Original Article

Psychometric Properties of Persian Version of Academic Success Inventory for College Students

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Abstract

Background: The students' average achievement test scores cannot predict the students' academic success appropriately. **Objectives:** This study aimed to determine the psychometric properties of Persian version of the Academic Success Inventory for College Students (ASICS). **Methods:** The study was conducted in four steps of translation, face and content validity, exploratory factor analysis, and reliability assessment. **Results:** The final version of the Persian version has 38 items. Ten factors with an eigenvalue more than one were extracted. Internal consistency of the scale was 0.75. Item-total correlation ranged from 0.33 to 0.7 for all items and the mean item-total correlation was between 2.20 and 2.90. **Conclusion:** The Persian version of ASICS showed appropriate psychometric properties. It can be used to assess the academic success of Iranian college students.

Keywords: *Academic success, Nursing students, Psychometrics, Scale*

Introduction

Traditionally, most universities use students' average achievement test scores and students' scores in standardized tests such as American College Test and Student's Academic Skills Test to predict the students' academic success. Some researchers have also used students' high school grade point average (GPA)[1] or their scores in standardized achievement test[2] to predict their academic success. However, these criteria are influenced by a complex of mediating factors[3,4] and cannot predict the students' academic success appropriately.[5] Evidence showed that a number of mediating factors such as the student's coping skills, self-confidence, and nonacademic activities can indirectly affect his or her academic success. Therefore, it is suggested that capabilities different from the students' scores and GPA should be measured to judge their potentials and academic success.[5]

According to our knowledge, no standardized tools are available to accurately measure the students' academic success in Iran. Valid and reliable instruments are needed to measure the academic success and facilitate planning and interventions in this area.[6,7]

A number of instruments are designed to measure certain aspects of academic success, such as motivation, career decision-making, or learning skills. However, these instruments focused on limited aspects and some are not adequately valid and reliable to measure the different aspects of academic success.[6,7]

Due to the previous instruments' limitations, in 2009, Prevatt *et al.* designed the Academic Success Inventory for College Students (ASICS).[5] A number of studies assessed and confirmed the validity and reliability of this self-report questionnaire.[5,8] The initial scale consisted of 72 items and was developed based on theory, empirical precedent, and interviews with experts in the field of academic success. Then, in a pilot study on 315 undergraduate students at a large public university in the southeastern United States, the scale was examined. Initial analyses revealed that ten out of fourteen subscales had good evidence of reliability (coefficient

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alpha >0.80). Based on feedback from course instructors of the pilot participants, a subscale was added to measure self-organizing skills. Furthermore, based on responses to open-ended questions, a subscale was added to measure the efficacy of the instruction. The final measure had 62 items.[9] In another study, the ASICS was reexamined on 929 students enrolled in a large public university in the southeastern United States. Data were collected over the course of two semesters from undergraduate students in classes on education, sociology, communications, and career development. An exploratory factor analysis (EFA) and confirmatory factor analysis indicated a 10-factor, 50-item structure explaining 64% of the variance. Finally, the internal consistency of the 50-item measure was also examined. The Cronbach's alpha of the overall ASICS was 0.93, and 0.61–0.93 for the subscales.[5] The 50-item ASICS is a self-reporting scale with Likert scale scoring and consists of 10 subscales, including basic academic skills (12 items), internal motivation/confidence (8 items), perceived instructor efficacy (5 items), concentration (4 items), external motivation/future (4 items), socializing (4 items), career decidedness (4 items), lack of anxiety (3 items), personal adjustment (3 items), and current external motivation (3 items). Students are initially asked to select one class that has been the hardest or most difficult to them within the past year. They are then instructed to answer all items with respect to that class. All items are rated from 1 (strongly disagree) to 7 (strongly agree). Negatively worded items are reverse scored so that higher scores on items reflect more positive functioning. The total score of this scale is between 50 and 350.[5] Festa-Dreher in the Florida State University examined the 50-item ASICS through an item response theory analysis and reconfirmed its validity and reliability.[8] However, no study is available on the validity and reliability of this scale on an eastern academic environment. However, it is important to assess if the ASICS is valid and reliable to be used as an instrument for assessing the academic success of Iranian college students.

Objectives

This study was conducted in order to translate and determine the psychometric properties of the Persian version of the ASICS.

METHODS

This methodological study was conducted in four steps, including translation, face and content validity, EFA, and reliability of the instrument.

Translation

Translation of the ASICS was based on the Wild *et al.*'s model.[10] First, two people who were fluent in Persian and English languages (the first author and a specialist in English) independently translated all the items of the original/English version of the ASICS to Persian and the research team produced the consolidated forward version. Then, another bilingual expert performed back translation. The results were consistent with the original version.

Validity assessment
Face validity

To assess face validity of the Persian ASICS, 15 experts in nursing were asked to read the items to evaluate the readability, fluency, clarity, and comprehensibility of the items. Furthermore, to ensure the instrument is appropriate for the target population, 10 nursing students read the draft of the instrument and assessed the instrument's readability, clarity, and wording.

Content validity

Content validity of the instrument was assessed, and Content Validity Index (CVI) and Content Validity Ratio (CVR) were calculated. Fifteen experts in nursing education were invited to assess if the items are essential, relevant, simple, and clear. The study objectives were explained to the experts and the first draft of the instrument and the validation guidelines were provided for them.

The CVI for individual items were calculated based on experts' scores for individual items on a 4-point Likert scale (1 = it is not relevant, 2 = it needs serious revision, 3 = it is relevant but needs minor revision, 4 = it is quite relevant). The CVI for the total instrument was also calculated based on the proportion of items rated as either 3 or 4.[11] A CVI score over 0.79 indicates a good content validity. Items with a CVI score from 0.70 to 0.79 needed revision or editing, and items with a CVI score <0.70 are considered as inappropriate.[12]

The CVR was calculated using the experts' opinions about the necessity of the individual items. Each expert in the panel was asked to determine if each item is essential and useful. Then, CVR for the individual items was calculated using Formula 1. According to the Lawshe's table, items with a CVR score over 0.49 were considered to be essential. Other items were omitted from the final instrument.[12]

Construct validity

After the content validity was confirmed, EFA was performed to discover the factors.[13,14]

The Kaiser–Meyer–Olkin (KMO) test and the Bartlett's test of sphericity were used to determine the sampling adequacy and appropriateness of the factor analysis model, respectively. EFA was conducted using principal component analysis with varimax rotation, and the

suitable number of factors was determined using eigenvalue criterion (eigenvalue >1) and scree plot. A loading with an absolute value of 0.35 was used as the cutoff point, and items with a factor loading exceeding 0.35 were considered to belong to a subscale.[13]

The minimum number of cases needed for performing EFA is four times the number of items in the instrument.[14] Then, according to the 39 items in the final Persian version of the ASICS, 156 individuals were required to conduct EFA; however, we recruited 180 individuals to compensate the possible dropouts. A simple random sampling method was used to select nursing students among a list of eligible students. The list was prepared by the Education Office in the Nursing and Midwifery School, Kashan University of Medical Sciences. Inclusion criteria included nursing students with Iranian nationality during their second or higher semesters. The first author invited the students to participate in the study, explained the study, and scheduled time for returning the questionnaires. If the students agreed, they completed the instrument. All the students were briefed about how to respond and scheduled a time for returning the completed questionnaire. The study was conducted from April to June 2015.

Reliability assessment

Reliability was examined using Cronbach's alpha coefficient. Item-total correlation was also used to assess the correlations between individual items and the overall scale score.[15]

Ethical considerations

Permission to conduct this study was obtained from the Research Ethics Committee in the Kashan University of Medical Sciences (approval code: IR.KAUMS. REC.1394.73). The participants signed an informed consent before participation in the study and were assured about data confidentially.

Data analysis

Data analysis was performed by SPSS version 13 (SPSS INC., Chicago, IL, USA). Descriptive statistics was used to describe the demographics. EFA, KMO, and Bartlett testes were used. CVR of the individual items was calculated using Formula 1, in which "n" represents the number of experts who indicated the items were essential and "N" represents the total number of experts. CVI was also calculated using Formula 2.

$$CVR = \frac{n - \frac{N}{2}}{\frac{N}{2}} \qquad (1)$$

$$CVI = \frac{\text{Number of experts who selected the codes 3 and 4}}{\text{The total number of the experts}} \qquad (2)$$

RESULTS

Face and content validity

For face validity, one item was revised considering the experts' views to improve the readability and clarity. All the 50 items had a CVI over 0.9. The mean CVI of simplicity, relevance, and clarity of the items were 0.91, 0.95, and 0.92, respectively. The CVR of the total items was over 0.8 except 11 items that had a CVR <0.5 and were deleted.[12]

Construct validity

The construct validity of the Persian ASICS was evaluated through administering the 39-item instrument on 180 nursing students. Of the 180 questionnaires distributed, 150 questionnaires were returned. Sixteen questionnaires were answered incompletely. Finally, 134 questionnaires were analyzed. Totally, 68.7% of the students (n = 92) were male; 57.5% were Iranian, 86.6% were single, and 75.4% resided in a dorm. Among the students, 23.1% were in third semester while 24.6% in fourth semester, 20.9% in fifth semester, 17.9% in sixth semester, 8.2% in seventh semester, and 5.2% in eighth semester.

First, the KMO index (=0.815) and Bartlett's test of sphericity (χ^2 = 2826.692) showed the adequacy of samples size for EFA (P < 0.0001) and appropriateness of the correlation matrix.

The distribution of cumulative variance after varimax rotation showed that only 10 factors can predict 67.36% of the total variance of academic success score. The factor loading values for the items in the 10 factors (subscales) are presented in Table 1. Except one item which was deleted, the factor loading value was >0.35 for all items in all
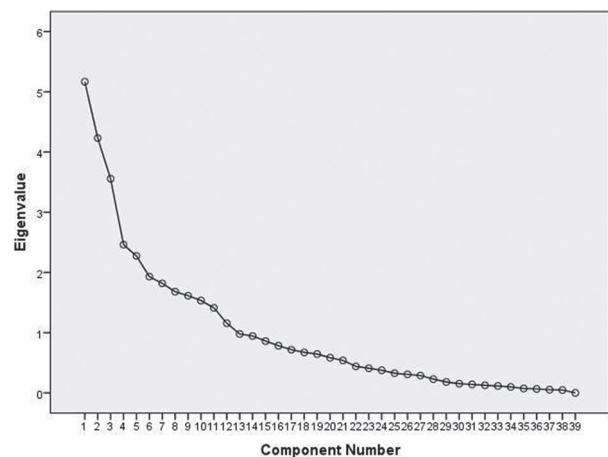

Figure 1: The scree plot of the Academic Success Inventory for College Students

Table 1: Correlation coefficient of the individual items with the total scale and factor loading values for items in the 10 factors with varimax rotation of the Academic Success Inventory for College Students

Items on factor	Mean±SD	Corrected item total correlation	Cronbach's alpha (if item deleted)	Variance of each factor	Eigenvalue
Factor (1): General academic skill (α=0.72)					
1. Studied a lot	0.89±2.86	0.55	0.62	9.65	5.16
6. Set homework goals	0.79±2.80	0.44	0.72		
Factor (2): Personal adjustment and concentration (α=0.75)	0.82±2.20	0.61	0.69		
24. Personal problems kept me from doing well	0.80±2.54	0.45	0.72	8.07	4.23
25. Personal difficulties affected my performance	0.80±2.54	0.45	0.72		
26. Easy to keep my mind from wandering	0.95±2.23	0.59	0.71		
27. I had a hard time concentrating	0.91±2.20	0.61	0.69		
Factor (3): Self-organized strategies (α=0.75)					
3. Used good study skills	0.79±2.85	0.65	0.67	7.26	3.55
4. Made good use of tools	0.77±2.78	0.59	0.69		
5. Used a goal setting strategy	0.86±2.68	0.62	0.68		
7. Was well organized	0.82±2.80	0.41	0.75		
Factor (4): Career decidedness (α=0.64)					
12. Certain about my occupation	0.85±2.86	0.38	0.56	7.18	2.46
13. Sure of what I want to do after I graduate	0.93±2.70	0.36	0.57		
14. My major is a good fit	0.92±2.75	0.4	0.54		
15. I need to do well to get a good job	0.83±3.07	0.49	0.50		
16. This class will be useful in my career	0.80±2.90	0.33	0.61		
Factor (5): Lack of anxiety (α =0.75)					
38. I was nervous for tests even when well prepared	0.98±2.67	0.70	0.60	6.85	2.27
39. Studying made me anxious	1.00±2.67	0.68	0.62		
Factor (6): Internal motivation (α=0.64)					
33. Got satisfaction from learning new things	0.90±2.88	0.52	0.65	6.18	1.93
34. Enjoyed the challenge of learning	0.99±2.70	0.53	0.62		
35. This class was interesting	0.86±2.49	0.44	0.71		
36. I enjoyed the lectures	0.90±2.61	0.48	0.68		
37. This class was boring	1.07±2.64	0.59	0.68		
Factor (7): Confidence (α=0.63)					
19. Instructor was ineffective	0.85±2.80	0.45	0.66	5.89	1.81
20. I understand the material	0.63±3.39	0.48	0.77		
21. Easy time concentrating	0.83±2.78	0.38	0.63		
22. If I work hard I can do well	0.73±3.38	0.49	0.48		
23. I am confident in my skills and abilities	0.82±3.11	0.47	0.49		
Factor (8): Efficacy of the instructor (α=0.62)					
8. Instructor motivated me	1.01±2.62	0.49	0.54	5.81	1.68
9. Disappointed in quality of the instructor	0.86±2.37	0.38	0.64		
10. What I learned I learned on my own	0.89±2.15	0.56	0.52		
11. Would have done better if instructor were better	0.89±2.86	0.59	0.51		
Factor (9): Socializing (α=0.53)					
28. I was distracted	0.88±2.53	0.48	0.58	5.68	1.61
29. Partied when should have been studying	0.89±2.41	0.44	0.62		
30. Grades suffered because of social life	0.81±2.20	0.49	0.57		
31. Too much time partying or hanging out with friends	0.93±2.23	0.52	0.51		
32. My diet affected by studying	0.85±3.05	0.41	0.64		
Factor (10): External motivation (α=0.51)					
17. In the future, I will use this material	0.81±2.50	0.52	0.49	5.36	1.53
18. This class will be useful in my career	0.78±2.73	0.54	0.51		
Cumulative variance (%)			67.36		
Total Cronbach's alpha			0.75		

SD: Standard deviation

subscales. The factor loading value ranged from 0.37 to 0.87 for 38 items that were remained the same in the final version of the Persian ASICS. The scree plot of the ASICS showed that only 10 factors had an eigenvalue >1 [Figure 1].

Factor 1 (general academic skills), containing two items and with the eigenvalue of 5.16, predicts 9.65% of the total variance of the academic success score. Factor 2 (personal adjustment and concentration), consisting of four items and with the eigenvalue of 4.23, predicts 8.07% of the total variance of the academic success score. Factor 3 (self-regulation strategies), containing four items and with the eigenvalue of 3.55, predicts 7.26% of the total variance of the academic success score. Factor 4 (career decidedness), consisting of five items and with the eigenvalue of 2.46, predicts 7.18% of the total variance of the academic success score. Factor 5 (lack of anxiety), containing two items and with the eigenvalue of 2.27, predicts 6.85% of the total variance of the academic success score. Factor 6 (internal motivation), consisting of five items and with the eigenvalue of 1.93, predicts 6.18% of the total variance of the academic success score. Factor 7 (self-confidence), consisting of five items and with the eigenvalue of 1.81, predicts 5.89% of the total variance of the academic success score. Factor 8 (perceived instructor efficacy), containing four items and with the eigenvalue of 1.68, predicts 5.81% of the total variance of the academic success score. Factor 9 (socializing), containing five items and with the eigenvalue of 1.61, predicts 5.68% of the total variance of the academic success score. Factor 10 (external motivation), containing two items and with the eigenvalue of 1.53, predicts 5.36% of the total variance of the academic success score.

RELIABILITY ASSESSMENT

Cronbach's alpha coefficient was 0.75 for the total scale and ranged from 0.51 to 0.75 for the subscales [Table 1].

Table 1 shows the correlation coefficient of the individual items with the total scale. Table 1 also presents the Cronbach's alpha if each item is deleted. As presented in Table 1, all items had a correlation coefficient >0.3 with the total scale. Moreover, item analysis revealed that the Corrected Item-Total Correlation (CITC) ranged from 0.33 to 0.7 for all items and the mean CITC of items was between 2.20 and 2.90 [Table 1].

DISCUSSION

This study was conducted to validate and assess the psychometric properties of the Persian version of the ASICS. The results showed that the Persian version of the ASICS possessed appropriate psychometric properties. Twelve items of the original instrument were omitted in the process of validation and EFA. However, the CVR was >0.80 for the remaining 38 items. According to the Lawshe's table[12] and the number of the experts, the minimum CVR in this study was 0.49.

In the current study, the overall CVI for the Persian version of the ASICS was greater than 0.90. This index was calculated using the Waltz and Bausell criteria, and the overall CVI showed an appropriate content validity.[11,16] Prevatt et al.[5] did not report the CVR of the original ASICS. In this study, the high level of content validity indices might be attributed to the validity of the tool and the precise process applied for confirming the face and content validity of the scale.

Using EFA, we identified 10 factors or subscales with eigenvalue >1 in the Persian ASICS. These 10 factors could explain 67% of the total variance of the academic success score. The highest proportion of variance could be explained by the first and second subscales ("general academic skills" and "personal adjustment and concentration"). The first and second subscales explained 9.65% and 8.07% of the total variance, respectively. Other factors could explain >5% of total variance, separately. Researchers expect to extract factors that each account for at least 5% of the variance or having the eigenvalue of 1 or greater.[11] The original ASICS also has 10 factors with slightly different labels that explained 64% of the total variance of the academic success score.[8] The 10 extracted factors confirm the Welles point of view that the academic success is a multidimensional concept[9] and cannot be measured by students' GPA.

In this study, the Cronbach's alpha coefficient was 0.75 for the total instrument and 0.51–0.75 for the subscales. The Cronbach's alpha of the original ASICS was 0.93 and ranged between 0.61 and 0.93 for the subscales.[8] Weinstein and Palmer also examined the internal consistency of the ASICS and the Cronbach's alpha ranged from 0.73 to 0.87 for the subscales.[17] According to LoBiondo and Haber, a reliability coefficient of 0.7 is appropriate. Therefore, it can be concluded that the Persian version of the ASICS has an acceptable reliability.[15] The difference in the reported reliability coefficients among the studies might be associated with the differences in characteristics of samples, the number of questions in final versions of instruments, and the scoring systems used in studies.[8] In this study, a random sample of students regardless of the status of their academic achievement completed the instrument. However, Prevatt et al. recruited a larger sample of students from different fields in a big university in the United States. They also selected

students with both groups of high and weak academic achievement.[5] However, in the present study, we used a random sample of nursing students in a nursing school. Although in reliability testing, researchers try to test the instrument; however, the characteristics of respondents can affect the reliability. A higher heterogeneity in a sample may result in a higher level of reliability.[18] Therefore, the higher reliability coefficient of the original version of the ASICS might be attributed to the higher level of heterogeneity in the sample.

In the current study, no item had a correlation <0.3 with the total ASICS score. LoBiondo and Haber argued that an item must be deleted if its deletion can add at least 0.3 to the overall alpha coefficient.[15] In the present study, deleting no item could increase the overall alpha coefficient of Persian version of the ASICS. Therefore, the 38 items were remained in the final version of the instrument.

CONCLUSION

The Persian version of the ASICS showed appropriate psychometric properties. It contains 10 subscales that assess important aspects of academic success. The Persian version of the ASICS also has appropriate validity and reliability and can be used to assess the academic success of Iranian college students. However, further studies with larger sample sizes and with a wide variety of participants' characteristics are suggested. In this study, we used a simple random sampling method to recruit the nursing students. In some cases, this method might not be successful in recruiting equal numbers of the subgroups, such as gender subgroups. Therefore, the number of males was higher than the females in our sample. A stratified random sampling method is suggested to be used in the future studies.

Conflicts of interest

There are no conflicts of interest.

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