



Psychometric Properties of the Academic Self Concept Scale among Indian CBSE School Students

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ABSTRACT

Introduction: Psychometrically sound instruments are required to reliably measure academy self concept for school students. For this study, we validate the academy self concept scale (ASCS) with students 16+ years. The objective of this study is to examine the factor structure, validity, and reliability of the 57-item academic self- concept scale in a Indian School Students.

Methods: The participants of the study are constituted by 581 students studying in CBSE Private School in 2021-2022 education year. All of the participants were subjected to the academic self- concept scale. Confirmatory factor analysis methods were used to examine the structural validity of academic self- concept scale. The reliability of academic self- concept scale was examined with, internal consistency.

Results: Confirmatory factor analysis in the sample confirmed an 8-factor model with indices of fitness that indicated a satisfactory model fit (goodness of fit index = 0.99; Tucker-Lewis index = 0.89; comparative fit index = 0.92; root mean square error of approximation = 0.1173; Standardized root mean square residual=0.0445). Our analyses support a eight-factor model of responses to the ASCS (Academic Ability, Academic Interest, Study, Examination, Academic Interactions, Academic efforts, Curriculum and Academic future) measuring a higher order latent construct. It was seen that the factor loads of the scale varied between 0.5952 and 0.8690. The internal consistency of the scale was 0.918.

Conclusion: The findings obtained in this study indicate that the academic self- concept scale has a eight-factor structure and this form can be used as a valid and reliable measuring means in evaluating academic self- concept in CBSE school students.

Key words: academic self- concept, validity, reliability

INTRODUCTION

Academic self- concept as an important psychological construct plays a significant role in academic success of student. Many empirical data and research studies indicate that positive academic self-concept is very important for performing well academically^{1,2}. It has been proposed by self- enhancement model that academic self- concept is a primary factor of academic performance indicating that academic performance is fostered by academic self- concept³. Several researches have revealed that academic self- concept

and academic performance have positive relationship between them^{4,5}. Academic achievement as an outcome of education shows the extent to which a student has been successful in his academic area. Many researchers have predicted and explained the influence of non - cognitive abilities such as motivation, academic self- concept, stress etc on academic achievement of student. It was found that a strong link existed between academic self- concept and academic achievement⁶. In the context of education, Academic self- concept has been considered as an im-

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portant psychological construct as it was found to be cause and effect of academic achievement⁷. Basically, academic self- concept has been evaluated by 2 approaches: interviews and self-reported measures. Both approaches have their advantages and disadvantages. Interview method for assessment is expensive in terms of the trained personnel needed to conduct such interviews and the additional amount of time will require especially within the nonclinical population. However, the self-reported measures of academic self- concept are beneficial in screening larger proportions of individuals, are less expensive, and can be completed within shorter time frames. There is various academic self concept scale previously published viz. Academic Self Concept Scale developed by Liu and Wang⁸, Kumar Anil⁹ Academic Self Concept Questionnaire developed by Tan and Yates¹⁰, Dr. R. K. Saraswata's Self Concept Scale and Self-Description Questionnaire developed by Marsh¹¹. A large number of tools on academic self concept have been developed in abroad. But the few scale developed scientifically to assess academic self concept in our country. In India the academic self concept scale developed by Kamble and Naik¹² is a self-reported measurement consisting of 8 subscales that evaluate academic self concept. Satisfactory psychometric characteristics of the scale have been reported among students studying in 10th and 12th class population. Thus, the application of academic self concept scale with satisfactory psychometric properties can be effective in the recognition of academic self concept. This is the first study undertaken among CBSE Indian students to examine the psychometric properties of an instrument that specifically assesses the academic self concept. The objectives of our study were (1) to examine the factor structure, validity, and reliability of the 57-item academic self- concept scale in an Indian School Students. (2) To study the academic self-concept of secondary school students.

METHOD

Sample population: First of all the authorities of different school were requested to give permission for collecting data from the students. After getting permission, written informed consent was taken from the parents and students. A total of 581 (320 women/261 men) school students of the Private CBSE school of Chhattisgarh were recruited for the study. Ages of participants were 17-19 and mean was 17.50 (SD=2.23). The adolescents who fulfilled the following criteria were included in the study:

Inclusion criteria: Students of class 11 and 12 who were able to communicate, read, write and comprehend in English and willing to participate in the study were included in the study.

Exclusion criteria: Students below 11th class and above 12th class were not included in the study. Students not present at the time of the study or not willing to participate in the study were also excluded.

Those with any chronic medical disorder or any current or previous history of a psychiatric disorder were also excluded.

We included a number of questions in the sociodemographic questionnaire formulated specifically for this study that will enable the identification of those to be excluded from the study. (1) Have you had or currently have a psychiatric disorder? (If yes, please state the diagnosis). (2) Do you currently having any medical problems? (If yes, please state the diagnosis). The respondents respond to each question by indicating a yes or no option.

The ethical approval for the study protocol was granted by the Departmental Ethics and Research Committee.

Tools

Academic self- concept scale: The academic self- concept scale (ASCS) developed by Kamble and Naik¹² was used to measure the Academic self- concept of secondary school students. ASCS scale comprises 57 items spread under 8 subscales or factors as academic ability, academic interests, study, examinations, Academic interaction, academic efforts, curriculum, academic future and academic future. The reliability of scale as estimated by Cronbach's alpha was found to be 0.93 which is acceptable in social science situation.

Data Analyses: Scale was administered at class hours and volunteered students were required to attend the study after necessary information was given. Administration was realized without time constraint and continued approximately 15-30 minutes. Statistical analyses were performed with the SPSS software, 16st version. We conducted Confirmatory factor analysis (CFA) using the maximum likelihood method to examine the factor structure in sample. CFA was performed with the JASP (Version 0.14.1). The satisfactory indices of fitness of the CFA model was evaluated with the help of the goodness of fit index (GFI), comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA) and Standardized root mean square residual (SRMR). The reliability of the academic self- concept scale subscales' items was determined by calculating the Cronbach α and split half. All statistical tests were 2-tailed and the level of significance was set at P value less than 0.05.

RESULTS

Sociodemographic characteristics and study measure scores of the students (n = 581). The mean age of the school students was 17.50 (2.23) years. Women constituted 55.1% of the total sample. Mean score achieved from scale was found 204 (SD=23.39) for the whole sample and score range was 115-265. When ASCS scores were evaluated regarding gender, mean score for men was found 201 (SD=24.15) and for women 207 (SD=22.34).

Table 1: Mean Score reported with regards to gender

	Female		Male		Total	
	Mean	SD	Mean	SD	Mean	SD
Academic Ability	31.53	4.63	31.20	4.99	31.38	4.79
Academic Interest	19.13	3.34	17.85	3.59	18.55	3.51
Study	40.97	5.50	39.02	6.18	40.09	5.89
Examination	24.84	3.60	24.28	3.97	24.59	3.78
Academic Interactions	31.66	4.64	31.36	4.33	31.53	4.50
Academic Efforts	20.52	2.28	19.80	2.60	20.20	2.45
Curriculum	18.18	3.03	17.33	3.08	17.80	3.08
Academic Future	20.92	2.46	20.16	3.11	20.58	2.79

Table 2: Parameter estimates (Factor loadings) for eight-factor ASCS among school going students

Indicator	Estimate	SE	z-value	p	95% CI		Std. Est. (all)	R ²
					Lower	Upper		
Academic Ability (AcA)	3.1627	0.1833	17.2536	<.001	2.8034	3.522	0.6605	0.4362
Academic Interest (AcIntr)	2.5481	0.1299	19.6103	<.001	2.2934	2.8027	0.7269	0.5284
Study (Std)	5.1155	0.2003	25.5406	<.001	4.7229	5.5081	0.869	0.7552
Examination (Exm)	2.9055	0.1365	21.2793	<.001	2.6379	3.1732	0.7703	0.5933
Academic Interactions (AcIntrc)	3.1249	0.1694	18.4479	<.001	2.7929	3.4569	0.6949	0.4829
Academic Efforts (AcE)	1.5361	0.0951	16.1549	<.001	1.3498	1.7225	0.6273	0.3936
Curriculum (Crr)	1.8311	0.121	15.1294	<.001	1.5939	2.0684	0.5952	0.3542
Academic Future (AcF)	1.8651	0.1065	17.5143	<.001	1.6564	2.0738	0.6681	0.4464

SE= Standard Error; CI= Confidence Interval;

Figure-1 Eight-factor ASC model among school going students

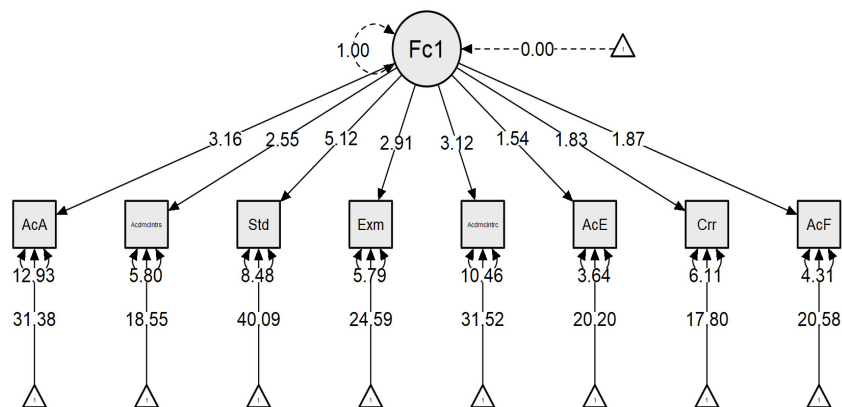


Table 3: Model fit indices of Confirmatory Factor Analysis

Fit indices	
Index	Value
Comparative Fit Index (CFI)	0.9265
Tucker-Lewis Index (TLI)	0.8971
Bentler-Bonett Non-normed Fit Index (NNFI)	0.8971
Bentler-Bonett Normed Fit Index (NFI)	0.9183
Parsimony Normed Fit Index (PNFI)	0.6560
Bollen's Relative Fit Index (RFI)	0.8857
Bollen's Incremental Fit Index (IFI)	0.9268
Relative Noncentrality Index (RNI)	0.9265
Other fit measures	
Metric	Value
Root mean square error of approximation (RMSEA)	0.1173
RMSEA 90% CI lower bound	0.1019
RMSEA 90% CI upper bound	0.1333
RMSEA p-value	1.9087e-12
Standardized root mean square residual (SRMR)	0.0445
Hoelter's critical N (α = .05)	102.4860
Hoelter's critical N (α = .01)	122.3752
Goodness of fit index (GFI)	0.9971
McDonald fit index (MFI)	0.8715
Expected cross validation index (ECVI)	0.3921

Table 4: Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
VAR00001	200.7694	530.454	.337	.917
VAR00002	200.8399	528.124	.462	.916
VAR00003	201.4871	530.499	.385	.916
VAR00004	201.4802	524.005	.427	.916
VAR00005	201.2547	538.897	.189	.918
VAR00006	201.3752	521.383	.560	.915
VAR00007	201.3649	525.242	.487	.916
VAR00008	201.1102	534.929	.303	.917
VAR00009	201.3391	530.649	.355	.917
VAR00010	201.2995	517.603	.574	.915
VAR00011	200.6730	519.162	.576	.915
VAR00012	200.8726	529.711	.342	.917
VAR00013	200.5198	528.760	.417	.916
VAR00014	201.6368	522.904	.447	.916
VAR00015	200.6213	529.108	.519	.916
VAR00016	201.2031	527.135	.422	.916
VAR00017	201.2754	528.369	.301	.917
VAR00018	201.0379	524.302	.524	.915
VAR00019	200.7487	520.347	.622	.914
VAR00020	201.2031	520.786	.551	.915
VAR00021	201.1962	531.675	.301	.917
VAR00022	201.4028	529.400	.416	.916
VAR00023	201.0775	528.641	.436	.916
VAR00024	201.1618	530.388	.311	.917
VAR00025	200.7986	516.189	.670	.914
VAR00026	201.1876	515.404	.592	.914
VAR00027	201.5645	542.329	.052	.920
VAR00028	201.4372	526.074	.471	.916
VAR00029	201.1308	523.741	.462	.916
VAR00030	200.8589	529.956	.402	.916
VAR00031	200.9931	533.462	.307	.917
VAR00032	201.2186	526.099	.386	.916
VAR00033	201.5370	529.990	.337	.917
VAR00034	200.6833	533.744	.295	.917
VAR00035	201.8881	529.344	.350	.917
VAR00036	201.1549	528.448	.383	.916
VAR00037	200.7900	531.797	.386	.916
VAR00038	201.7814	526.144	.362	.917
VAR00039	201.6678	529.019	.349	.917
VAR00040	201.2151	526.645	.472	.916
VAR00041	200.1549	534.717	.362	.917
VAR00042	200.6454	535.905	.265	.917
VAR00043	200.6231	528.466	.472	.916
VAR00044	201.1979	520.590	.560	.915
VAR00045	200.6730	540.448	.161	.918
VAR00046	200.2169	540.349	.238	.917
VAR00047	202.2186	530.995	.280	.917
VAR00048	201.2719	525.660	.479	.916
VAR00049	201.9088	528.949	.411	.916
VAR00050	202.3098	552.142	-.122	.921
VAR00051	202.0843	531.857	.245	.918
VAR00052	200.6730	526.824	.492	.916
VAR00053	200.9329	527.856	.412	.916
VAR00054	200.6093	531.963	.400	.916
VAR00055	200.4613	530.018	.424	.916
VAR00056	200.2238	533.284	.385	.916
VAR00057	200.7453	525.873	.466	.916
Cronbach's Alpha				.918

The mean scores on the academic ability, academic interests, study, examinations, Academic interaction, academic efforts, curriculum, academic future and academic future subscales were reported with regards to gender in table 1.

Structural Validity

Confirmatory Factor Analysis (CFA): Each of 57 items was assumed to load upon their respective factors. We assumed that each factor would significant-

ly contribute to measurement of a higher order ASC latent construct. CFA was performed by using Maximum Likelihood Estimation Method to determine whether eight factorial structures of the academic self- concept scale reported by Kamble and Naik¹² can be confirmed in a sample consisting of CBSE school students of Chhattisgarh.

There are many goodness-of-fit indices to evaluate suitability of model according to CFA results. Several goodness-of-fit index values are recommended to be utilized to perform suitability of the model due to strong and weak aspects of suitability indices in differentiating theoretical model and real data¹³. Values over 0.95 for Comparative Fit Index (CFI), Incremental Fit Index (IFI), Relative Fit Index (RFI), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI) indicate goodness-of-fit and values between 0.90 and 0.94 indicate acceptable fit. Standardized Root Mean Square Residual (SRMR) less than 0.05 indicate goodness-of-fit and values between 0.06 and 0.08 indicate acceptable fit¹⁴⁻¹⁷. Several types of research have suggested that all the indexes are supposed to be above 0.90 to be a good fit¹⁸⁻²¹ as cited in Kumar & Shrivastava²². Values for Root Mean Square Error of Approximation (RMSEA) should be accepted in the range of 0.05 to 1.00 the lower value is said to be a good level.

Model fit was excellent in the samples (see table -3) Figure 1 and table 2 shows the regression weights. All values depicted in Fig.1 and table-2 for the all school going students - academic ability, academic interests, study, examinations, Academic interaction, academic efforts, academic future and academic future subscales show the largest values (>.62). Curriculum, shows the lowest weight for the sample (.59).

It can be said that eight factorial structure of the scale is preserved in this sample of Indian school students according to these criteria. Standardized factor loads, z-value and R² values regarding CFA are presented in Table 2 and goodness-of-fit index values are presented in Table 3.

Reliability Study: The internal consistency of the scale was .91. These results indicate that scale has high level of reliability values. Examination of the Cronbach α values if an item is deleted showed that the removal of any of the items on the ASC scales will not significantly improve the overall Cronbach α values of each subscale (table-4).

DISCUSSION

This study aimed to evaluate the psychometric properties of ASCS developed by Kamble and Naik¹² among school going children. For this purpose, validity of ASCS was tested by descriptive and confirmatory factor analysis methods; reliability was tested by internal consistencies, and split half reliability methods. Confirmatory factor analysis was performed to determine confirmation of eight factorial

structure in a sample consisting of Indian school students. It was concluded that eight factorial structure is preserved by CFA. Our findings indicate that ASCS has similar psychometric properties with its original version. The results of this study support the factorial validity of the ASCS as a multidimensional measure of academy self concept among CBSE school students. The present study also replicates these findings and provides cross-cultural validation of the staging model proposed by the author. These findings provide evidence for the construct validity

The ASCS demonstrated high internal consistency (Cronbach's alpha = 0.91), for the whole scale. A Cronbach's alpha value of 0.9 for a scale is considered as a good indicator of internal consistency of the scale. Hence, it can be presumed that the Indian version of ASCS has good internal consistency and the items of the each factor assess similar characteristics. When the Cronbach's alpha values were compared with that reported for the original scale,¹² values for the ASCS in the study were slightly lower. Further research is necessary to determine if the relative contribution of factors that predict self concept are similar for those with school students, and other psychiatric conditions. Invariance analyses should be undertaken comparing the structure of the ASCS across populations.

Our study has some limitations. First of all, it was performed in a sample consisting of only school students. It will be appropriate to examine psychometric properties of the scale in samples who are other than school students. In this study, reliability of the scale was examined by inner consistency. Determining reliability of the scale can be suggested by test-retest method in future studies. Some item of the scale was low factor load and total item correlation. There was an agreement that this item could not be fully understood by participants.

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