

Original Paper

Relationship between L2 Grit and English Academic Achievement in Secondary School English Learners

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Abstract

Grounded in the theoretical framework of second language (L2) grit, this study investigates the levels of L2 grit among secondary school students in China and examines its relationship with their English academic performance. Based on questionnaire data and final English examination scores from 85 students at a secondary school in Qingdao, the study reveals two key findings: 1) students demonstrate moderately high levels of L2 grit across both dimensions—perseverance of effort and consistency of interests; 2) both dimensions of L2 grit are significantly and positively correlated with English academic performance. These results indicate that students with higher levels of L2 grit tend to achieve better academic outcomes in English learning. The findings further suggest that fostering L2 grit in young learners not only enhances their academic performance but also contributes to the development of sustained motivation and resilience. Therefore, the study calls for greater attention from educators to cultivating students' long-term motivation and perseverance in language learning.

Keywords

second language grit, English academic performance, elementary education

1. Introduction

The Compulsory Education English Curriculum Standards (2022 Edition) points out that English teaching should not only attach importance to “what students learn”, but also pay attention to whether students “enjoy learning”. However, under the evaluation system that mainly takes final examination results as the primary reference, English teaching practice often places greater emphasis on improving scores, while relatively neglecting learners' volitional qualities and emotional experiences in the process of English learning (Wei et al., 2024). In fact, English learning is characterized by a long learning period, high investment requirements, and frequent experiences of frustration. If learners lack

the stable interest, sustained effort, and positive emotional support, it is often difficult for them to maintain long-term learning engagement and achieve desirable outcomes.

For a long time, research in the field of second language acquisition has focused on the influence of individual difference factors such as cognition, motivation, emotion, and learning strategies on language learning (Li, 2021). In the environmental context of English learning in Chinese secondary schools, students' English academic achievement is affected by multiple factors. How to improve students' English learning outcomes has therefore become an important topic in educational research. L2 grit, as one of the important positive psychological factors (Duckworth et al., 2009), has gradually attracted more attention in the field of individual differences in second language acquisition in recent years (Keegan, 2017; Giordano, 2019; Khajavy et al., 2020; Sudina et al., 2021; Teimouri et al., 2020; Wei et al., 2020). As a positive psychological trait, grit is manifested in students' perseverance and passion in pursuing long-term learning goals, and has been shown to play a positive role in foreign language learning (Liu, Fang, & Teng, 2021). The cultivation of L2 grit can help students maintain motivation and patience in long-term English learning, thereby improving their academic achievement. Although existing studies have shown that L2 grit has a positive influence on foreign language learning, most of them have focused on college students and senior high school students (Lee & Lee, 2019; Wei et al., 2020), while relatively few studies have examined learners at the secondary school stage. Secondary school learners constitute a particularly important group in the study of L2 grit because this stage represents a critical transitional period in foreign language learning. At this age, students are moving from basic language exposure to more systematic and demanding English learning, and their learning habits, motivational orientations, and attitudes toward English are still being formed. Compared with younger learners, secondary school students face greater academic pressure, more complex language tasks, and higher expectations in examinations. At the same time, they are also at a developmental stage in which self-regulation, persistence, and emotional coping abilities are gradually developing. Therefore, whether students can maintain sustained effort and stable interest during this period may have a lasting influence on their later English learning trajectories. Investigating L2 grit among secondary school learners can help educators better understand how students respond to difficulties, maintain motivation, and build resilience in English learning. This is especially meaningful in the Chinese educational context, where English achievement at the secondary school stage may affect students' confidence, future learning choices, and long-term language development.

Therefore, this study focuses on the relationship between L2 grit and English academic achievement among secondary school English learners, especially its specific manifestation in secondary school English learning. This may help lay a solid psychological foundation for junior secondary school students' lifelong foreign language learning. This study aims to explore the relationship between L2 grit and English academic achievement among secondary school English learners. Using a quantitative research method, it employs an L2 grit questionnaire as the research instrument to investigate and

analyze data from a group of students at a secondary school in Qingdao. It is expected that this study will provide theoretical support for English education practice, particularly in cultivating students' grit, and offer new ideas and methods for improving students' English academic achievement.

2. Literature Review

In recent years, L2 grit has gradually become a major focus in second language acquisition research. Existing studies generally hold that L2 grit reflects learners' sustained effort and stable interest in pursuing long-term learning goals during the process of second language learning, and that it is closely related to variables such as learning motivation, emotional experience, self-efficacy, and academic achievement. Previous findings also have shown that L2 grit has a certain predictive effect on English achievement, but its mechanism of influence varies across different learning stages and research contexts. Meanwhile, the two dimensions of L2 grit, namely perseverance of effort and consistency of interest, do not play exactly the same role in second language achievement. According to existing research, perseverance of effort usually demonstrates a more stable and significant predictive effect.

2.1 L2 Grit

In recent years, grit, as an important non-cognitive trait, has gradually attracted wide attention from researchers in the field of education. Psychologists represented by Duckworth first proposed the concept of grit (Duckworth et al., 2007), defining it as individuals' perseverance and passion for long-term goals, including perseverance of effort and consistency of interest (Wei et al., 2024; Liu, Fang, & Teng, 2021). The research of Duckworth shows that grit is significantly related to academic achievement. Especially in the field of language learning, grit is regarded as an important predictor of second language learning outcomes.

Given the important influence of grit on academic achievement, many researchers have attempted to introduce the concept of grit into second language learning (Lake, 2013; Teimouri et al., 2022). The researchers found that learners with higher levels of L2 grit have more tendency to have clear learning motivation, and they are willing to invest time and energy in foreign language learning, show greater confidence in their foreign language ability, and achieve higher academic performance and well-being. Accordingly, Teimouri et al. (2022) defined L2 grit as learners' perseverance and passion manifested in the process of second language learning. Existing research mainly focuses on the emotional mechanisms and learning behavioral effects of L2 grit. Teimouri et al. (2022) also found that L2 grit was more strongly correlated with motivation, emotions, GPA, language course grades, and self-rated language proficiency than general grit. Mikami (2024) also found that L2 grit had stronger explanatory power for L2 performance than general grit.

Regarding whether L2 grit should be treated as a single-factor construct or a two-factor construct, namely Perseverance of Effort (PE) and Consistency of Interest (CI) (Credé et al., 2017), recent research has gradually reached a consensus in favor of the two-factor structure (Zhao & Wang, 2023;

Wang, 2023). A number of empirical studies and reviews have pointed out that the two-factor structure is superior to treating grit as a single overall construct in terms of both statistical model fit and theoretical interpretation. Moreover, if the total score is used, the positive effect of PE is often offset by CI, which may lead to an underestimation of the effect. A confirmatory factor analysis based on a sample of Chinese English majors showed that the two-factor model ($CFI \approx .95$, $TLI \approx .93$) was significantly better than the one-factor model ($CFI \approx .75$, $TLI \approx .65$). Therefore, it is more appropriate to adopt the two-factor model in subsequent analyses (Wang, 2023). In terms of effects, existing evidence shows that PE predicts learning outcomes more stably and strongly, whereas CI is often non-significant and may even show a negative effect under certain conditions. This further suggests that PE and CI should not simply be combined into a total score (Clark & Malecki, 2019; Sudina & Plonsky, 2021; Khajavy & Aghaee, 2024; Wang, 2024; Wei, Chen, & Zhao, 2025). Overall, adopting a two-factor model and analyzing PE and CI separately is currently a more consistent and interpretable approach.

2.2 L2 Grit and Academic Achievement

The predictive role of grit in academic achievement has been widely recognized. The research of Duckworth et al. found that grit was significantly correlated with students' performance in spelling bees, college entrance examination scores, and success in military training (Duckworth et al., 2007). With regard to the relationship between grit and academic achievement, researchers have found a positive correlation between the two variables. Specifically, studies have shown that grit is significantly and positively correlated with college students' Scholastic Assessment Test (SAT) scores (Duckworth et al., 2007), grade point average (Akos & Kretchmar, 2017), and literacy achievement (O'Neal et al., 2018). In the field of second language learning, research has found that grit can significantly predict students' foreign language achievement, and that Foreign Language Enjoyment (FLE) plays a mediating role in this process (Wei et al., 2019).

However, findings in the Chinese academic context are not entirely consistent. Wei et al. (2024) pointed out that previous studies include both findings supporting a significant relationship between grit and achievement and findings that failed to identify such a significant association between grit and achievement. Therefore, the relationship between L2 grit and academic achievement still needs the further clarification. In their empirical study of ninth-grade English learners, L2 grit was significantly and positively correlated with English achievement. However, in the structural equation model, L2 grit did not have a direct prediction to English achievement, but indirectly influenced English achievement through emotional variables such as enjoyment, anxiety, and boredom. This suggests that, at the stage of basic education, the influence of L2 grit on academic achievement may be more likely to manifest as an indirect effect. In contrast, Yang and Luo (2025), based on a sample of senior high school students, found that L2 grit not only significantly predicted final English examination scores and self-perceived English proficiency, but also, after controlling for general grit, additionally explained 6.4% of the variance in final English examination scores and 14.8% of the variance in self-perceived English

proficiency. This result indicates that, in the context of Chinese senior high school English learning, L2 grit has independent and stable predictive power. Related research has also pointed out that students with higher grit scores are more likely to enter graduate school, but the relationship between grit and academic achievement is not significant (Palisoc et al., 2017). Bazalais et al. (2016) also failed to find a significant predictive effect of grit on academic achievement in a sample of science students.

Therefore, although most studies have shown a significant positive correlation between grit and academic achievement, some studies have presented different views. Despite certain controversies, the majority of studies still indicate that grit, as a non-cognitive factor, can promote academic achievement by influencing students' learning motivation, emotions, and behaviors.

2.3 The Relationship between the Two Dimensions of L2 Grit and Second Language Achievement

Among the two dimensions of grit, Perseverance of Effort (PE) and Consistency of Interest (CI) play quite different roles. Meta-analytic results show that PE has a significantly stronger predictive effect on academic achievement than CI. PE reflects individuals' sustained effort when facing difficulties, whereas CI focuses on the maintenance of interest and passion for long-term goals (Cred et al., 2017). The study by Akos and Kretchmar (2017) similarly showed that PE had a more significant influence on academic achievement, while CI had a relatively weak influence.

For second language learners, the influence of PE on English learning achievement is particularly prominent. Studies have found that PE is more effective than CI in predicting students' second language learning outcomes (Khajavy et al., 2020). Other studies have also shown that PE plays a significant role between second language learning motivation and English achievement, whereas the influence of CI is relatively weak (Wei et al., 2019). This result suggests that, in language learning, sustained effort and perseverance are more important than the maintenance of interest. Liu et al. (2021) also pointed out that PE can effectively reduce anxiety in English learning, thereby enhancing academic efficacy.

In addition to PE and CI, grit is also closely related to other non-cognitive factors. Lake (2013) found that grit was positively correlated with self-efficacy and learning motivation, and that students with higher levels of grit tended to invest more time and energy in English learning and have greater confidence in their own abilities. In addition, Changlek and Palanukulwong (2015) showed that grit was positively correlated with foreign language learning motivation and negatively correlated with language anxiety. Further research has confirmed the positive correlation between the ideal L2 self and learners' willingness to communicate, with grit playing a mediating role in this relationship (Lan et al., 2021).

In summary, L2 grit, as an important factor affecting academic achievement, has demonstrated a relatively significant predictive role, especially in English learning and second language learning. Research shows that PE has a more prominent influence on academic achievement, while CI is relatively weaker. Future research should continue to explore the relationship between grit and other

non-cognitive factors, such as learning motivation, self-efficacy, and learning anxiety, and further examine the influence of cultural background on the effects of grit. At the same time, the further optimization and application of L2 grit scales, especially their effectiveness in second language learning contexts, will also be an important direction for future research.

2.4 Research Questions

The above review of domestic and international literature shows that existing related studies still have several limitations. In view of this, the present study intends to examine L2 grit and English academic achievement among secondary school English learners, and aims to answer the following three research questions:

- 1) What is the level of L2 grit among secondary school English learners?
- 2) How do the two dimensions of L2 grit, namely perseverance of effort and consistency of interest, differ in their effects on academic achievement?
- 3) What predictive effect does L2 grit have on academic achievement among secondary school English learners?

3. Research Methods

This study adopted convenience sampling and collected 85 valid questionnaires from secondary school students in a coastal city. The participants were 15 to 16 years old and had learned English for about seven years, with a basic ability to conduct simple daily communication in English. To measure students' L2 grit, the study used the Chinese Revised Version of the L2 Grit Scale, which includes two dimensions: perseverance of effort and consistency of interest. The scale was revised to better fit the Chinese foreign language learning context and to improve item validity. Data were collected through Wenjuanxing, and SPSS 27.0 was used for reverse coding, reliability analysis, descriptive statistics, and correlation analysis.

3.1 Participants

This study adopted convenience sampling. After obtaining consent from the school, parents, and the students themselves, questionnaires were distributed at a secondary school in a coastal city. A total of 85 valid responses were ultimately collected. Among the participants, boys accounted for 57.6% and girls accounted for 42.4%. Their ages ranged from 15 to 16 years old, with a mean age of 15.44 years ($SD = 0.499$). The participants had learned English for approximately seven years, spent more than 12 hours per week learning English, had a vocabulary size of about 1,800 words, and were able to use English to conduct relatively simple daily conversations.

3.2 Instruments

The instruments for measuring grit have been widely validated and applied. Duckworth and Quinn (2009) proposed the Short Grit Scale (Grit-S), whose validity has been confirmed across different cultural contexts. Researchers have further developed an L2 grit scale specifically designed for second

language learners, and the application of this scale has revealed a significant relationship between grit and learning achievement (Teimouri et al., 2020). The nine-item L2 Grit Scale developed by Teimouri et al. (2020) not only verified the two-dimensional structure of grit, but also provided an effective tool for measuring L2 grit (Sudina et al., 2021; Wei et al., 2020). Through these scales, researchers can more accurately assess students' perseverance in pursuing long-term goals and the consistency of their interest, which provides a powerful tool for understanding the relationship between grit and academic achievement.

The L2 grit scale includes two dimensions, namely perseverance of effort and consistency of interest. It is specifically used to measure language learners' grit in second language learning and has been confirmed as an important indicator for evaluating second language learning outcomes (Wang, 2023; Yang, Zhang, & Li, 2024). The scale adopts a five-point Likert format ranging from "strongly disagree" (1 point) to "strongly agree" (5 points). The model fit indices were generally acceptable: $\chi^2/df = 2.3$, which falls between 1 and 3; CFI = 0.94 > 0.9; TLI = 0.95 > 0.9; RMSEA = 0.119 > 0.08; and SRMR = 0.172 > 0.08. Two subdimensions were generated, namely perseverance of effort (Cronbach's $\alpha = .981$) and consistency of interest (Cronbach's $\alpha = .809$). However, existing scales are not without limitations. Yang and Luo (2025) pointed out that Teimouri et al.'s scale revealed the following problems in application: first, the reliability of the CI subscale was relatively low; second, insufficient attention was paid to the "goal" component; third, some CI items showed low factor loadings in multiple studies. This indicates that the L2 grit scale still requires localized revision and structural optimization.

Based on this, the present study adopts the Chinese Revised Version of the L2 Grit Scale (Yang & Luo, 2025). The scale mainly underwent three revisions: 1) according to the suggestions of Oxford and Khajavy (2021), a new item was added to replace the item with the lowest factor loading in the PE subscale; 2) items that did not fit the Chinese foreign language learning context were slightly adjusted; 3) one item in the CI subscale showed poor discrimination ($r = 0.108$, $p > 0.05$), and was therefore deleted. In this study, questionnaires were distributed and collected through Wenjuanxing. SPSS 27.0 was used to recode reverse-scored items in the positive direction, and reliability analysis, descriptive statistics, and correlation analysis were conducted on the data.

4. Results

Table 1. Descriptive Analysis (N = 85)

Variables	Range	Mean	SD	Skewness	Kurtosis
Age	15-16	15.440	0.499	0.266	-1.976
Scores	42-119	92.578	17.535	-0.586	0.027
PE	1-5	3.407	1.103	-0.391	-0.795
CI	1-5	3.314	1.170	-0.200	-1.101
L2 grit	1-5	3.360	1.106	-0.304	-0.923

The results of the normality test (Table 1) show that the data for each variable generally followed a normal distribution, indicating that the sample data were suitable for subsequent statistical analysis. Both perseverance of effort and consistency of interest in English learning were at a moderate level. Specifically, the mean score for perseverance of effort was 3.407, indicating that the participants' learning engagement was at a moderately high level. This suggests that most students were able to make continuous efforts in English learning and showed a certain degree of persistence when completing learning tasks. The mean score for consistency of interest was 3.314, suggesting that the participants' interest in English learning also tended to be at a moderately high level. This finding indicates that students generally maintained a positive attitude toward English learning, although their interest may still be influenced by learning difficulty, classroom activities, and external support.

The relatively large standard deviations indicate considerable differences among the participants in these two dimensions. In other words, while some students showed strong persistence and stable interest, others may have lacked sufficient motivation or confidence in English learning. In addition, the skewness and kurtosis values of both variables suggest certain distributional differences, showing a slight right skew and a relatively flat distribution. This means that the scores were not highly concentrated around the mean, and the participants' responses were relatively dispersed. Overall, although most participants maintained a certain level of interest and effort in English learning, there were notable individual differences, which provides important background information for further exploring learning motivation and emotional factors.

Table 2. Correlation Analysis (N=85)

Variables	1	2	3	4
PE	—			
CI	.896**	—		
L2 grit	.972**	.975**	—	
Scores	.958**	.935**	.972**	—

The results of the correlation analysis (Table 2) show that all variables were significantly and positively correlated with one another. Specifically, perseverance of effort showed extremely strong positive correlations with consistency of interest, L2 grit, and academic achievement, with correlation coefficients of 0.896, 0.972, and 0.958, respectively, all reaching a significant level ($p < 0.01$). This indicates that students who are more willing to make continuous efforts in English learning also tend to maintain stronger learning interest and obtain better academic results. Consistency of interest was also very strongly and positively correlated with L2 grit (0.975) and academic achievement (0.935), suggesting that stable interest may play an important role in supporting students' long-term learning engagement.

The correlation coefficient between L2 grit and academic achievement was 0.972, which was also highly significant. This result further suggests that L2 grit, as a comprehensive psychological factor, is closely associated with students' English learning outcomes. Students with higher levels of L2 grit are more likely to remain motivated, persist in learning tasks, and overcome difficulties in the process of language learning. These results indicate that students' effort in English learning, interest, L2 grit, and academic achievement are closely interrelated, and that students' performance across these dimensions is highly consistent. Therefore, improving students' perseverance and maintaining their learning interest may be helpful for enhancing English academic achievement. This provides strong support for understanding the relationship between English learning motivation and learning outcomes.

5. Discussion

The study indicates that students have showed a moderately high level of L2 grit, with relatively balanced scores in perseverance of effort and consistency of interest. However, individual differences were evident, as some students lacked stable motivation and persistence when facing learning difficulties. Therefore, teachers and parents should provide encouragement, emotional support, and effective learning environments to help students maintain effort and confidence in English learning.

The two dimensions of L2 grit both showed significant predictive effects on English academic achievement. Perseverance of effort directly supports students' continuous engagement and helps them overcome obstacles, while consistency of interest contributes to motivation, although it may be more unstable and influenced by teaching methods, classroom atmosphere, and learning content. The study

suggests that both effort and interest are important, but long-term achievement depends more on sustained effort and effective learning habits than on short-term interest alone.

In general, L2 grit is an important non-cognitive factor affecting English achievement. Students with higher L2 grit are more likely to persist in learning, regulate negative emotions such as anxiety and pressure, and achieve better academic performance. Therefore, English teaching should focus on cultivating students' perseverance, stable motivation, emotional regulation, and long-term engagement.

5.1 L2 Grit Level of Secondary School English Learners

The L2 grit level of secondary school English learners showed relatively balanced but slightly fluctuating characteristics. In the present study, students' scores on the two dimensions of "perseverance of effort" and "consistency of interest" were both at a moderately high level, indicating that most students possessed a certain degree of motivation and engagement in English learning. However, this level was not entirely stable, and considerable individual differences were observed. Some students may have shown relatively low learning motivation or interest due to factors such as family background, educational resources, and personality, whereas others were able to continuously invest more effort and maintain a higher level of enthusiasm for learning.

At present, although students generally demonstrated a moderate level of grit in English learning, many problems still exist in actual learning practice. Many students showed relatively weak coping ability when encountering learning obstacles and lacked the perseverance needed for continuous learning. In the early stage of language learning, students' interest and enthusiasm may be relatively high. However, as the difficulty of learning content increases, they may feel tired and frustrated, which may gradually reduce their learning interest. For students who lack sufficient grit, they may quickly give up or lose motivation when facing difficulties, which contradicts the long-term and progressive nature of second language learning.

Based on this situation, teachers and parents should provide more positive encouragement and emotional support to help students cope with challenges in learning. In classroom teaching, teachers may adopt richer and more flexible teaching methods, such as task-based learning and cooperative learning, to enhance students' autonomous learning ability and sense of teamwork, thereby cultivating their ability to persist in effort. In addition, parents should create a supportive environment for their children, pay attention to their emotional needs, and encourage them not to give up easily when encountering difficulties. Through the joint efforts of families and schools, students' L2 grit can be effectively improved, enabling them to better adapt to the long-term requirements of English learning.

5.2 Predictive Effects of the Two Dimensions of L2 Grit on Academic Achievement

The two dimensions of L2 grit, namely perseverance of effort and consistency of interest, both had significant predictive effects in secondary school English learning. Perseverance of effort refers to students' patience and persistence when facing learning obstacles, and students' continuous engagement when encountering difficulties is a key factor influencing academic achievement. Perseverance of effort

means that individuals devote sustained energy to long-term work, even when facing challenges or experiencing failure (Liu, Fang, & Teng, 2021). Consistency of interest is mainly reflected in students' maintenance of long-term interest and enthusiasm for English learning. Although interest has a positive influence on learning motivation, its effect on academic achievement is usually more indirect.

Different from some previous research findings, the results of the present study indicate that both perseverance of effort and consistency of interest have more direct and long-term effects on academic achievement. This study did not further confirm the view of Sudina et al. (2021), namely that perseverance of effort in language learning is a significant positive predictor of students' language achievement and self-perceived English proficiency, and that its effect is even stronger than overall "grit," whereas consistency of interest is not a significant predictor. Sudina et al. (2021) further emphasized that, in English as a second language contexts, consistency of interest is a significant negative predictor. This suggests that differences in research participants and research regions may lead to variations in results. In Chinese secondary and primary education, students' interest is usually a driving force for foreign language learning, influenced by factors such as teachers' teaching methods, classroom atmosphere, and the attractiveness of learning content. Interest is relatively unstable and may be affected by many external factors. For example, if English learning content is too monotonous or boring, students' interest may easily be frustrated, resulting in a decline in learning enthusiasm. Therefore, interest is one of the important factors affecting academic achievement at the secondary school stage. However, it should not be denied that its effect is relatively short-term and context-dependent, and long-term improvement in academic achievement cannot rely solely on students' level of interest.

Therefore, future English teaching should pay more attention to cultivating students' "quality of effort" rather than merely relying on the stimulation of short-term interest. In addition, the process of second language learning often requires long-term repeated accumulation and practice. Especially at the secondary school stage, language learning is often accompanied by the accumulation of basic knowledge such as vocabulary and grammar, as well as the improvement of listening and speaking abilities. In this process, students' continuous learning engagement, persistence when facing challenges, and effort in English learning can effectively promote the improvement of their language ability.

5.3 Predictive Effect of L2 Grit on Academic Achievement

L2 grit plays an important role in predicting secondary school students' English academic achievement. Especially under the interaction of its dimensions, L2 grit has become one of the key factors contributing to the improvement of academic achievement, which is consistent with most previous research findings (Wei et al., 2019). From the overall performance of L2 grit, students with higher levels of L2 grit not only show more significant performance in both interest and effort, but also achieve better academic results. As a non-cognitive ability, L2 grit also influences academic achievement through students' learning motivation, learning behavior, and emotional regulation. In the

learning process, students constantly face English tasks of varying difficulty. Only through continuous effort and repeated practice can they gradually master language knowledge and improve their listening, speaking, reading, and writing skills. Therefore, students with higher L2 grit are usually able to maintain a certain level of engagement in long-term English learning and do not easily give up when facing difficulties, which directly promotes the improvement of their academic achievement (Credé et al., 2017). In contrast, students who lack grit may feel confused or frustrated when encountering challenges, thereby losing interest or confidence in English learning, which may lead to stagnation in their academic achievement.

In addition, L2 grit also affects academic achievement by regulating students' emotional states (Wei et al., 2024). For secondary school students, the learning process is often accompanied by negative emotions such as anxiety and pressure. Especially when facing difficult language tasks, emotional fluctuations may affect their learning outcomes (Li, Han, & Li, 2022). Students with higher L2 grit are able to maintain a positive attitude through self-regulation and avoid the negative influence of excessive anxiety on learning outcomes. Therefore, L2 grit not only promotes students' continuous effort, but also helps them maintain a good emotional state and achieve better performance in learning. This study provides useful implications for secondary school English education and teaching. Firstly, L2 grit is an important predictor of academic achievement. Especially at the secondary school stage, teachers should pay more attention to how to cultivate students' L2 grit. Helping students develop perseverance in long-term learning by setting appropriate learning goals and providing timely feedback will significantly improve their academic performance. Secondly, teachers should focus on stimulating students' learning interest in classroom teaching. However, they should also recognize that although interest can promote students' short-term learning outcomes, it is not sufficient to maintain long-term academic progress. Therefore, in teaching, in addition to interesting content and highly interactive activities, teachers also need to help students establish more stable learning motivation and patience. Finally, L2 grit is not only closely related to learning motivation and emotional management, but also helps students better cope with academic pressure and anxiety. Therefore, educators need to comprehensively consider students' emotional needs and help them maintain a positive learning attitude and emotional state through comprehensive support and guidance, thereby improving their second language learning outcomes.

6. Conclusion

This study explored the predictive effect of L2 grit on the academic achievement of secondary school English learners. The results showed that the two dimensions of L2 grit, namely perseverance of effort and consistency of interest, were both significantly and positively correlated with students' English academic achievement. Through this study, it can be clearly seen that L2 grit, as a positive psychological trait, plays an important role in English education, especially in helping students

overcome learning difficulties, enhance learning motivation, and maintain learning interest.

However, this study has certain limitations. First, the sample size was relatively small and was limited to one secondary school in Qingdao, which may restrict the generalizability and representativeness of the findings. Second, this study only focused on the relationship between L2 grit and academic achievement, while ignoring other possible mediating factors that may affect academic achievement, such as emotional factors and learning strategies. In addition, the cultivation mechanism and specific operational strategies of L2 grit still require further exploration.

Future research may expand the sample scope to include students from different regions and different grades, so as to improve the external validity of the findings. Meanwhile, further studies may explore the relationship between L2 grit and other psychological variables, such as learning motivation and self-efficacy, especially how to cultivate students' L2 grit through classroom teaching and extracurricular activities. Through multidimensional research, a more comprehensive theoretical basis and practical guidance can be provided for the educational practice of second language learners.

Competing interests

The authors declare no competing interests.

Declaration of generative AI

Generative Artificial Intelligence (AI) tools (ChatGPT) were used solely for language editing and refinement to improve clarity and readability. The authors take full responsibility for the content of the manuscript.

Ethical statement

This study involves human participants. Although formal ethical approval was not required according to institutional guidelines, informed consent was obtained from all participants, as well as from their parents or legal guardians. Permission was also granted by the school and relevant teachers prior to data collection. Participation was voluntary, and all data were collected and used in accordance with relevant ethical standards, ensuring the anonymity and confidentiality of the participants.

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Note: **p<0.01

Supplementary material

英语学习坚毅调查问卷

亲爱的同学：

您好！感谢您参与本次问卷调查。本次调查旨在了解您在英语学习中的坚毅现状。本问卷中的选项没有正误之分，数字 1-5 代表这个句子与您实际情况的符合程度，其中 1 代表“完全不符合我”，5 代表“非常符合我”，请根据您的实际情况在相应的数字打钩。本调查会对您的所有作答保密，数据仅用于学术研究，希望您真实地描述你的情况。非常感谢您的合作与支持！

班级：_____ 性别：_____

		完全 不 符合 我	不 太 符合 我	有 点 符合 我	很 符 合 我	非 常 符 合 我
1	我是一个勤奋的英语学习者。	1	2	3	4	5
2	提到英语，我是一个努力的学习者。	1	2	3	4	5
3	我觉得我已经失去了英语学习兴趣。	1	2	3	4	5
4	既然我已经决定要学好英语，任何事情都无法阻止我实现这一目标。	1	2	3	4	5
5	我会排除万难，在英语学习中取得进步	1	2	3	4	5
6	我没有以前对英语学习那么感兴趣了	1	2	3	4	5
7	我对英语着迷了一阵子，但后来失去了兴趣。	1	2	3	4	5
8	我一旦设定了英语学习目标，就会努力迎接任何随之而来的挑战	1	2	3	4	5