

Evaluating Feasibility, Validity, Reliability and Norm Finding of the Beck's Self-Concept Questionnaire

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Background: Self-concept is a series of attributes, abilities, attitudes and values that individuals believe they are described by them. There is a direct association between positive self-concept and feeling self-validity, inventory, creativity, thought health and mental health of individuals. The differences between self-concept and self-esteem include qualitative feels and judgments of individuals when describe themselves. Self-concept is a psychological concept including emotions, evaluations, attitudes and self-description of individuals. Self-concept is externally defined through personal and behavioral characteristics; although, internally defined through emotion of individuals towards themselves and the world in relationship with others

Objectives: This study evaluated the feasibility, validity, reliability and norm finding of the Beck's self-concept questionnaire.

Materials and Methods: In total, 707 female students from public high schools of Tehran, Iran were selected by multistage cluster sampling. Participants completed the 25-question questionnaire.

Results: Based on the results, four questions were removed and validity coefficient of 21-question questionnaire was 0.786 using the general formula of Cronbach's alpha. For structural reliability, the method of principal components analysis was used.

Conclusions: The questionnaire contained six factors. These six factors together explained 50.9% of the total variables variance. For convergent reliability, the Pearson's correlation coefficient was used between the Beck' and Rogers' self-concept questionnaires. There was a positive and significant correlation between the two questionnaires; therefore, the questionnaire had a convergent reliability. Eventually, percentile and subject norm were calculated for the questionnaire.

Keywords: Self-Concept; Principal Component Analysis; Questionnaires

1. Background

Self-concept is a series of attributes, abilities, attitudes and values that individuals believe they are described by them (1, 2). There is a direct association between positive self-concept and feeling self-validity, inventory, creativity, thought health and mental health of individuals (1). Self-concept and self-esteem are sometimes considered synonyms in the literature, but there are structural and conceptual differences between the two words. Self-concept refers to attributes and attitudes by which individuals describe themselves and usually related to physical and behavioral characteristics and emotional qualities. In contrast, self-esteem refers to self-perceptions and evaluations of individuals in environmental experiences (3, 4).

The differences between self-concept and self-esteem include qualitative feels and judgments of individuals when describe themselves. Self-concept is a psychological concept including emotions, evaluations, attitudes and self-description of individuals. Self-concept is externally defined through personal and behavioral characteristics; although, internally defined through emotion

of individuals towards themselves and the world in relationship with others (5).

Self-concept is cognitive generalization resulted from self-experiences and its main core is relationship with important people in the life (6). Papika defined self-concept as complicated and cognitive structure of individuals' self-generalization including characteristics, abilities, knowledge, values, attitudes, roles and other issues by which individuals describe themselves and constantly order them; Bandora called it human performance (7). Other researchers reported that self-concept include attitudes, knowledge about ability, skill and social acceptability. Self-concept has three levels (4, 5, 8-10). The first level is individual self-concept referring to abilities and weaknesses of individuals. The second level is communicative self-concept in which individuals judge themselves based on relationships with others. Besides, the third level is collective self-concept referring to membership of individuals in a group (8).

Rosu et al. believed that self-confidence and charm are

effective in self-concept. If self-concept is positive, there is no psychological impairment, but if self-concept is negative, it endangers individuals' psychological health. Self-concept is considered as the main part of students' learning and development (11).

Generally, understanding self-concept of students is important. Such questionnaires help teachers to be aware of negative self-concept of students to prevent probable academic failure (2, 6, 12). The purpose of the present study was to evaluate the feasibility, validity, reliability and norm finding of the Beck's (13) self-concept questionnaire for female students of public high schools in Tehran, Iran. Evaluating technical characteristics of this tool is the first step for psychological health and improvement of students' performance. In summary, the objectives of this study were as follows:

- Understanding self-concept in students
- Help to improve self-concept in students
- Help to solve negative self-concept in students
- Help to enhance self-confidence of students
- Providing a valid and reliable tool for future researches.

2. Objectives

Because this tool (list) has been translated for the first time to Persian, it is necessary to evaluate its validity and reliability to answer the following questions;

- Is the Beck's self-concept questionnaire valid?
- Does the Beck's self-concept questionnaire have adequate structural reliability?
- Does the Beck's self-concept questionnaire have convergent reliability?

3. Materials and Methods

The study population of this study included all female students of public high schools in 19 regions of Tehran, Iran. As the subject of this study was to standardize self-concept questionnaire; therefore, the sample size should be large enough for factorial analysis. Therefore, according to common methods to standardize a questionnaire, a sample size of 707 students was selected through cluster multistage sampling. First, all regions of Education Department of Tehran were divided into four parts including North, Sought, West and East, then, from each part, one area (areas of 3, 8, 9, 11, 17) was randomly selected. Subsequently, a list of selected high schools was prepared and from each area, two high schools were randomly selected. Our sample unit was class not individual. Finally, 20 classes were selected for the study and all students answered the questionnaire.

The Beck's self-concept (BST), as a tool of self-evaluation was used in this study. The questionnaire was performed individually or in group. Its original language is English and includes 25 questions, in which individuals must compare themselves with others whom they know. This questionnaire is a 5-point test in which eight questions indicating increasing value and 17 questions indicating decreasing value. The scores can be changed for each

question from 1 to 5, and the total score is calculated by summing the obtained scores. Therefore, the total score is ranged from 25 to 125.

The other used tool in this study was the Rogers' self-concept questionnaire. This questionnaire includes two forms, A and B. In both forms, an identical set of 25 pairs of opposite behavioral attributes were provided. In answering the form A, individuals must describe themselves with respect to each attribute. After completing A, answering form B about each attribute, individuals must describe themselves based on their wishes and ideals. The score of individuals answer in selecting each attribute from pairs of opposite attributes, ranged from 1 to 7. In scoring the questionnaire, the difference rate of individuals' scores for each attribute in forms A and B was calculated.

To conduct the Beck's self-concept questionnaire, it was first translated by an assistant professor from English to Persian. After translation and edit of the questionnaire, a group of 707 students was selected. The questionnaires were distributed among students. Students were acknowledged for their cooperation in the study and required information was identically explained in all classes. The required time to answer the question was about 20 to 30 minutes. Students were asked to answer the questions honestly and not to write their name and family name.

Data analysis based on the objective of the study and using descriptive and inferential statistics methods was as follows:

1. To determine the group index, common descriptive statistical methods such as frequency distribution, indices of central tendency and measures of dispersion were used.
2. To determine the internal consistency and validity of the list, Cronbach's alpha coefficient was used.
3. To determine the reliability of the questionnaire, the method of principal components (pc) analysis was used.
4. To determine the convergent reliability, the Pearson correlation between the Beck's self-concept questionnaire and the Rogers's self-concept questionnaire was used.
5. For preparing several types of norm, at first the table of frequency distribution was prepared, after matching (fitting) it with a normal distribution and preparing the related distribution, percentage and standard scores were calculated and the scores indicating weak and strong self-concept were separated and the norm of questionnaire was found.

4. Results

As described before, the main objective of the present study was to evaluate validity, reliability, and norm finding of the Beck's self-concept questionnaire. To estimate the validity coefficient of the questionnaire, the general formula of Cronbach's alpha coefficient was used. The total validity coefficient for this 25-question questionnaire was 0.750. Regarding the correlation coefficient of each question with the total score of questionnaire and the results of factorial analysis of the questionnaire, of

all questions, four questions were removed and validity of 21-question questionnaire was re-estimated again. The results of the estimation of validity coefficient after removal of inappropriate questions was 0.786 indicating that the questionnaire had internal consistency and its results were reliable for factorial analysis. The most important aspect of any questionnaire is to assess its reliability. The study tool should be able to measure for what is prepared. In this study, the evidence for two types of reliability, structural and convergent were collected.

To determine the reliability of the questionnaire, factorial analysis method was applied. Factorial analysis is a term used for making reliable and developing psychometric tools, analyzing data to discover new structures and contributes to the formulation of theory of interviews content analysis, management styles, occupational interests, etc. For factorial analysis, it is necessary to consider the following assumptions:

1. Kaiser Meyer Olkin (KMO) should be at least 0.6 and preferably more. In this study, KMO was 0.850, which justified factorial analysis for this study.

2. To evaluate whether correlation matrix of data is not zero in the groups, the Bartlett test was used. The purpose of this test was to reject the zero assumption based on the accuracy of identity matrix that its diagonal elements are 1 and its all non-diagonal elements are 0 in the study population. In the present study, the statistical id of the Bartlett test was 2298.5887, which was significant (0.00), therefore there was a correlation between the populations.

3. To determine the nature of association between the variables, and also to find a definition and name factors, researchers considered coefficients more than 0.30, and sometimes more than 0.40 as significant and meaningful, and considered the coefficients lower than it as zero (random factor). In this study, factorial load with coefficients of 0.30 were selected as acceptable, therefore, if the factorial load of a question on all rotated factors was lower than 0.30, it would be excluded from the study. As described before, KMO was 0.850 and the significant level of the Bartlett test id was (0.00).

Factorial analysis of the questionnaire to determine included factors considered three main indices:

1. Special value
2. Proportion of variance shown by each factor
3. The graph of special value and scree graph

The initial statistical id obtained from principal components analysis (pc) showed that special values of six factors were more than one. Percentage of common variance between the variables for these six factors together showed 50.9% of the total variance of variables. Of all questions, six factors were obtained showing 50.9% of the variance. The first factor with special value of 4.310 showed 20.5% of the total variance of variables (Figure 1).

4.1. Gradient Graph of Scree

Gradient graph of Scree shows a plan of total variance, in which each variable is related to other variables. In this

graph, large factors are shown above and other factors with gradual gradient shown next together. The experience revealed that if K is the number of real subject, Scree test starts from K (n). From this graph, contribution of the first factor in total variance of variables is significant and differs from other factors, but the gradient of graph is removed from sixth factors and in fact, the apex of graph is started from sixth factor. As the cutting-point for factor rotation is where the gradient is altering; therefore, appropriate factors for rotation using this method are six factors.

Variance shown by the factors, indicated that before rotation, the first factor indicated 20.5%, the second 7.6%, the third 6.8%, etc. of variance. Other factors each had little contribution in showing the variance. The results of factorial analysis showed that of 21 questions of the questionnaire, six factors were obtained justifying 50.9% of the total variance of variables.

The subscription rate of 21-question questionnaire of motivated strategies for learning obtained from principal components analysis showed that the highest subscription rate was 0.723 belonging to question 5. Most of the questions had a subscription rate more than 0.45 indicating that the questionnaire is a single-factor questionnaire. Organized matrix is shown in Table 1.

As the simple structure of factors shown in Table 1, the questions commonly correlated with one factor and provided a short scale test, obtained and named as following steps:

The first factor was highly correlated with questions 4, 7, 13, 18 and 19.

The second factor was highly correlated with questions 6, 10, 14, 17 and 21.

The third factor was highly correlated with questions 1, 8, 11 and 15.

The fourth factor was highly correlated with questions 2, 9 and 20.

The fifth factor was highly correlated with questions 3 and 12.

The sixth factor was highly correlated with questions 5 and 16.

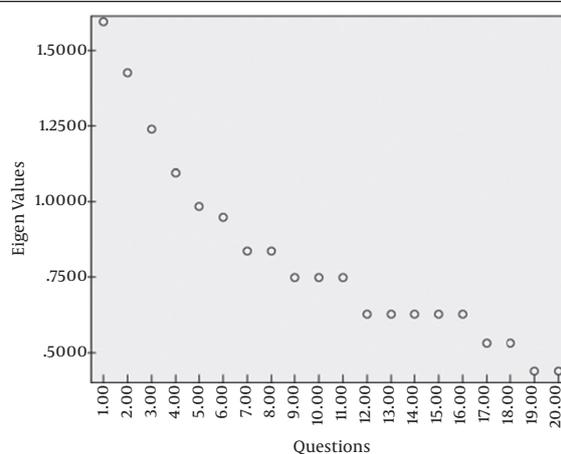


Figure 1. Graph of 21 Parameters of the Beck's Self-concept Questionnaire

Table 1. Organized Matrix of Rotate Factor in the Beck's Self-concept Questionnaire ^a

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Q19	0.7660					
Q4	0.4648					
Q7	0.722					
Q13	0.5710					
Q18	0.5601	0.3829				
Q21		0.7259				
Q6		0.721				
Q17	0.3298	0.5834				
Q10		0.3598	0.3703			
Q14		0.3530	3479			0.3302
Q1			0.6340			
Q8			0.5734			
Q15			0.4965			
Q11			-0.4584	0.3565		
Q2				0.7212		
Q20				0.6801		
Q9				0.4520		0.3229
Q3					0.7018	
Q12		0.3024			0.6046	
Q5					0.8466	
Q16			-0.3582		0.3554	0.3979

^a Abbreviation: Q, question.

To evaluate the convergent reliability, Pearson correlation coefficient was used between the Beck's self-concept questionnaire and the Rogers' self-concept questionnaire. The obtained Pearson correlation coefficient was 0.540, which was statistically significant ($\alpha = 0.001$). Therefore, the questionnaire had convergent reliability.

To determine the definition and interpretation of scores of each individual, it is necessary to express raw score in a scale that gives a general framework to compare scores. The purpose of this scale was to express relative position of individuals in an appropriate reference group. An ap-

propriate reference group is a group in which individuals can be compared.

In this study, raw scores converted to normalized scores as follows:

1) The frequency of raw scores converted to percent and cumulative percent.

2) Normal scores equal to each cumulative percent, were shown in "Z" normalized distribution table.

3) All "Z" normalized scores were converted to "T" score to remove negative signs.

In Figure 2, standardized scores (Z) and T scores (T) for the Beck's self-concept questionnaire are shown.

Score	F	CF1	CF2	Centile	Z Score	T Score	Score
79	.25	704.00	703.88	100.0	3.572	85.7	79
78	.50	703.75	703.50	99.9	3.191	81.9	78
77	.25	703.25	703.13	99.9	3.025	80.2	77
73	.25	703.00	702.88	99.8	2.949	79.5	73
72	1.00	702.75	702.25	99.8	2.809	78.1	72
71	1.75	701.75	700.88	99.6	2.617	76.2	71
70	1.75	700.00	699.13	99.3	2.462	74.6	70
69	2.25	698.25	697.13	99.0	2.336	73.4	69
68	4.00	696.00	694.00	98.6	2.192	71.9	68
67	6.75	692.00	688.63	97.8	2.018	70.2	67
66	8.50	685.25	681.00	96.7	1.843	68.4	66
65	7.25	676.75	673.13	95.6	1.708	67.1	65
64	8.50	669.50	665.25	94.5	1.598	66.0	64
63	13.75	661.00	654.13	92.9	1.470	64.7	63
62	17.25	647.25	638.63	90.7	1.324	63.2	62
61	18.00	630.00	621.00	88.2	1.186	61.9	61
60	17.00	612.00	603.50	85.7	1.068	60.7	60
59	19.00	595.00	585.50	83.2	.961	59.6	59
58	26.75	576.00	562.63	79.9	.839	58.4	58
57	35.75	549.25	531.38	75.5	.689	56.9	57
56	41.50	513.50	492.75	70.0	.524	55.2	56
55	39.00	472.00	452.50	64.3	.365	53.6	55
54	33.00	433.00	416.50	59.2	.231	52.3	54
53	29.50	400.00	385.25	54.7	.118	51.2	53
52	30.25	370.50	355.38	50.5	.012	50.1	52
51	33.25	340.25	323.63	46.0	-.101	49.0	51
50	33.00	307.00	290.50	41.3	-.220	47.8	50
49	30.25	274.00	258.88	36.8	-.337	46.6	49
48	27.00	243.75	230.25	32.7	-.448	45.5	48
47	26.25	216.75	203.63	28.9	-.555	44.4	47
46	26.25	190.50	177.38	25.2	-.668	43.3	46
45	23.25	164.25	152.63	21.7	-.783	42.2	45
44	18.50	141.00	131.75	18.7	-.888	41.1	44
43	16.75	122.50	114.13	16.2	-.986	40.1	43
42	18.50	105.75	96.50	13.7	-1.094	39.1	42
41	16.75	87.25	78.88	11.2	-1.216	37.8	41
40	12.50	70.50	64.25	9.1	-1.333	36.7	40
39	12.25	58.00	51.88	7.4	-1.449	35.5	39
38	11.25	45.75	40.13	5.7	-1.581	34.2	38
37	7.25	34.50	30.88	4.4	-1.708	32.9	37
36	5.00	27.25	24.75	3.5	-1.810	31.9	36
35	4.00	22.25	20.25	2.9	-1.900	31.0	35
34	3.50	18.25	16.50	2.3	-1.988	30.1	34
33	3.50	14.75	13.00	1.8	-2.087	29.1	33
32	2.75	11.25	9.88	1.4	-2.137	28.0	32
31	1.75	8.50	7.63	1.1	-2.237	27.0	31
30	1.25	6.75	6.13	.9	-2.379	26.2	30
29	1.00	5.50	5.00	.7	-2.452	25.5	29
28	1.25	4.50	3.88	.6	-2.543	24.6	28
27	1.25	3.25	2.63	.4	-2.676	23.2	27
26	.75	2.00	1.63	.2	-2.833	21.7	26
25	.25	1.25	1.13	.2	-2.949	20.5	25
22	.25	1.00	.88	.1	-3.025	19.8	22
21	.50	.75	.50	.0	-3.191	18.1	21

Figure 2. Norm's Table of the Beck's Self-concept Questionnaire

5. Discussion

The purpose of this study was to evaluate the feasibility, validity, reliability and norm finding of the Beck's Self-Concept Questionnaire in female students of public high schools in Tehran, Iran. After conducting the questionnaire on 707 students, inappropriate questions were removed and finally the Beck's self-concept questionnaire was analyzed.

In the next stage, to assess the questionnaire validity, four questions were removed and the validity of 21-question questionnaire was estimated. The validity

coefficient after removal of inappropriate questions was 0.786, indicating that the questionnaire had a good internal consistency.

To evaluate the structural reliability of the questionnaire, principal components (pc) analysis was used. Using factorial analysis, six factors were obtained showing 50.9% of the total variance, and the first factor with 4.3 special value showed 20.5% of common variance between the questions. Before conducting factorial analysis, adequacy of sampling was performed. Also using the Bartlett test and KMO, and rejection of zero supposition based on the accuracy of identity matrix in the population, it was showed that factorial analysis is logical.

Factorial matrix showed that the first factor had the highest factorial load and its contribution was more than other factors. Factorial analysis showed that this questionnaire including six factors had an adequate reliability. Questions 10, 14 and 16 were complicated due to several factors; therefore, it is better to evaluate these questions in future researches.

To evaluate the convergent reliability of the questionnaire, the Pearson correlation coefficient was used between the Beck's self-concept questionnaire and the Rogers' self-concept questionnaire, and the results showed a positive and significant correlation between the two questionnaires. Therefore, the questionnaire had a convergent reliability.

To find the norm of definitive prospective questionnaire, for all short scale tests, raw scores converted to normalized scores. For this, the frequency of raw scores converted to percent and cumulative percent. Then, normal scores equal to each cumulative percent were shown in "Z" normalized distribution table. Finally, all "Z" normalized scores were converted to "T" score to remove negative signs.

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