 2024; Jiang & Yu, 2025). However, Luan et al.'s (2025) findings are different. Although they confirmed the stronger predictive power of PE on cognitive engagement than CI, which turned out to be nonsignificant, CI was found to have a stronger predictive power on behavioral and emotional engagement than PE. These mixed results highlight the need to examine the two facets of L2 grit separately rather than treating grit as a unidimensional construct (Jiang & Yu, 2025). However, despite the recognized importance of L2 grit in FL research, the distinct predictive roles of PE and CI in relation to specific types of engagement have received less attention (Luan et al., 2025). In addition, these conflicting findings suggest the potential value of employing non-linear statistical approaches, such as LPA, which can uncover distinct learner profiles based on varying combinations of PE and CI (Zhan & Zhong, 2025).

Findings on gender differences in grit remain inconclusive. While several studies have reported negligible or non-significant associations between gender and grit (Duckworth et al., 2007; Teimouri et al., 2022, 2024), other research has identified small but statistically significant gender differences where females were found to be significantly higher than males in terms of PE and CI (Christensen & Knezek, 2014).

2.3. L2 grit and engagement: A *SDT* perspective

SDT posits that all learners possess innate growth tendencies, such as intrinsic motivation, curiosity, and the psychological needs for autonomy, competence, and relatedness,

which form the foundation for high-quality engagement and positive academic functioning (Deci & Ryan, 2000; Reeve, 2012). SDT emphasizes that activating these inner motivational resources can significantly enhance student engagement (Reeve, 2012). Within this framework, L2 grit can be understood as an important internal resource that drives FL engagement (Jin, 2024; Li, 2024). Specifically, learners with high levels of L2 grit pursue language learning goals that they find personally meaningful and aligned with their interests, which reflects a sense of autonomy in their motivation. Since these goals are interest-driven rather than externally imposed, gritty FL learners are more likely to engage in learning activities with greater initiative and persistence. At the same time, the consistent effort that defines L2 grit enables learners to overcome setbacks and gradually develop their language skills. As they experience progress, their sense of competence is strengthened. Thereby, as a key internal resource that supports autonomous motivation and fosters a sense of competence, L2 grit contributes to FL engagement.

2.4. Grit profiles: A person-centered approach

Previous studies examining the relationship between L2 grit and FL engagement have predominantly used variable-centered approaches, such as SEM (Jin, 2024; Li, 2024; Sun et al., 2024). While these methods are effective for identifying general patterns and linear associations between variables, they assume a homogeneous population and may overlook the existence of distinct learner subgroups and non-linear relationships (Li et al., 2022). However, grit is increasingly recognized as a non-uniform construct, with different grit or L2 grit profiles emerging across learner populations (Datu & Fong, 2018; Dehkordi et al., 2021). In light of this, Datu (2021) highlighted the value of person-centered approaches, such as LPA and cluster analysis, to identify meaningful learner profiles and examine how these profiles relate to outcomes like engagement and academic performance. Unlike variable-centered methods, person-centered approaches allow for the identification of subgroups of learners who share similar patterns of PE and CI, thereby accounting for individual differences and capturing more complex and non-linear relationships. For instance, Datu and Fong (2018) applied a person-centered approach to study the association between general grit and test-related emotions among 1,051 Hong Kong primary school students. Their cluster analysis identified three distinct grit profiles: (1) High PE and High CI, (2) High PE and Low CI, and (3) Low PE and High CI. Interestingly, students with high PE but low CI reported more positive and fewer negative emotions during testing.

However, within the field of FL teaching, few studies have adopted a person-centered approach to investigate grit. One such study by Dehkordi et al. (2021) examined domain-general grit profiles among 384 Iranian EFL learners and identified three clusters: (1) High PE and High CI, (2) High PE and Low CI, and (3) Low PE and High CI. Learners in the first cluster showed the highest levels of Big Five personality traits and FL achievement. Even fewer studies have explored the link between L2 grit profiles and FL engagement. An exception is Zhan and Zhong (2025), who identified three profiles among Chinese multilingual learners: (1) high L2 self, PE, and low CI, (2) low L2 self, PE, and CI, and (3) moderate ideal self, PE, and high CI. Their findings showed that

learners in Profile 1 had higher emotional and behavioral engagement than those in Profile 2, while no significant differences were found between Profiles 1 and 3. However, their focus was on the combined effects of future L2 self and grit, rather than isolating the role of grit profiles alone.

Taken together, the present study aims to further explore the heterogeneity of L2 grit profiles and their relationship with FL engagement among Chinese university learners. This study makes two key contributions to the existing L2 grit literature. First, while previous research has examined the association between L2 grit and general FL engagement (Jin, 2024; Li, 2024; Sun et al., 2024), we specifically investigate how L2 grit relates to distinct dimensions of FL engagement. Second, unlike most existing L2 grit studies that employ variable-centered approaches, our study adopts a person-centered approach to examine the relationship between L2 grit and FL engagement. By identifying distinct L2 grit profiles, we aim to guide targeted interventions for diverse learner needs to promote their FL engagement.

3. METHODOLOGY

3.1. Participants

This study adopted a convenience sampling method, a type of non-probability sampling, in which participants are selected based on practical criteria such as geographical proximity, availability, and willingness to participate (Dörnyei, 2007). As Dörnyei (2007) notes, "captive audiences such as students in the researchers' own institution are prime examples of convenience sampling" (p. 98). Given the constraints of accessibility, university students from two public universities in Northern China were recruited. Participants were recruited from a variety of academic disciplines to ensure representation across diverse fields of study. Inclusion criteria were: (1) current enrollment in an undergraduate program, (2) native Chinese speaker, (3) English as a second language learner, and (4) successful completion of the National College Entrance Examination (gaokao). Participants with prior overseas study experience were excluded. The final sample consisted of 400 students, including 271 females (67.8%) and 129 males (32.3%), aged 17 to 25 years ($M = 19.51$, $SD = 1.58$). Participants were enrolled across all four undergraduate levels: 37.0% were first-year students, 26.5% were second-year, 20.8% were third-year, and 15.8% were fourth-year students. According to Tein et al. (2013), a sample size of 250 or more is generally adequate to detect meaningful latent profiles. Thus, the current sample of 400 was sufficient for LPA.

It is important to acknowledge that the use of convenience sampling and the specific demographic composition of the sample may limit the generalizability of the findings. Factors such as gender imbalance, restricted geographical location, and the particular educational and cultural context of Chinese university students were not controlled for and could potentially influence the results. Future research should consider more diverse and representative samples, as well as account for additional demographic and contextual variables, to enhance the robustness and generalizability of the findings.

3.2. Instruments

3.2.1. L2 grit

This study adopted the Chinese version of the L2 grit scale validated by Sun et al. (2024), which has shown satisfactory reliability and validity in their study. It was originally developed by Teimouri et al. (2022). The scale consists of nine items divided into two subscales: PE and CI. The PE subscale includes five items (e.g., "I am a diligent English language learner"), while the CI subscale contains four items (e.g., "I think I have lost my interest in learning English"). Responses were recorded on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). One item from the CI subscale was excluded from subsequent analyses due to a factor loading below 0.50. The scale demonstrated satisfactory overall reliability (Cronbach's α = 0.856) and consistent reliability for PE (Cronbach's α = 0.885) and CI (Cronbach's α = 0.793) subscales. Construct validity was satisfactory: χ^2(df) = 40.574 (17), χ^2/df = 2.387, TLI = 0.977, CFI = 0.986, RMSEA = 0.059 (90% CI [0.036, 0.082]), and SRMR = 0.034.

3.2.2. FL engagement

This study adopted the 17-item Chinese version of the FL engagement scale validated by Sun et al. (2024), which has shown satisfactory reliability and validity in their study. It was originally developed by Reeve (2013). The scale includes four subscales: behavioral engagement (4 items, e.g., "I pay attention in [English] class"), agentic engagement (5 items, e.g., "During [English] class, I ask questions to help me learn"), cognitive engagement (4 items, e.g., "When I study for [English] class, I try to connect what I am learning"), and emotional engagement (4 items, e.g., "[English] class is fun"). Participants responded using a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The reliability of the scale was deemed to be excellent for the overall scale (Cronbach's α = 0.978) and its subscales (Cronbach's α = 0.940, 0.953, 0.962, and 0.962, respectively). Construct validity was also confirmed through strong model fit indices: χ^2(df) = 371.198 (107), χ^2/df = 3.469, TLI = 0.964, CFI = 0.972, RMSEA = 0.079 (90% CI [0.070, 0.087]), and SRMR = 0.026.

3.3. Data collection

Before completing the questionnaire, participants were informed of the study's purpose and assured that their responses would remain confidential and would be used solely for research. In line with ethical standards, participation was voluntary, and they were made aware of their right to withdraw from the study at any time. After obtaining consent from the participants or their legal guardians, the questionnaire was distributed through an online survey platform (http://www.wjx.cn/). Each participant received 1 yuan as a token of appreciation. On average, the questionnaire took approximately five minutes to complete.

3.4. Data analysis

This study was a quantitative cross-sectional study. Top of Form
There was no missing data due to the online format requiring completion of all items.

Data analyses included descriptive statistics, tests of normality, and reliability analysis conducted with SPSS 26.0. Confirmatory factor analysis was conducted using Mplus 8.3 (Muthén & Muthén, 2017) with maximum likelihood estimation to assess construct validity. Model fit was evaluated using the following indices: Chi-square (χ^2) testing (where $\chi^2/df < 5$ indicates acceptable fit), Tucker–Lewis Index (TLI > .90 indicates acceptable fit), Comparative Fit Index (CFI > .90 indicates acceptable fit), Standardized Root Mean Square Residual (SRMR < .08 indicates good fit), and Root Mean Square Error of Approximation (RMSEA < .08 indicates acceptable fit) (Byrne, 2001).

To address RQ1 and RQ2, independent-sample t-tests and Pearson correlation analyses were conducted using SPSS. For RQ3, LPA was conducted using Mplus to identify grit profiles. Model selection was guided by multiple indices such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), ample-size adjusted BIC (aBIC), Lo–Mendell–Rubin Likelihood Ratio Test (L-M-R LRT), Bootstrap Likelihood Ratio Test (BLRT), and entropy. Lower values of BIC, aBIC, and AIC are indicative of superior model fit, while statistically significant L-M-R LRT and BLRT suggest the superiority of a model with K profiles over a model with K-1 profiles (Muthén & Asparouhov, 2012). Entropy, a metric quantifying the model's efficacy in classifying data into specific profiles, was also evaluated, with values closer to 1 signifying better classification (Jung & Wickrama, 2008). Preference was given to models with lower AIC/BIC/aBIC, significant L-M-R LRT and BLRT, and entropy closer to 1 (Muthén & Asparouhov, 2012; Jung & Wickrama, 2008). To address RQ4, one-way ANOVA and post-hoc comparisons were used to examine differences in FL engagement among L2 grit profiles.

4. Results

4.1. Gender differences in L2 grit and FL engagement

Independent-sample t-tests showed no significant gender differences in PE, CI, agentic, or cognitive engagement ($p > .05$). However, female students reported significantly higher behavioral ($t = -3.249$, $p = .001$, $d = -0.336$) and emotional engagement ($t = -2.192$, $p < .05$, $d = -0.243$).

4.2. The specific relationships between L2 grit components and FL engagement dimensions

Table 1 presents descriptive statistics and bivariate correlations. All skewness and kurtosis values fell within the acceptable range ($|\pm2|$), indicating normal distribution (Kim, 2013). Learners reported moderate to high levels of PE ($M = 3.161$, $SD = 0.873$), CI ($M = 3.436$, $SD = 0.947$), and all four dimensions of FL engagement—behavioral ($M = 4.868$), agentic ($M = 4.200$), cognitive ($M = 4.679$), and emotional ($M = 4.773$).

Correlation analyses revealed significant positive associations among all variables ($p < .001$). PE correlated more strongly with all FL engagement dimensions than CI did, with large effect sizes ($rs > .60$; Plonsky & Oswald, 2014). Notably, PE showed the strongest correlation with behavioral engagement, while CI was more closely associated with emotional engagement.

Table 1. *Descriptive statistics and bivariate correlations (N=400)*

FACTORS	PE	CI	BE	AE	CE	EE
PE	-					
CI	.412***	-				
BE	.756***	.354***	-			
AE	.655***	.292***	.745***	-		
CE	.688***	.302***	.808***	.810***	-	
EE	.696***	.375***	.854***	.785***	.871***	-
M	3.161	3.436	4.868	4.200	4.679	4.773
SD	.873	.947	1.299	1.361	1.342	1.362
Skewness	-.180	.059	-.473	-.130	-.465	-.525
Kurtosis	.197	-.585	.338	.007	.352	.323

Note: PE, perseverance of effort; CI, consistency of interest; BE, behavioral engagement; AE, agentic engagement; CE, cognitive engagement; EE, emotional engagement. *** $p<.001$.

4.3. L2 grit profiles represented among Chinese university learners

LPA of students' L2 grit identified a 4-profile solution as the best fit for the data. Several criteria were used to determine the superiority of the 4-profile model (see Table 2). First, this model showed consistently lower AIC, BIC, and aBIC values compared to the 2-profile and 3-profile models, indicating a better balance between model complexity and explanatory power. Second, the significant values for the LMR and BLRT indicated that the inclusion of a fourth profile significantly improved model fit over the 3-profile solution. Third, the higher entropy value of the 4-profile model indicated better classification accuracy and clearer separation of profiles compared to the 2-profile and 3-profile models. Moreover, in the 5-profile solution, the smallest cluster accounted for less than 5% of the total sample (Ferguson et al., 2020), raising concerns about its representativeness and stability. Consequently, the 4-profile solution was favored for providing more distinct and interpretable groupings compared to the 5-profile solution.

Table 2. *Model fit indices for latent profiles*

PROFILE	AIC	BIC	aBIC	LMR(p)	BLRT(p)	ENTROPY	GROUP SIZE FOR EACH PROFILE
1-profile	2276.299	2292.265	2279.573				400
2-profile	2188.229	2216.169	2193.958	.000	.000	.701	296/104
3-profile	2130.307	2170.222	2138.491	.000	.000	.833	16/266/118
4-profile	2091.885	2143.775	2102.525	.001	.000	.834	28/106/20/246
5-profile	2063.249	2127.112	2076.343	.001	.000	.865	2/20/33/236/109
6-profile	2046.569	2122.407	2062.119	.108	.000	.836	2/22/30/214/97/35

Figure 1 depicts the Z-scores of distinct L2 grit profiles. Profile 1 (n=28), termed *low-all*, represented participants with low levels of both PE and CI. In contrast, Profile 2 (n=106), referred to as the *high-all* group, demonstrated high levels of both PE and CI. Profile 3 (n=20), characterized by the lowest PE but relatively high CI, was labeled *low PE and high CI*. Profile 4 (n=246), with average levels of PE and CI, was named *average-all*.
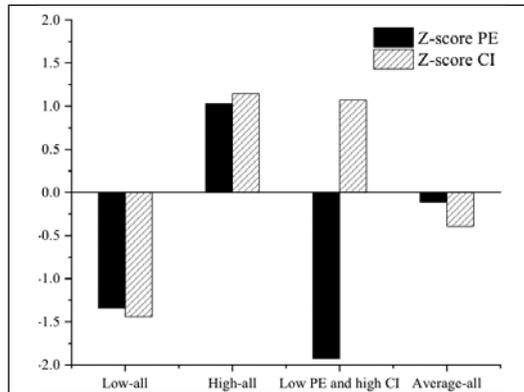
Figure 1. *Levels of L2 grit among students from different profiles*

4.4. The relationship between L2 grit profiles and components of FL engagement

ANOVA and post-hoc analyses revealed significant differences in FL engagement across L2 grit profiles (see Table 3). Learners in the *high-all* profile exhibited the highest levels of engagement across all dimensions, followed by those in the *average-all* profile. In contrast, both the *low-all* and *low PE and high CI* groups showed significantly lower engagement, with no significant difference between them. Similarly, for L2 grit dimensions, PE was highest in the *high-all* group and lowest in the *low P and high CI* group, while CI was comparably high in the *high-all* and *average-all* profiles but lower in the other two. Figure 2 visualizes the levels of FL engagement across L2 grit profiles.

Table 3. *Mean scores of variables and ANOVA across L2 grit profiles (SD in parentheses)*

CONSTRUCTS	PROFILE 1: LOW-ALL (N=28)	PROFILE 2: HIGH-ALL (N=106)	PROFILE 3: LOW PE AND HIGH CI (N=20)	PROFILE 4: AVERAGE-ALL (N=246)	$F_{(3, 396)}$	PARTIAL η^2	POST-HOC COMPARISON
PE	1.829 (.471)	4.089 (.556)	1.450 (.481)	3.052 (.490)	262.688***	.666	2>4>1>3
CI	1.976 (.505)	4.544 (.468)	4.450 (.554)	3.042 (.548)	300.043***	.694	2>4>1, 3>4>1
BE	3.348 (1.055)	5.969 (.935)	3.000 (1.668)	4.719 (0.969)	87.560***	.399	2>4>1, 2>4>3
AE	2.786 (1.131)	5.125 (1.282)	2.780 (1.917)	4.077 (1.054)	45.845***	.258	2>4>1, 2>4>3
CE	3.348 (1.420)	5.675 (1.079)	3.025 (1.962)	4.536 (1.018)	56.165***	.298	2>4>1, 2>4>3
EE	3.223 (1.458)	5.908 (.979)	3.225 (2.058)	4.585 (.991)	71.716***	.352	2>4>1, 2>4>3

Note: PE, perseverance of effort; CI, consistency of interest; BE, behavioral engagement; AE, agentic engagement; CE, cognitive engagement; EE, emotional engagement. *** $p<.001$.
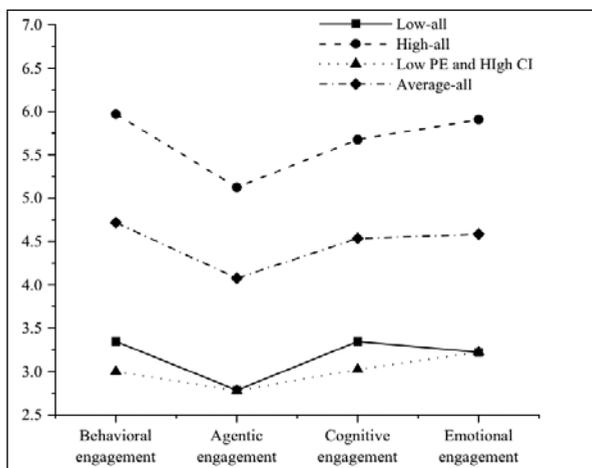
Figure 2. *Levels of FL engagement across L2 grit profiles*

5. DISCUSSION

To address RQ1, it was found that female FL learners reported higher behavioral and emotional engagement than male learners. This finding aligns with previous research suggesting that female learners often demonstrate higher behavioral and emotional engagement in FL learning (e.g., Oga-Baldwin & Nakata, 2017). Notably, the absence of a significant gender difference in cognitive engagement in this study contrasts with Jiang and Yu's (2025) who found female students were more cognitively engaged and applied more interaction strategies than male students in online learning environments. This may be attributed to the distinct cognitive and interactive demands of traditional FL classrooms versus online settings. However, no significant gender differences emerged in PE or CI, consistent with prior research indicating that these grit dimensions tend to be relatively stable across genders (Teimouri, 2022; Jiang & Yu, 2025).

To answer RQ2, it was indicated that PE was more strongly associated with FL engagement than CI. This finding supports previous research suggesting that PE plays a more important role than CI in predicting FL engagement (Fan et al., 2024; Khajavy, 2021). However, this pattern differs from the findings of Luan et al. (2025), who found that PE was more predictive than CI only for cognitive engagement, but less predictive than CI for emotional and behavioral engagement. One possible reason for this difference is the learning context, as Luan et al.'s (2025) study focused on online environments where higher levels of boredom and disengagement may make CI more relevant for sustaining engagement than PE. Additionally, the results showed that PE was more closely linked to behavioral engagement, while CI was more strongly associated with emotional engagement. This pattern aligns with the core features of L2 grit: PE reflects students' ongoing effort and active involvement in learning tasks, whereas CI captures their enduring interest and emotional attachment to the learning process (Duckworth et al., 2007). Together, the differentiating relationships between L2 grit components and FL engagement dimensions further highlighted the importance of

disentangling these constructs rather than treating them as an overall construct (Luan et al., 2025; Jiang & Yu, 2025; Sun et al., 2024; Zhan & Zhong, 2025).

To answer RQ3, the four distinct grit profiles revealed by LPA reflected varied combinations of PE and CI, highlighting the heterogeneity of L2 grit profiles among FL learners, thus consistent with previous findings (Dehkordi et al., 2021; Zhan & Zhong, 2025). Regarding the prevalence of profiles, the largest group was *average-all*, which included the majority of participants, followed by the *high-all* profile. In contrast, the *low-all* profile and the *low PE and high CI* profile were less common. This might be due to the Chinese university FL context, where most students develop moderate grit levels, while fewer sustain high perseverance and interest, as their motivation is often driven by extrinsic goals such as passing English examinations to meet graduation requirements (Shi & Sun, 2025a). These findings indicated that L2 grit was malleable which can be influenced by specific learning contexts (Shi & Sun, 2025b; Sudina & Plonsky, 2021).

To address RQ4, the results revealed that learners in the *high-all* profile demonstrated the highest engagement across all four dimensions, followed by those in the *average-all* profile, while students in the *low-all* profile exhibited the lowest levels of engagement. This pattern is consistent with prior variable-centered studies reporting positive associations between L2 grit and FL engagement (Jin, 2024; Li, 2024; Sun et al., 2024). From the perspective of SDT, internal motivational resources are critical for fostering deep and sustained engagement (Deci & Ryan, 2000; Reeve, 2012). In this context, L2 grit can be seen as a vital internal resource that energizes FL engagement (Jin, 2024; Li, 2024). Specifically, grittier FL learners are more likely to pursue language learning goals that are personally meaningful and interest-driven, thereby reflecting greater autonomy. Their sustained effort and resilience enable them to overcome challenges, which in turn facilitates the gradual development of competence. Thus, by supporting both autonomous motivation and a sense of competence, L2 grit plays a central role in enhancing student engagement in the FL classroom.

Interestingly, students in the *low PE and high CI* profile reported engagement levels comparable to the *low-all* group, highlighting the nonlinear nature of the relationship between L2 grit and FL engagement. Despite maintaining a high level of CI, the lack of PE appears to reduce these learners' overall engagement. From the perspective of SDT, insufficient perseverance may undermine the fulfillment of the need for competence, thereby diminishing engagement (Deci & Ryan, 2000; Reeve, 2012). This finding underscores the critical role of PE in sustaining FL engagement. It is particularly salient in the Chinese FL context, where English is often learned for instrumental reasons, such as passing exams or meeting graduation requirements, which emphasizes persistent effort (Fan et al., 2024).

6. Conclusion and implications

This study makes a theoretical contribution by applying SDT to examine how different configurations of L2 grit, specifically PE and CI, relate to FL engagement. By distinguishing between PE and CI, the findings reveal that these components have distinct predictive effects across behavioral, cognitive, emotional, and agentic dimensions of engagement. The identification of four grit profiles and their varied engagement levels underscores the complex nonlinear relationship between L2 grit and engagement, supporting SDT's emphasis

on the role of internal resources in fulfilling learners' psychological needs for autonomy and competence. While both PE and CI are important, PE appears especially critical in FL learning contexts that demand sustained effort to meet external goals.

Pedagogically, tailored strategies should address the distinct needs of each L2 grit profile to enhance engagement across behavioral, cognitive, emotional, and agentic domains in the Chinese university FL context. For students with low PE and low CI, instructors can implement structured study schedules, use culturally familiar and relevant language materials, and encourage frequent short-term goal-setting to rebuild both effort and interest. Those with average PE and CI would benefit from group discussions, project-based tasks connected to real-life scenarios in China, and regular motivational feedback to boost perseverance and engagement. High PE and CI students should be challenged with complex tasks like academic presentations or research projects that promote autonomy and resilience (Zhan & Zhong, 2025). For learners with low PE but high CI, teachers might focus on scaffolded tasks that gradually increase in difficulty, combined with personalized feedback and stimulating activities related to their interests, such as Chinese cultural topics or contemporary issues, to strengthen their effort while maintaining enthusiasm. These context-sensitive and profile-specific approaches can effectively promote sustained engagement and better FL learning outcomes in Chinese university settings.

Despite its contributions, this study has several limitations. First, the reliance on self-reported data may have introduced biases such as social desirability or inaccurate self-assessment. Future studies could incorporate additional data collection methods (e.g., classroom observations) to enable data triangulation. Second, the cross-sectional design limits causal interpretation. Longitudinal or intervention-based research is needed to examine how L2 grit and engagement evolve over time. Third, this study measured FL engagement as a trait-level construct over a broad timescale. Future research could focus on more fine-grained, short-term measures such as task engagement (Hiver et al., 2024). Finally, as the sample was limited to Chinese university learners, generalizability is constrained. Future studies should include other age groups and diverse cultural settings to test the robustness of these findings.

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