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Evaluating the Psychometric Properties of the Persian Version of the Academic Grit Scale in Iranian Students

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ABSTRACT

Objective: This study aimed to examine the validity and reliability of the Persian version of the Academic Grit Scale in Iranian students using a correlational-descriptive and psychometric research design.

Methods: The participants were a total of 440 male and female senior high school students in Masjed Soleyman in the academic year 2022-2023 who were selected through multi-cluster sampling. The data were collected using the Academic Grit Scale (2019), the General Grit Scale (2009), the Procrastination Assessment Scale -Students (1984), and the Multidimensional Students' Life Satisfaction Scale (2001). The collected data were analyzed through the Pearson correlation test, Cronbach's alpha, and factor analysis with AMOS-24 and SPSS-22 software.

Results: The confirmatory factor analysis revealed the single-factor structure of the Persian version of the academic grit scale. Overall, the Persian version of the scale has acceptable and relatively strong psychometric properties in terms of content validity (CVI < 0.79 & CVR < 0.62), convergent validity with overall grit (r = 0.446; P<0.1) and life satisfaction (r=0.524; p<0.01), divergent validity with academic procrastination (r=-0.586; p<0.01) and internal consistency (Cronbach's alpha (α) = 0.905).

Conclusions: The data from this study suggested that the Persian version of the Academic Grit Scale is an appropriate tool for evaluating academic grit in Iranian students, which can be used in research and clinical settings. The present study also provided some implications to enhance the practice of school counselors, teachers, and other professionals who try to positively influence the performance of children and adolescents.

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Introduction

A prominent focus within positive psychology is the study of happiness (Diener, 2000). Consequently, understanding the elements that contribute to and sustain happiness is a significant subject within this emerging and rapidly advancing area of psychology. Positive psychology emphasizes traits such as personal strengths, effective character, and the experience of positive emotions or achievements (Clark & Malecki, 2019). The popularity of the last concept is reflected in the huge number of scholarly articles on success. Accordingly, more than 2 million studies can be found on this topic in reliable databases such as EBSCO (2016). The most common predictors of improving or reducing quality of life are intelligence, personality, surrounding conditions, customs, attitudes, and educational background. (Credé & Kuncel, 2008). Nonetheless, there is another trait that stands out as particularly crucial for success, one that predicts achievement irrespective of life circumstances or job characteristics (Duckworth et al., 2007). This trait is referred to as grit, which is described as perseverance and enthusiasm for long-term goals and the determination to follow long-term objectives (Von Culin et al., 2014) .

Grit encompasses two distinct components: consistency of interest and perseverance of effort. Consistency of interest pertains to the commitment to a particular path and increased focus on tasks around that direction, while perseverance of effort refers to maintaining effort over time, especially in the face of challenges or setbacks. Grit can predict success in fields that are usually considered difficult and require hard work (Duckworth & Quinn, 2009) .

This concept can also be examined in light of Tinto's (1975) dropout theory, which has been revised recently. According to this theory, several factors (academic problems, adjustment, goals, uncertainty, integration and membership in the community, inadaptability, and isolation) affect students' grit. Tinto states that students' commitment and perseverance toward educational goals directly affect the level of students' enthusiasm to do homework and students' continued attendance at school. Hence, academic grit means a student’s reaction to and their resistance to factors/conditions leading to academic failure. Students often face many changes and ups and downs during their academic life, sometimes leading to their academic failure. Students who do not have enough academic grit and, as a result, interest and persistence when facing problems, will experience poor performance and a significant level of academic failure (Tinto, 1975).

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Academic grit during the school years from elementary to middle school and even beyond is still not well known and significant comprehensive studies have not addressed it. However, this trait has been positively linked to valuable consequences among young individuals, including aspects like general self-efficacy, job satisfaction, job maintenance, and adaptive emotional states (Credé et al., 2017). Recent research has shown a positive relationship between grit and various significant outcomes during adolescence, such as overall life satisfaction, satisfaction with school, and academic performance, many of which have been affirmed through meta-analytic studies (Clark & Malecki, 2019). Although most of the studies on grit have used academic samples and analyzed general academic grit instead of its specific dimensions, a significant implication of academic grit is its potential in the early education of students to increase their ability to face and cope with challenges in adulthood (Clark & Malecki, 2019).

Moreover, in their longitudinal study, Postigo Gutiérrez et al. (2021) investigated grit and its relationship with school performance in adolescents and found a correlation between grit and academic achievement. They also showed a high level of grit leads to higher academic achievement. Their findings also indicated that the presence of grit is an effective factor in improving academic talents and school performance (Postigo Gutiérrez et al., 2021). In another study, Tang et al. (2021) investigated the effect of grit on academic burnout and psychological and social problems of adolescents and concluded that a higher level of stability, when adolescents experience academic burnout, significantly reduces symptoms of depression and loneliness in them. They also suggested grit to be a resilience factor that can contribute to reducing psychological and social problems (Tang et al., 2021).

The 8-item Academic Grit Scale (Duckworth & Quinn, 2009) is the most commonly utilized assessment tool for measuring grit, representing a condensed version of the original 12-item Grit Scale (Duckworth et al., 2007). This scale has two subscales, each with four items focusing on consistency of interest and perseverance of effort. The reliability coefficients concerning internal consistency, criterion-related validity, stability reliability, and the two-factor structure of both the 8-item and 12-item scales have been deemed acceptable in various studies involving diverse samples, including children, adolescents, and university students (Duckworth & Quinn, 2009; Duckworth et al., 2007). The 8-item Academic Grit Scale, the most widely used grit scale, has shown adequate psychometric power in validation studies. However, recent results indicate low

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internal consistency of this scale in adolescents (Datu et al., 2016). In addition, although the 8-item Academic Grit Scale exhibited a correlated two-factor construct at the time of its construction (Duckworth et al., 2007), more recent studies have shown an one-factor construct (Areepattamannil & Khine, 2018) or a well defined two-factor construct (Abuhassàn & Bates, 2015). In a meta-analysis (Credé et al., 2017), evidence supporting the hierarchical structure of grit was scant, but the findings reported a distinct two-factor construct of consistency of interest and perseverance of effort. Besides, while initial researchers regarded grit as a stable personality trait, a study showed that grit can fluctuate throughout life, which contradicts the notion of it being a fixed trait (Roberts et al., 2009). In a study, students exhibited a significant and constant decrease in grit over two academic years (West et al., 2016). This show that grit might be a flexible concept instead of a stable trait, indicating it should not be classified strictly as a personality trait. In short, the weak psychometric evidence of the 8-item grit scale in adolescents, contradictory findings about the characteristics of the factor structure, and the necessity of redefining grit not as a personality trait made researchers develop another version of the grit scale (Clark & Malecki, 2019).

In the new version of the grit scale, researchers (Clark & Malecki, 2019) revised this concept in such a way that it is defined as an individual characteristic or skill involving determination, flexibility, and focus in pursuit of long-term and challenging goals in the field of education. To construct the new version, 40 items were first developed by 14 experts (in the field of psychology), and their content validity was evaluated. After reviewing experts' ratings and overall evaluation, 10 items were deleted, 20 items were revised, 9 items remained unaltered, and 1 item was added. Accordingly, a total of 30 items remained. After following up and checking other psychometric criteria again, 20 more items were discarded as they did not meet the accepted psychometric indicators. Finally, a 10-item version of the grit scale was prepared. The psychometric properties of the new scale were investigated in a sample of 757 American sixth- to eighth-grade students using validity and reliability indices and factor structure. The results from exploratory and confirmatory factor analyses affirmed the factorial structure of the 10-item grit scale, while also providing compelling evidence for its internal consistency and validity. Other findings also indicated academic grit is positively associated with academic achievement, life satisfaction, and school satisfaction (Clark & Malecki, 2019).

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A recent study examined the factor structure of the Academic Grit Scale in a large sample of Chinese adolescents (n = 1894) aged 9 to 14 years old. The single-factor model of the scale showed good fit indices. In addition, academic grit was significantly associated with positive academic emotions and academic achievement, which provided evidence of adequate criterion-related validity. This study provided further evidence for the construct validity of the Academic Grit Scale among primary and secondary school students in China (Lin et al., 2024).

The effort to standardize and apply contextualization tools among different cultural groups is not only common for research purposes but also for use in evaluation and needs assessment. Nevertheless, there are various challenges to achieving these outcomes, including societal and cultural constructs that influence the indicators and measurable definitions of grit. No one can easily assume that the tools developed to measure the concepts and constructs in one culture can be used and compared in the same way in other cultures. Hence, different tools and tests to be used in different cultures must be first selected with scientific precision and rigor. Then, they need to be examined with advanced statistical and psychometric procedures to adequately and confidently assess the validity and reliability of the resulting measurements (Costa & McCrae, 1998).

Considering that grit plays a crucial role in successful outcomes in overtime and is associated with numerous valuable benefits, it warrants considerable attention in both psychology and counseling research. Indeed, addressing academic grit in early education and student periods is a requirement to predict and improve grit at higher academic levels. By using the academic grit scale as a screening tool, educators and teachers can measure the academic grit of students during their studies and apply necessary and supportive measures to maintain or improve it, especially among students facing stressful academic situations and academic competitions who are prone to academic failure. Developing a strong tool for academic grit can be used in effectiveness studies to compare changes in academic grit, in longitudinal studies to observe the course of changes in academic grit, and in cross-sectional studies to understand the relationship between academic grit and psychological changes (such as life satisfaction, school satisfaction, and academic progress).

To the best of our knowledge, so far in Iran, the 8-item version (Duckworth & Quinn, 2009) has been administered to the students of the Electronic Education Center of University of Guilan (Ghasemi Vajargah & Fazli, 2021) and the 12-item version (Duckworth et al., 2007) has been administered to undergraduate students at Bu-Ali Sina University in Hamadan (Hosseni et al.,

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2018). However, no study has addressed the psychometric properties of the 10-item grit scale which is newer than the other versions. Furthermore, similar studies have generally assessed the scale among university students and academic samples, but the focus of the present study is on high school students. Accordingly, the present study aimed to find out if the Persian version of the Academic Grit Scale provides acceptable psychometric properties among Iranian academic samples. Moreover, this study sought to examine the validity and reliability of the Persian version of the scale in Iranian high school students.

Material and Methods

Participants

This cross-sectional psychometric study was conducted on male and female upper secondary school students in the academic year 2022-2023 in Masjed Soleyman, Iran. A large sample of 440 students was selected through cluster sampling and using common reliability assessment and validating tests taking into account the possibility of participants' drop-out. Bandalos (2014) considers a sample size of at least 400 people to be adequate for confirmatory factor analysis. After discarding incomplete questionnaires, data from 414 students were utilized for final analysis(Bandalos, 2014).

Instruments

Academic Grit Scale (AGS): This 10-item scale was developed by Clark and Malecki (2019) to measure students' effort and determination to succeed in their academic careers and school environments. The items are scored on a five-point Likert scale ranging from 1 = "not at all like me" to 5 = "very much like me". The validity and reliability of this scale were calculated on 757 American sixth- to eighth-grade adolescent students using validity and reliability indices and exploratory and confirmatory factor analysis. Confirmatory and exploratory factor analyses corroborated the factorial structure of the 10-item grit scale, providing robust results for its internal consistency and validity. Other findings also indicated that AGS is positively associated with academic achievement, life satisfaction, and school satisfaction (Clark & Malecki, 2019).

Procrastination Assessment Scale -Students (PASS): This scale was developed in 1984 (Solomon & Rothblum, 1984) and contains 27 items and three subscales: homework preparation (11 items), exam preparation (8 items), and class homework preparation (8 items). Each item is scored using

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five options from “never” (1) to “always” (5). The internal consistency of the scale was assessed through Cronbach’s alpha in a study (Solomon & Rothblum, 1988) and the corresponding value was 0.79 for the whole scale, 0.85 for exam preparation, 0.86 for homework preparation, and 0.89 for class homework preparation. In Iran, Cronbach’s alpha coefficient was reported to be 0.91 confirming the overall validity of the PASS(Jokar & Delavarpour, 2007).

Multidimensional Students’ Life Satisfaction Scale (MSLSS): This tool was made in 2001 with 40 six-option items (Huebner, 2007). The scale has five subscales: friends, school, family, living environment, and self. MSLSS has good convergent validity (positive correlation with self-esteem and positive experiences with peers) and divergent validity (negative correlation with anxiety and social pressure). Also, Cronbach’s alpha coefficient for the whole score was 0.90 and for the subscales ranged from 0.53 (self) to 0.81 (the living environment). The test-retest reliability for the scale was 0.81 within a 4-week interval (Huebner, 2007). Cronbach’s alpha for the total score was reported as 0.79 for use in Iran and for the subscales of family, friends, school, living environment, and self were 0.83, 0.58, 0.80, 0.33, and 0.80, respectively (Koohbanani et al., 2013).

General Grit: This scale was developed in 2009 (Duckworth & Quinn, 2009) and has 8 items and two subscales that assessed the consistency of interest and perseverance of effort on a five-point Likert scale ranging from 1 = “not at all like me” to 5 = “very much like me”. Higher scores indicate higher grit in the respondent and vice versa. The construct validity of the scale was assessed using factor analysis and the results confirmed the validity of the scale (Duckworth & Quinn, 2009). Besides, the internal consistency of the scale was confirmed with Cronbach’s alpha of 0.73. In Iran, this coefficient was reported as 0.83 (Ghasemi Vajargah & Fazli, 2021).

Procedure

The AGS was translated to Persian by two proficient Persian translators experienced in translating similar instruments, though unfamiliar with this particular scale. Afterward, any inconsistency between the two translated versions was reviewed and resolved by the researchers and the two translators, and a single version was selected. In the next step, two other translators who were proficient in English and Persian back-translated the scale into English. Moreover, any inconsistency between the two versions was discussed and resolved and a single version of AGS was prepared. The face validity of the AGS was assessed by 10 psychologists and counselors. Moreover, the content validity of the AGS was checked using the Lawshe method and comments

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of 12 subject-matter psychologist (Lawshe, 1975). Subsequently, the face and content validity of the Persian version of the AGS were confirmed by administering it to 40 students selected via convenience sampling. Their feedback was sought to address any issues with the items and to estimate the time required for completion.

A qualitative assessment of the face validity of the Persian version of AGS involved input from both students and 10 experts in the field to assess the difficulty, relevance, and clarity of the items. Revisions were made based on their feedback. Moreover, the Lawshe method was used to evaluate the content validity of the scale. To this end, each item was first assessed as "necessary", "useful but not necessary", or "unnecessary" by experts. Moreover, the content validity ratio (CVR) was calculated for each item. The minimum acceptable CVR for each item should be 62% (Lawshe, 1975). In this study, the CVR for all items was higher than 0.62. The content validity index (CVI) was also measured by assessing the "simplicity", "relevance", and "clarity" of each item. The acceptable CVI should be greater than 0.79 (Lawshe, 1975). In the present study, the CVI for all items was estimated to be 0.80. Thus, no item was modified or deleted from the Persian version of the AGS. After obtaining the necessary permits from the university officials and the Education Department of Khuzestan Province, Iran, the participants were selected through multi-cluster sampling. To do so, the educational districts in Khuzestan Province were divided into some clusters. Afterward, a district with 7 high schools for boys and 5 high schools for girls was selected randomly. In the next stage, 2 high schools for boys and 2 high schools for girls were selected randomly. Before distributing the questionnaires among the students, the objectives of the study and the research procedure were explained to school principals and students. Furthermore, informed consent was obtained from the students. They were also assured that their participation in the study would be voluntary, they could withdraw from the study at any stage, and their data would remain anonymous and confidential. In addition, the students were told that the present study only followed research and academic purposes and did not have disciplinary or any other applications.

Data analysis

The collected data were summarized using descriptive statistics including frequency, mean, standard deviation, and percentage. Besides, the convergent and divergent validity and test-retest reliability were assessed using Pearson's correlation test. The internal consistency of the scale was

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evaluated using Cronbach's alpha and the factor structure of the scale was assessed using confirmatory factor analysis through SPSS-22 and AMOS-24 software.

Results

The participants in this study were 414 high school students. The data revealed that 50.5% of the participants were boys and 44% of them were 16 years old. Moreover, 55% of the participants were tenth-grade students and 56% of them were studying experimental sciences. In addition, 76% of the students had a GPA between 18 and 20. Preliminary analysis showed no outliers in the dataset. In addition, the data were checked for normality, and the skewness and kurtosis values of the results ranged from -2 to +2, confirming the normal distribution of the data. To examine the factor structure of the Persian version of the AGS, a confirmatory factor analysis was run.

Table 1 . Fit Indices of the Single-Factor Model

Fit Indices	acceptable thresholds	Observed Value	Evaluation of Fit Indices
χ^2/DF	≤ 3 (Awang, 2012)	2.84	Acceptable
IFI	> .90 (Awang, 2012)	0.99	Acceptable
NFI	> .90 (Awang, 2012)	0.98	Acceptable
RMSEA	< .08 (Awang, 2012)	0.067	Acceptable
RFI	> .90 (Awang, 2012)	0.97	Acceptable
CFI	> .90(Awang, 2012)	0.99	Acceptable
GFI	> .90 (Awang, 2012)	0.95	Acceptable
SRMR	< .08 (Awang, 2012)	0.033	Acceptable

Note. χ^2/DF: the Chi-Square Divided by the Degrees of Freedom; IFI: Incremental Fit Index; NFI: Normed Fit Index; RMSEA: Root Mean Square Error of Approximation; RFI: the Relative Fit Index; CFI: Comparative Fit Index; GFI: The Comparative Fit Index; SRMR; The Root Mean Square Error of Approximation

As can be seen in Table 1, χ2/df is smaller than 3, confirming the fit of the model and showing that the model fits the data. Besides, RMSEA is equal to 0.067, and SRMR is equal to 0.033, which is smaller than the criterion value (0.08). Finally, IFI, RFI, CFI, GFI, and NFI indices are also greater than the intended criterion (0.9) and the sum of these indices confirms the Goodness of fit (GOF) of the deta. Fit indices for the single-factor model indicated suitable fit of the model with the data derived from the Persian version of the AGS (see *Table 1*).

Table 2 shows the factor loadings for each of the items in the Persian version of the AGS in the form of standard coefficients along with the t-statistics and the level of significance related to each item. As can be seen, all the standardized factor loadings were higher than 0.40 and were

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significant (P<0.01). A comparison of the standardized factor loadings for each item shows that item 9 has the highest factor loading (0.81) and item 7 has the lowest factor loading (0.57).

Table 2. Factor Loadings of each of the items of the Persian Version of the AGS in Confirmatory Factor Analysis

Variable	Items	Standardized Coefficient	T	P-Value
AGS	1	0.61	13.21	0.01
	2	0.68	15.20	0.01
	3	0.71	16.24	0.01
	4	0.74	17.20	0.01
	5	0.65	14.42	0.01
	6	0.71	16.02	0.01
	7	0.57	12.12	0.01
	8	0.78	18.48	0.01
	9	0.81	19.43	0.01
	10	0.74	17.18	0.01

Note. AGS: the Persian Version of the Academic Grit Scale.

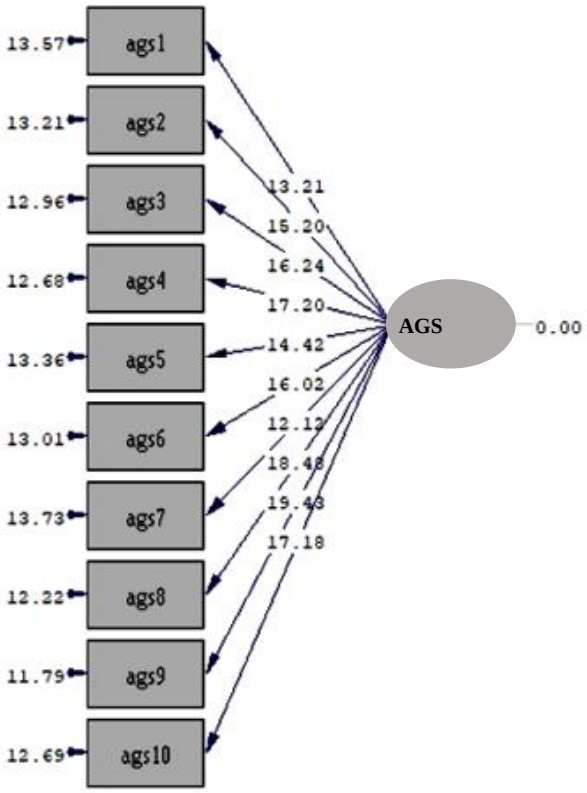


Figure 1. Confirmatory factor analysis of the Persian version of the AGS

Figure 1 related to the confirmatory factor analysis for the Persian version of the AGS. For factor loadings to be significant, the t-value of each path must be greater than 1.96. As shown, the t-values related to all items were higher than 1.96.

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To assess the divergent and convergent validity of the Persian version of the AGS in high school students, the general Grit Scale, the Procrastination Assessment Scale -Students (PASS), and the Multidimensional Students' Life Satisfaction Scale (MSLSS) were conducted to the students and Pearson's correlation coefficients between the variables were calculated (see *Table 3*). The results indicated life satisfaction and general grit have positive and significant correlations with academic grit (P<0.01). Furthermore, the convergence validity of the AGS was confirmed. Besides, all the correlations between academic procrastination and AGS were negative and significant (*P*<0.01), confirming the divergent validity of the AGS.

Table 3. Correlation Matrix of the Persian Version of the AGS with Other Research Variables

Variables	1	2	3	4
AGS	1			
MSLSS	0.524**	1		
PASS	-0586**	-0.537**	1	
General Grit	0.446**	0.451**	-0.667**	1

*Note. * P<0.05 level (2-tailed); ** P<0.01 level (2-tailed); AGS: : the Persian Version of the Academic Grit Scale; MSLSS: the Multidimensional Students' Life Satisfaction Scale; PASS: the Procrastination Assessment Scale -Students.*

Cronbach's alpha coefficient was calculated to check the internal consistency of the scale. An alpha value greater than 0.9 is excellent, between 0.0-8.9 is well, 0.7-0.8 is acceptable, 0.6-0.7 is debatable, 0.5-0.6 is weak, and less than 0.5 is unacceptable (DeVellis & Thorpe, 2021). The total alpha coefficient in this study was 0.905, indicating the good internal consistency of the Persian version of the AGS. The data in Table 3 also show the credibility of the scale after removing each item. As can be seen, removing any of the items does not increase the credibility of the scale.

Table 4. Cronbach's alpha coefficients of the Persian version of the AGS

Item	Item-Total Correlation	Alpha if Item Deleted
1	0.581	0.901
2	0.647	0.897
3	0.677	0.895
4	0.706	0.893
5	0.622	0.898
6	0.673	0.895
7	0.530	0.904
8	0.743	0.891
9	0.764	0.889
10	0.693	0.894
Total Alpha	0.905	

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Discussion

The present study examined the psychometric properties of the Persian version of the AGS in Iranian high school students. The small number of items on the AGS (10 items), its ease of administration, the increased attention to the variables related to positive psychology, including grit, and the significance of this concept in students' academic achievement were among the most important reasons assessing the psychometric properties of the AGS in the present study. In this study, the face, content, construct, divergent and convergent validity, and internal consistency of the Persian version of the AGS were investigated. Overall, the results confirmed that this scale is a suitable tool for measuring students' academic grit.

To assess the face and content validity of the AGS, it was first translated into Persian. The confirmatory factor analysis revealed the single-factor structure of the Persian version of the AGS. An assessment of the fit indices of the single-factor model showed a good fit of the model with the data from the Persian version of the AGS. Similar findings have been reported in the original study (Clark & Malecki, 2019), especially regarding the single-factor model.

The single-factor and multi-factor analysis of the Chinese version showed that the single-factor model was stronger than the multi-factor model, as confirmed in the present study. Thus, the total factor findings in these two related studies as well as the present study highlighted that academic grit is mainly accounted for by a general factor, and using an overall academic grit score is more reliable than the separate scores of the possible factors in the scale(Lin et al., 2024). The factor loadings estimated in the present study ranged from 0.57 to 0.81, while the corresponding values in the original study (Clark & Malecki, 2019) varied from 41 to 0.81. The factor loadings for the Chinese version of the scale ranged from 0.70 to 0.85, indicating higher values compared to the values measured in the present study(Lin et al., 2024).

Following the validation data, the 10 items remained in the Persian version of the AGS, and no item was removed. This can indicate the samples' correct understanding and interpretation of the translated items that are represented in the original version (DeVellis & Thorpe, 2021). In addition, similar findings indicated the applicability of the AGS for Iranian students despite the existence of cultural differences. The internal consistency of the AGS in this study was reflected by a Cronbach's alpha of 0.90, compared to 0.93 in the original work (Clark & Malecki, 2019). The

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corresponding value for the Chinese version of the scale was 0.88, indicating its relatively lower internal consistency compared to the present study(Lin et al., 2024).

The findings from the present study also indicated that Cronbach's alpha of the whole scale does not increase if any of the items are removed, which showed the high internal consistency each of the items in the AGS and that all the items measure the same construct (DeVellis & Thorpe, 2021). Although the 8-item version of the scale is the most widely used academic grit assessment tool, as mentioned earlier, it has shown minimal evidence for internal consistency in adolescents (Datu et al., 2016). Conversely, the current study's results suggested that the 10-item scale possesses strong psychometric qualities, enhancing the generalizability of the findings to a broader adolescent population.

The scores obtained from the Persian version of the AGS had positive and significant correlations with students' life satisfaction and general grit and negative and significant correlations with academic procrastination. These findings confirm the convergent and divergent validity of the scale as indicated in the original study, the Chinese version and other studies addressing the scale. Clark and Malecki (2019) showed that AGS scores are positively and significantly associated with life satisfaction, school satisfaction, and academic achievement of students. Consistent with these findings, both life satisfaction (Datu et al., 2016) and school satisfaction (Bowman et al., 2015) were found to be positively related to academic grit. Similar evidence was also found about procrastination (Attia & Abdelwahid, 2020). Similarly, the assessment of the Chinese version of the scale (Lin et al., 2024) suggested that academic grit is a positive predictor of academic achievement and positive academic emotions. This shows that in stressful academic situations and academic competitions, a higher level of academic grit may help students maintain positive academic emotions and effective academic performance (Eroglu & Kaya, 2023). Overall, these results reinforce existing literature, offering validation for the AGS in relation to several significant outcomes for adolescents.

The present study confirmed the relationship between academic grit and important outcomes associated with adolescence (students' life satisfaction, reduction of procrastination, and general grit). Rather than focusing on children and adolescents, grit has often been studied in adult samples. However, such studies are necessary to clarify the predictive power of grit across the lifespan. This means that whether adolescents may report the same results in the future or not.

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Limitations

The data in the present study were collected through self-report instruments, and the students may intentionally or unknowingly have provided wrong or invalid information. However, the researchers tried to eliminate this problem by being involved in data collection in the research setting and encouraging the students to ask their questions about the items. Although most similar studies have used self-report methods to assess variables, future studies can use more objective methods (such as behavioral observations) or multiple reports to assess these variables. Since the present study adopted a cross-sectional design, its findings restrict the possibility of drawing causal conclusions. Thus, future research might explore longitudinal methodologies or assess the effectiveness of various interventions aimed at fostering grit. Furthermore, since the current findings may apply predominantly to populations similar to the sample studied, future studies should investigate the role of academic grit across a wider range of student demographics.

Conclusion

Following previous studies (Clark & Malecki, 2019), the data in the present study confirmed the strong psychometric properties of the Persian version of the AGS in terms of internal consistency, face and content validity, and convergent and divergent validity in students. The present study provided evidence of the positive relationship between academic grit and satisfaction with school, general grit, and procrastination in a sample of Iranian students. Expanding the focus of grit to domains beyond academic achievement and school (e.g., university) as well as beyond students (e.g., college students) in future studies may help increase knowledge in this area. Future studies should also examine the question of whether academic grit functions differently across developmental periods. The evidence from the literature has shown differences across various age groups (Credé et al., 2017). This confirms the importance of the predictive validity of the scale in future psychometric studies. The findings from the present study can have some implications for improving the function of school counselors, teachers, and others who try to positively influence children and adolescents. Since grit is associated with important outcomes (such as academic achievement, life satisfaction, school satisfaction, and reduced procrastination), it can be assessed in general school screenings to predict student performance and provide targeted support. It should be noted that school counselors are responsible for identifying tools with strong psychometric properties for evaluating students' grit and applying the results of these evaluations.

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Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries. can be directed to the corresponding author.

Ethics statement

All ethical principles are considered in this article. The participants were informed of the purpose of the research and its implementation stages. Principles of the Helsinki Convention were also observed.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection, and analysis. All authors contributed to the article and approved the submitted version.

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This research did not receive any grant from funding agencies in the government, public, commercial, or non-profit sectors could be construed as a potential conflict of interest

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