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Deal With the Item 8 of Rosenberg Self Esteem Scale (1965) and Revalidate the Factor Structure: Based on Measuring Groups of Middle School Students

LIANG Bin[a],*; ZHANG Jiajiang[a]

[a]Institute of Teacher Educational Tesearch, Sichuan normal university, Chengdu, China.
*Corresponding author.

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Abstract

Using Rosenberg Self Esteem Scale (1965), we have measured 1889 students in schools. Through correlation analysis, item analysis, exploratory factor analysis and confirmatory factor analysis, we study two different ways in dealing with the item 8 of Rosenberg Self Esteem Scale (Rosenberg, 1965), namely the score is counted according to the positive item method and deleting the item 8, explore factor models of the scale and verify the goodness of fit of different models. Our results show: (a) the item 8 should be reserved. It should adopt that the score is counted according to the positive item method. The score correlating with the total score is 0.33 ($P < 0.01$); (b) if the factor analysis uses two factors，the two factor correlation model has better goodness of fit (χ^2/df=6.12, CFI=0.95, TLI=0.93, RMSEA=0.06), namely the two factor model can be used in the scale.

Key words: Self-esteem; Factor analysis; Rosenberg Self Esteem Scale

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INTRODUCTION

As an important affective component of self-system, self-esteem is a general evaluation for self, an emotional feeling for self-worth and self-competence and a core factor which affects the individual's social adaptation (Yang & Zhang, 2003). Self-esteem is the center aspect of an individual experience and his life quality. Early studies mainly measured an individual's general evaluation for his self-esteem and commonly used questionnaires: Rosenberg Self Esteem Scale (RSES), Self-Liking and Competence Scale (SLCS), Self Esteem Index (SEI), Feeling of Inadequacy Scale (FIS), Collective Self Esteem Scale (CSES), Personal Evaluation Inventory (PEI), etc. (Huang & Yang, 1998; Sun, 2007). Among them, RSES was a typical measurement tool. Rosenberg believed that this kind of general evaluation for an individual is one dimension. This idea has been verified in many studies (Rosenberg M & Rosenberg Fr, 1978). The Chinese version of Rosenberg Self Esteem Scale has been introduced and translated by Ji Yifu and Yu Xin (Wang, Wang, & Ma, 1999) and is widely used in China. However, the scale has a cultural adaptation problem, namely the Chinese expression of the item 8 of the scale is positive, and the score is counted according to the negative item method. So many scholars working in related studies have proposed three methods: delete item 8 (Wang, Gao, Xu, Huang, & Wang, 1998; Tian, 2006; Wang, Dai, & Wu, 2008), count the score according to the positive item method (Han, Jiang, Tang, & Wang, 2005) or change the Chinese expression. Based on other people's previous research, Shen and Cai (2008) verified a changed Chinese expression and found that a negative Chinese expression was more appropriate than the positive expression and an euphemistic expression. At present, it is inconclusive that the method is better.

Currently, most discussion and verification about factors in the Rosenberg Self Esteem Scale are based on the measurements among college students, but rarely using the scale to measure middle school students. If the scale is a good one, the measured objects should not be limited to a certain group of people. It should be used for the wider population. The scale should have higher

reliability and validity in different groups of people and its structure should be stable. So this study chose school students as measured objects and we hope to explore different suitable groups who can be measured for the scale. In order to follow the original translators' version, our study is based on the scale translated by Ji Yifu and Yu Xin. We have studied two approaches (changing scoring ways and delete the item 8) which were used by other researchers in their previous research, and analyzed the factor structure of the scale.

1. OBJECTS AND METHODS

1.1 Objects

We selected students from a junior high school and a high school in a county of Guangxi province as measured objects and conducted sample surveys in randomly selected classes. Sent out 2,000 questionnaires and got back 1,983 effective and filled questionnaires. The effective rate was 99%. The specific object distribution is described in Table 1.

Table 1
The Object Distribution

Grades	Gender		Total
	Boys	Girls	
7th	141	210	351
8th	153	246	399
9th	36	45	81
10th	264	293	557
11th	254	341	595
Total	848	1135	1983

1.2 The Measurement Tool

We used Rosenberg Self Esteem Scale (RSES) to measure students' self-esteem. The scale consists of 10 items. It is a measurement tool for an individual reporting on his overall personal self-esteem. It includes 5 positive expression items and 5 negative expression items. The item 8 is "I wish I could have more respect for myself. " This item uses 4 point scoring method (1= strongly agree, 2= agree, 3= disagree, 4= strongly disagree).

1.3 Data Analysis

Using SPSS18.0 software, we do the correlation analysis, T test and exploratory factor analysis; using AMOS17.0 for confirmatory factor analysis. We randomly select 30% (572 questionnaires) to do factor analysis and use the remaining 70% (1,317 questionnaires) to do confirmatory factor analysis.

2. RESULTS

2.1 Item Analysis of the Scale

First, we do correlation analysis between item scores and the total score. It shows that the item 8 negatively correlates with 9 other items and the total score when the score of item 8 is counted according to the negative item standard; if the score is counted according to the positive item method, item 8 positively correlates with 9 other items. The correlation of item 8 with 9 other items and the total score is shown in Table 2.

Table 2
The Correlation of Item 8 With 9 Other Items and the Total Score

Item	1	2	3	4	5	6	7	8	9	10	Total score1/2
1	1										
2	0.47**	1									
3	0.34**	0.30**	1								
4	0.39**	0.37**	0.44**	1							
5	0.23**	0.26**	0.32*	0.17**	1						
6	0.36**	0.33**	0.26**	0.34**	0.21**	1					
7	0.36**	0.42**	0.38**	0.34**	0.30**	0.38**	1				
8	-0.25**	-0.17**	-0.07	-0.17**	-0.01	-0.27**	-0.15**	1			
9	0.25**	0.24**	0.54**	0.32**	0.28**	0.31**	0.30**	-0.04	1		
10	0.32**	0.27**	0.51**	0.32**	0.26**	0.32**	0.35**	-0.08*	0.63**	1	
Total score1	0.61**	0.62**	0.72**	0.61**	0.54**	0.32**	0.66**	-0.07	0.69**	0.70**	1
Total score2	0.65**	0.63**	0.70**	0.62**	0.51**	0.32**	0.66**	0.33**	0.66**	0.68**	1

Note. Total score 1 refers to the score is counted according to the negative item method in item 8; total score 2 refers to the score is counted according to the positive item method in item 8; * $P < 0.05$, * *$P < 0.01$, * * * $P < 0.005$, * * * * $P < 0.001$, the same below.

The item discrimination, internal consistency and the split half reliability of the scale can reflect the suitability and reliability of items of the scale in a certain extent. We use the critical ratio value (CR value) to analyze the item discrimination. T tests show that there are statistic differences among all the groups ($P < 0.001$, $t > 3$). The results from analyzing the item 8 are shown in the table 3. In the item 8, if the score is counted according to the positive item method instead of the negative item method, or deleting the item 8, the reliability of the scale improves step by step.

Different scholars have different opinions (Han, et al., 2005; Tian, 2006) about deleting item 8. In order to maintain the integrity and also consider the original work,

this study has retained items 8. At the same time, we have performed the exploratory factor analysis as a contrast for further exploring the factor structure of the scale.

Table 3
Doing the Reliability Analysis by Using Different Methods in the Measurements

Item 8	Discrimination		Internal consistency split	Half reliability
	t(*df*)	*p*		
Scoring in negative item method	2.998(318)	0.003	0.780	0.772
Scoring in positive item method	-7.438(294)	0.000	0.813	0.799
Deleting item 8	——	——	0.821	0.802

2.2 Exploratory Factor Analysis About the Scale

Doing the Kaiser-Meyer-Olkin (KMO) Measure and Bartlett's Test of Sphericity, our results show that the value of KMO is 0.852, chi square value of Bartlett's test is 1497.353, degrees of freedom is 45, and $p < 0.001$ reaching the significant level.

Exploratory factor analysis has been conducted on 10 items of Rosenberg Self Esteem Scale. We use the method of principal component analysis and the method of Varimax for the orthogonal rotation. Two eigenvalues are greater than 1. The verification of scree plot shows that use 2 factors. These two factors explain 50.76% of the variance. According to the research of Li (2004), Yang, &Wang (2007) et al., these two factors are named "self-affirmation" and "self-denial". Self-affirmation factor (38%) contains 4 items and self-denial (12.76%) contains 6 items. In two factors of self-affirmation and self-denial, both item 4 and item 7 have higher loadings (> 0.40). After the score is counted according to the negative item method, the factor loading of item 8 becomes negative. The results are in the Table 4.

Table 4
Factor Loading of Each Item of Rosenberg Self Esteem Scale

Self- denial		Self-affirmation	
Item	Loading	Item	Loading
9	0.82	1	0.69
10	0.77	8	-0.67(0.67)
3	0.76	2	0.65
5	0.50	6	0.62
7	0.41	7	0.53
4	0.40	4	0.52

Note. The data in bracket is the result for the score is counted according to the positive item method in item 8.

If we delete the item 8, results show that the value of KMO is 0.853, Chi-Square of Bartlett's Test of Sphericity has the value 1430.310, degrees of freedom is 36, and $P < 0.001$ reaching the significant level. If the factor analysis is conducted in the same way, two eigenvalues are greater than 1. The verification of scree plot shows that use 2 factors. These two factors explain 54.05% of the variance. "Self-affirmation" factor (12.51%) contains 4 items; "self-denial" factor (41.54%) contains 5 items. The factor loading of each item is shown in Table 5.

Table 5
Factor Loading of Each Item of Rosenberg Self Esteem Scale

Self- denial		Self-affirmation	
Item	Loading	Item	Loading
9	0.86	2	0.78
10	0.80	1	0.74
3	0.74	7	0.64
5	0.39	6	0.60
		4	0.58

Based on the above results, although the Rosenberg Self Esteem Scale is often used as a single dimension scale, some scholars (Li, 2004; Yang & Wang, 2007) found that the scale was indeed composed of two dimensions (although the researchers gave different names for the dimensions). This study is consistent with the result. Therefore, the structure is also admissible.

Therefore, whether in theory or from the data, the item 8 is not suitable for scoring according to the negative item method; if the score is counted according to the positive item method, the discrimination of each item of Rosenberg Self Esteem Scale is good and the reliability improves; if deleting the item, then the reliability of the scale will be further improved, at the same time, the two factor loadings of original item 4 and item 7 change to one factor loading only (Table 5).

2.3 Confirmatory Factor Analysis

Among numerous fitting indices, χ^2/df, CFI, TLI, RMSEA are the most commonly used fitting indices. Using Amos17.0 for the confirmatory factor analysis, according to Yang, and Wang (2007) studies, we set a factor model, two independent factor model and two correlated factor model and test the goodness of fit of the model and data.

A factor model is put all 10 items as a latent variable index. A factor model 1 refers to retaining item 8 and a factor model 2 refers to deleting item 8. The two independent factor models is based on table 5 and 4.It put 5 items of self-affirmation dimension as an index of a latent variable, and 4 items of self-denial dimension as an index of a latent variable, setting these two latent variables to be independent. The two independent factor model 1 contains item 8 in the self-affirmation factor. The two independent factor model 2 refers to deleting item 8. The two correlated factor model is based on the two independent factor model and set two latent variables to be correlate. Similarly, the two correlated factor model 1 contains the item 8 in the self-affirmation factor. The two correlated factor model 2 refers to deleting item 8. See the data of goodness of fit in Table 6.

The two correlated factor model and the two independent factor model are mutually nested models. The two correlated factor model is less a degree of freedom, and the Chi square value reduces 328.51 (or 341).

The chi square test reaches at a 0.001 level of significance. It shows that the data of the two correlated factor model is fitter than the data of the two independent factor models. Data supports the two correlated factor model. Although the two correlated factor model and a factor model are not mutually nested models, we can still use the chi square test to roughly compare the goodness of fit of models (Hou, Wen, & Cheng, 2004). It shows that the data of the two correlated factor model is fitter than the data of a factor model. It also supports the acceptance of the two correlated factor model. At the same time, among the three models, the root mean square error of approximation (RMSEA) of the two correlated factor model is less than 0.08 which reaches the standard. It also shows that the two correlated factor model has better data. However, in the two correlated factor model, whether retaining and deleting item 8, the goodness of fit of these two models are same.

Table 6
The Data of Goodness of Fit of the Three Models

Model TLI RMSEA	χ^2	*df*	χ^2/df	CFI	TLI	RMSEA
A factor model 1	683.98	35	19.54	0.80	0.74	0.12
A factor model 2	598.32	27	22.16	0.82	0.76	0.13
The two independent factor model 1	536.59	35	15.33	0.84	0.80	0.10
The two independent factor model 2	503.68	27	18.66	0.85	0.80	0.12
The two correlated factor model 1	208.08	34	6.12	0.95	0.93	0.06
The two correlated factor model 2	162.68	26	6.26	0.96	0.94	0.06

3. DISCUSSION

Currently, Rosenberg Self-Esteem Scale has the highest use rate and also is the most widely used self-esteem scale in China. It has higher reliability and validity, and the items are less. The less items can effectively reduce the resisting mood of measured objects. However, because of cultural differences, different scholars have different translation about the item 8 when they use the scale, so the use of the scale is limited in China.

In the collection of data, our study is based on the scale translated by Ji and Yu. We have studied two approaches (changing scoring method and deleting the item 8). The study finds that the score of item 8 is negatively correlated with the rest items of the scale and the total score, and the score has no significant correlation with the total score if the score is counted according to the negative item method. This may affect the internal structure of the scale. The exploratory factor analysis also shows that the item 8 should not be scoring according to the negative item standard. This result is not inconsistent with reports from Shen (2008), and Lin et al. (2010), and the reason may be that this research measured middle school students, but the latter measured a less number of college students. The original scale has been used in English speaking countries and the item 8 is the negative way of thinking. Therefore, after it was translated into Chinese, if in accordance with the negative way of thinking and following the structure of the scale, there may be conducive to the scale itself stable of inner structure. But due to different ways of thinking of the two kinds of culture, the negative expression may affect the reliability and validity of the scale. In light of this situation, this problem needs to be studied and verified further.

The results of exploratory factor analysis are in favor of the extraction of two factors based on both the verification of scree plot and eigenvalue standard. After the Varimax orthogonal rotation, the factor loading of each item is greater than 0.40 which shows that these items can well represent their respective factors. After we delete the item 8, although also extract two factors, the factor loadings of some items are less than 0.40. Based on the above finding, this study recommends that do not delete the item 8. Through the confirmatory factor analysis, we compare the goodness of fit indices of three different models after delete the item 8. The results show that these indices of three kinds of models do not significantly improve after delete item 8. Therefore, the results show that the method of deleting item 8 is not very good. At the same time, the scale is widely used in the world, the total score will be affected if delete item 8. It may also affect academic exchange based on the scale research (Shen, 2008).

The exploratory factor analysis of Wang (2008) et al found that they could extract 2 factors from the 10 items of the scale with eigenvalues greater than 1, but the factor structure was chaos. Except the item 8 only loaded onto the second factor, other items not only loaded onto the second factor but also had higher loadings onto the first factor; after deleting item 8, the exploratory factor analysis could only extract a factor. But our study find that can extract 2 factors whether delete item 8 or not. At the same time, because the item 8 is scoring according to the positive item method , the item 8 can be included in the dimension of self-affirmation so the numbers of items in two factors are not the same. The result is differing from the research report of Yang and Wang (2007). In addition, we find that indices of goodness of fit of three models show that the two correlated factor model has the best data of goodness of fit and only data of goodness of fit of the two correlated factor model can be accepted. This result is consistent with the result of Lin (2010) and Yang (2007), et al.. Therefore, distinguishing self-affirmation dimension and self-denial dimension can better reflect self-esteem level of an individual. This also confirms the result of the exploratory factor analysis.

To sum up, the results of this study indicate that we should not delete the item 8, and we should adopt the

scoring way which is according to the positive item method. At the same time, the results of this study also support to use the two factor model in the use of the Rosenberg Self Esteem Scale and the item 8 should be in the self-affirmation dimension.

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