



Validity and Composite Reliability of the Rosenberg Self-Esteem Scale among U.K. University Students

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Abstract: The purpose of this study was to examine the factor structure and composite reliability of the Rosenberg Self-Esteem Scale (RSES) in sample of 761 U.K. university students. Two competing models of the factor structure of the RSES were evaluated using confirmatory factor analysis (CFA). Fit indices indicated the two-factor solution (i.e., positive and negative self-esteem) was a better fit for the data than the one-factor model. This indicates the existence of two correlated, but distinct components of self-esteem in U.K. university students. Methodological and theoretical implications that arise for these findings are discussed.

Key words: Self-esteem; confirmatory factor analysis; validity and reliability

Introduction

Global self-esteem (GSE), the evaluative component of an individual's self-concept, has received considerable attention in the psychological literature, and has been useful in advancing our understanding of a wide range of phenomena (e.g. Dutton & Brown, 1997; Hawkins, Catalano, & Miller, 1992).

The Rosenberg Self-esteem Scale (RSES; Rosenberg, 1989) is the most widely used self-report measure of self-esteem and was designed to measure self-esteem as a one-dimensional construct. The factor structure of this scale, however, has been the subject of considerable debate (Corwyn, 2000; Owens, 1994). While numerous studies support this one-dimensional model (e.g., Shevlin, Bunting, and Lewis, 1995), other research has found evidence of a range of multi-factorial solutions (see Huang & Dong, 2012 for a review). A considerable number of researchers contend that the RSES is more appropriately conceptualized as a two-factor solution, comprised of positive and negative aspects of self-esteem (Bachman & O'Malley, 1986; Carmines & Zeller, 1979; Dobson, Goudy, Keith, & Powers, 1979; Kaufmann, Rasinski, Lee, & West, 1991; Ownes, 1993).

In an attempt to reconcile these conflicting findings, Marsh (1996) evaluated six alternative one- and two- factor structural models, including a series of correlated uniqueness models. Results indicated that the RSES could be accurately represented by a single common factor and a method factor associated with the negatively worded items. However, Marsh analyzed a 7-item scale, with

four positively and three negatively worded items, instead of the full 10-item scale. Subsequently, Tomas and Oliver (1999) investigated nine models, six of which took into account method effects, using CFA techniques. The results of their analysis were in line with those of Marsh (1996), indicating the existence of a single common factor and a method factor mainly comprised of the negatively worded items. Dunbar, Ford, Hunt, and Der (2000) reported a one-factor model with correlated standard errors for the negatively worded items was a more parsimonious fit to the data than the two-factor model, although the single-factor model with correlated positive standard errors produced the best fit of all. The results of this study can, however, be criticised due to the researchers' use of correlating measurement errors. It has been argued (Brown, 2006) that *post-hoc* modifications, such the correlation of measurement errors, should never be used simply to improve model fit. This is because such a-theoretical procedures imply the presence of an additional unspecified latent construct. Moreover, correlation among item errors can lead to difficulties in the understanding and interpretation of models, and decrease the likelihood of replication.

Following Brown's (2006) recommendations, Boduszek, Shevlin, Mallett, Hyland, & O'Kane (2012) compared a one- and two- factor solutions of the RSES among sample of 312 recidivistic, male Polish prisoners, without the use of correlated error variance. The results indicated that the two-factor model, representing the positive and negative components of self-esteem, was an adequate fit of the data, and provided a better fit for the data than the one-factor conceptualization. Additionally, composite reliability of the two-factors was very good for both the positive ($\rho_c = .96$) and negative ($\rho_c = .98$) self-esteem sub-scales.

Despite the frequency with which self-esteem is measured among university students, the factor structure of the RSES among this population has received little attention (Huang & dong, 2012). Moreover, few studies have examined the factor structure of this scale, without the use of correlated error variances (Boduszek et al., 2012). Given the inconsistent findings concerning the most appropriate factor structure of the RSES, and the paucity of such research among U.K. university students (Huang & Dong, 2012), the present study aims to replicate and extend Boduszek et al's. (2012) study by investigating the dimensionality and composite reliability of the RSES among a large sample of male and female university students from the U.K.

Methods

Participants

Data were collected from 761 students currently registered on courses at a large Russell Group university in the U.K. The sample consisted of 337 females (80.4%) and 77 males (18.4%). Five participants did not specify their sex. The majority of participants reported their ethnicity as White (83.6%) and the largest proportion of participants were between 18 and 21 years old (61.5%, $n = 468$). Participants were compensated for their time by being entered into a prize draw to win a £30, £20 or £10 gift card from the retailer of their choice. All study measures and procedures were approved by the University of Sheffield's Research Ethics Committee. Participants were informed that they could withdraw from the study at any time, and that all data provided would remain confidential.

Measure

The Rosenberg Self-esteem Scale (Rosenberg, 1989) consists of ten items scaled on a four-point response format (1 = *strongly disagree* to 4 = *strongly agree*). Five items are positively worded (e.g., “On the whole, I am satisfied with myself”) and five negatively worded (e.g., “I feel I do not have much to be proud of”), in an attempt to inhibit response biases, such as acquiescence. Scores can range from 10 to 40, where higher values represent more positive evaluations of the self (Rosenberg 1965).

Results

Two alternative CFA models of self-esteem

Two competing CFA models of the RSES were specified and tested. The models were a one-factor model consisting of all the RSES items, and a two-factor model consisting of positive and negative self-esteem items. Items were allowed to load onto only a single factor and error variances were not correlated, as suggested by previous research (see Boduszek, et al., 2012). The absolute and comparative fit indices for each model are shown in Table 1. As seen in Table 1, all indices increased in the two-factor model compared with the one-factor model. A chi-squared test indicated that the one-factor model differed significantly from the two-factor model ($\Delta\chi^2 = 239.70, \Delta df = 1, p < .001$). Additionally, the CFI = .93; TLI = .91; RMSEA = .08; and SRMR = .04 indicate adequate model fit. The AIC also indicates that the two-factor model is a better fit to the data than the one-factor model. The standardized and unstandardized factor loadings for each item on their respective subscales are shown in Table 2. All of the item loadings were between .67 and .83 on the positive self-esteem factor and between .63 and .76 on negative self-esteem factor.

Table 1. *Fit indices for the alternative CFA models of Rosenberg self-esteem scale.*

Item	1 Factor Model	2 Factor Model
χ^2	387.49	239.70
<i>df</i>	35	34
<i>p</i>	.00	.00
RMSEA	.12	.08
90% CI	.11 .13	.08 .10
SRMR	.06	.04
AIC	13967.08	13781.12
CFI	.88	.93
TLI	.85	.91

Note. RMSEA = Root-Mean-Square Error of Approximation; CI = Confidence Interval; SRMR = Standardized Root Mean Square Residual; AIC = Akaike Information Criterion; CFI = Comparative Fit Index; TLI = Tucker Lewis Index.

Table 2. *Unstandardized and standardized factor loadings (and standard errors) for two-factor model of self-esteem.*

Item	B	β	SE
SELF-ESTEEM			
Factor 1 (Positive Self-Esteem)			
1. On the whole, I am satisfied with myself.	1.00	.83	.02
3. I feel that I have a number of good qualities.	.62	.70	.02
4. I am able to do things as well as most other people.	.70	.67	.03
7. I feel that I'm a person of worth, at least on an equal plane with others.	.90	.76	.03
10. I take a positive attitude toward myself.	1.04	.82	.02
Factor 2 (Negative Self-Esteem)			
2. At times, I think I am no good at all.	1.00	.75	.03
5. I feel I do not have much to be proud of.	.81	.70	.03
6. I certainly feel useless at times.	.97	.73	.02
8. I wish I could have more respect for myself.	.84	.63	.03
9. All in all, I am inclined to feel that I am a failure.	1.04	.76	.03

Note. All Factor loadings are statistically significant ($p < .001$).

Composite reliability

In contrast to previous studies examining the RSES, which have typically assessed the internal consistency of items (Cronbach's α), the present study evaluated the internal reliability of the scale using composite reliabilities. Composite reliability was calculated using the formula:

$$\rho_c = \frac{\left(\sum_{i=1}^m \lambda_i\right)^2}{\left(\sum_{i=1}^m \lambda_i\right)^2 + \left(\sum_{i=1}^m (\theta_i)\right)}$$

where ρ_c = reliability of the factor score, λ_i = standardized factor loading, and θ_i = standard error variance. Values greater than .60 are generally considered acceptable (Bagozzi & Yi, 1988; Diamantopoulos & Siguaw, 2000). Results indicate that both factors are measured with very good reliability (*positive self-esteem*, $\rho_c = .99$; *negative self-esteem*, $\rho_c = .99$).

Discussion

The aim of the present study was to examine the factor structure and composite reliability of the Rosenberg Self-Esteem Scale (RSES) using data derived from a large sample of U.K. university students. To do this, two competing models of the factor structure of the RSES were specified and tested, using confirmatory factor analysis. In contrast to earlier studies examining the factor structure of the RSES (e.g. Dunbar, Ford, Hunt & Der, 2000; Greenberger, Chen, Dmitrieva, & Farruggia, 2003; Marsh, 1996; Tomas & Oliver, 1999), items in the present study were allowed to load onto only a single latent factor, and measurement errors were not correlated. This is consistent with the recommendations of Brown (2006), and earlier research by Boduszek et al. (2012).

Fit indices indicated that the two-factor model consisting of two latent variables (positive and negative self-esteem) was a better fit to the data than the one-factor model. This finding supports research by Boduszek et al. (2012), which found that the RSES represented two substantially distinct dimensions within a sample of Polish recidivistic prisoners. Consequently, there is a strong empirical support for the suggestion that a one-dimensional solution, which is consistent with Rosenberg's original conceptualisation, may not provide an adequate explanation of all RSES responses. Additional support for the two-factor model is provided by the standardized factor loadings. All items contained within the scale exceeded Kline's (1994) recommendation that item factor loadings should be equal to or greater than .30. Factor loadings for the positive self-esteem items ranged from .67 to .83, while the factor loadings for the negative self-esteem items ranged from .63 to .76. The positive and negative RSES subscales also showed good composite reliability (.99 positive self-esteem and .99 negative self-esteem).

The results suggest that the RSES may be best specified as assessing two distinct yet related dimensions – positive and negative self-esteem. Furthermore, the two components of self-esteem (positive and negative) are not bi-polar constructs. Individuals may obtain a low score on negative self-esteem but not obtain a high score on positive self-esteem (Boduszek et al., 2012). This underscores the importance of considering both aspects of self-esteem (positive and negative) when employing the RSES in research (Boduszek et al., 2012).

The results of the present study should be interpreted in light of several important limitations. First, although the sample was large, it comprised of students who self-selected into a research study, which may limit the generalizability to other populations (e.g., older or younger cohorts) or to those unwilling to participate in research. Replication of these results is, therefore, needed. Second, the use of self-report data may have introduced a number of well-known biases.

As the RSES was found to assess two substantially distinct constructs (positive and negative self-esteem) and not the one-dimensional construct of global self-esteem that was originally conceptualized by Rosenberg (1965), research is needed to examine the relevance of distinguishing between the two correlated, but distinct constructs. Specifically, further research should seek to examine how the two factors relate differentially to other variables (see, for example, Boduszek, Shevlin, Mallerr, & Hyland, 2012).

A critical assumption underlying the use of the RSES is that the positively and negatively worded items measure the same latent construct. However, the results indicate the presence of two distinct but related components of self-esteem associated with the positively and negatively worded items. Consequently, the validity of this assumption is called into question. This suggests that researchers may need to re-evaluate their use of the RSES among university students, and the theoretical underpinnings of the measure.

References

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- Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, *19*, 716–723.
- Bachman, J. G., & O'Malley, P. M. (1986). Self-concept, self-esteem, and educational experiences: The frog pond revisited (again). *Journal of Personality and Social Psychology*, *50*, 35–46.
- Bagozzi, R.P., & Phillips, L.W. (1982). Representing and Testing Organizational Theories: A Holistic Construal, *Administrative Science Quarterly*, *27* (September): 459–489.
- Bentler, P. M. (1990). Comparative fit indices in structural models. *Psychological Bulletin*, *107*, 238–246.

- Boduszek, D., Shevlin, M., Mallett, J., Hyland, P. & O'Kane, D. (2012). Dimensionality and construct validity of the Rosenberg self-esteem scale within a sample of recidivistic prisoners. *Journal of Criminal Psychology, 2*, 19-25.
- Boduszek, D., Adamson, G., Shevlin, M., Mallett, J., & Hyland, P. (2013). Criminal social identity of recidivistic prisoners: The role of self-esteem, family and criminal friends. *Journal of Police and Criminal Psychology*. (In press) DOI: 10.1007/s11896-012-9105-7
- Bollen, K. A. (1989). *Structural equations with latent variables*. New York: Wiley.
- Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: The Guilford Press.
- Browne, M. W., & Cudeck, R. (1989). Single sample cross-validation indices for covariance structures. *Multivariate Behavioral Research, 24*, 445-455.
- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136-162). Newsbury Park, CA: Sage.
- Carmines, E. G., & Zeller, R. A. (1979). *Reliability and validity assessment*. Beverly Hills, CA: Sage.
- Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences* (2nd Ed.). Hillsdale, NJ: Erlbaum.
- Corwyn, R. F. (2000). The factor structure of global self-esteem among adolescents and adults. *Journal of Research in Personality, 34*, 357-379.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297-334.
- Diamantopoulos, A., & Winklhofer, H.M. (2001). Index Construction With Formative Indicators: An Alternative to Scale Development. *Journal of Marketing Research, 38* (2), 269-277.
- Dobson, C., Goudy, W. J., Keith, P. M., & Powers, E. (1979). Further analysis of Rosenberg's self-esteem scale. *Psychological Reports, 44*, 639-641.
- Dunbar, M., Ford, G., Hunt, K., & Der, G. (2000). Question wording effects in the assessment of global self-esteem. *European Journal of Psychological Assessment, 16*, 13-19.
- Dutton, K. A., & Brown, J. D. (1997). Global self-esteem and specific self-views as determinants of people's reactions to success and failure. *Journal of Personality and Social Psychology, 73*, 139-148.
- Greenberger, E., Chen, C., Dmitrieva, J., & Farruggia, S. P. (2003). Item-wording and the dimensionality of the Rosenberg Self-Esteem Scale: Do they matter? *Personality and Individual Differences, 35*, 1241-1254.
- Hawkins, J.D., Catalano, R.F., & Miller, J.Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for Substance abuse prevention. *Psychological Bulletin, 112*:64-105.
- Hu, L., & Bentler, P. (1998). Fit indices in covariance structural modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*, 424- 453. Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.
- Huang, C., & Dong, N. (2012). Factor structures of the Rosenberg Self-Esteem Scale: A meta-analysis of pattern matrices. *European Journal of Psychological Assessment, 28*, 132-138.
- Joreskog, K., & Sorbom, D. (1981). *LISREL V: Analysis of linear structural relationships by the method of maximum likelihood*. Chicago: National Educational Resources.
- Jöreskog, K., & Sörbom, D. (2004). *Interactive Lisrel (8,72)*. Scientific Software International. Inc.
- Kaufman, P., Rasinski, K.A., Lee, R., & West, J. (1991). *National Education Longitudinal Study of 1988. Quality of the responses of eighth-grade students in NELS88*. Washington, DC: U.S. Department of Education.
- Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd Ed.). London: The Guilford Press.
- MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modelling in psychological research. *Annual Review of Psychology, 51*, 201-226.
- Marsh, H. M. (1996). Positive and negative global self-esteem: A substantial meaningful distinction or artifacts? *Journal of Personality and Social Psychology, 70*, 810-819.
- Muthen, L. K., & Muthen, B. O. (1998 - 2010). *Mplus – Statistical analysis with latent variables. User's guide* (6th Ed). Muthen and Muthen: Los Angeles.
- Novick, M., & Lewis, G. (1967). Coefficient alpha and the reliability of composite measurements. *Psychometrika, 32*, 1-13.
- Owens, T. J. (1994). Two dimensions of self-esteem: Reciprocal effects of positive self-worth and self-deprecation on adolescent problems. *American Sociological Review, 59*, 391-407.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

- Rosenberg, M. (1989). *Society and the adolescent self-image*. (Rev. Ed.). Middeltown, CT: Wesleyan University Press.
- Shevlin, M., Bunting, B. P., & Lewis, C. A. (1995). Confirmatory Factor Analysis of The Rosenberg Self-Esteem Scale. *Psychological Reports, 76*, 707-710.
- Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioural Research, 25*, 173-180.
- Tomás, J. M., & Oliver, A. (1999). Rosenberg's self-esteem scale: Two factors or method effects. *Structural Equation Modeling, 6*, 84-98.
- Tucker, L. R., & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. *Psychometrika, 38*, 1-10.