Psychometric properties of the Rosenberg self-esteem scale in Mexican university students

Propiedades psicométricas de la escala de autoestima de Rosenberg en estudiantes universitarios mexicanos

Oscar Ulises Reynoso-González[1], Karla Patricia Valdés-García[2*], Marco Antonio Santana-Campas[3], Laura Elena De Luna-Velasco[3], Alicia Edith Hermosillo-De la Torre[4]

[1]Centro Universitario de Los Altos de la Universidad de Guadalajara.
[2]Universidad Autónoma de Coahuila, Saltillo. Coahuila, México*.
karlavaldes@uadec.edu.mx
[3]Centro Universitario del Sur de la Universidad de Guadalajara.
[4]Departamento de Psicología de la Universidad Autónoma de Aguascalientes y responsable del laboratorio de Regulación Emocional y Prevención del Suicidio.
*Corresponding author

Abstract

This work aimed to evaluate the psychometric properties of the Rosenberg self-esteem scale in Mexican university students. The research was carried out under an instrumental design, with an incidental sample of 675 students from three institutions. From the literature review, three factorial configurations were evaluated: (1) univariate, (2) bifactorial, and (3) bifactorial with a general factor, with the maximum likelihood method. Results confirmed that the bifactorial model with a general factor presented the best psychometric properties (X2 [24] = 34.71; p = 0.073; CFI = 0.99; TLI = 0.99; RMSEA = 0.02 [0.00-0.04]; SRMR = 0.02; AIC = 96.71), together with adequate internal consistency values (α = 0.87, 0.80, 0.79). Additionally, the authors presented a proposal for the scale and cut-off points to classify results. It is concluded that the Rosenberg self-esteem scale under a bifactorial model with a general factor presents appropriate psychometric properties for Mexican university students.

Keywords: Self-esteem; Rosenberg; psychometric properties; university students.

Resumen

El proyecto tuvo como objetivo evaluar las propiedades psicométricas de la escala de autoestima de Rosenberg en estudiantes universitarios mexicanos. La investigación se llevó a cabo bajo un diseño instrumental, con una muestra incidental de 675 estudiantes de tres instituciones de educación superior. A partir de la revisión de la literatura fueron evaluadas tres configuraciones factoriales: (1) unifactorial, (2) bifactorial y (3) bifactorial con un factor general, con el método de máxima verosimilitud. Los resultados confirmaron que el modelo bifactorial con factor general presentó las mejores propiedades psicométricas (X^2 [24] = 34.71; p = 0.073; CFI = 0.99; TLI = 0.99; RMSEA = 0.02 [0.00-0.04]; SRMR = 0.02; AIC = 96.71), junto a valores adecuados de consistencia interna (α = 0.87, 0.80, 0.79). Adicionalmente, se presentó una propuesta de baremación y puntos de corte para la clasificación de resultados. Se concluye que la escala de autoestima de Rosenberg bajo un modelo bifactorial con factor general presenta propiedades psicométricas apropiadas para su empleo en estudiantes universitarios mexicanos.

Palabras clave: Autoestima; Rosenberg; propiedades psicométricas; estudiantes universitarios.

Introduction

The self-esteem concept proposed by William James at the end of the 19th century was based on his theories about the self, recognizing people's cognitive capacity to identify and evaluate their actions, thoughts, etc. (Kohler, 2003). From this theory, self-esteem was established as the evaluation of a person about himself. In this sense, James understands self-esteem as an individual´s concept that is developed in social interaction with others and from which the parameters of comparison and worth of an individual are established (Kohler, 2003).

This concept, widely studied in several areas of psychology, has been understood from different conceptions. For example, it has been considered as the result of certain aspects, seeking to understand what generates or diminishes it; it has also been identified as part of other constructs, such as self-concept: independently as a necessary aspect for emotional stability and adaptation in interpersonal relationships; and it has been referred to as protection under challenging experiences and situations. These are only some of the approaches that have been established for its understanding and study (Cast & Burke, 2002; Spencer *et al.*, 1993; Thoits, 1994).

Gecas & Schwalbe (1983) distinguish two dimensions within self-esteem: (1) the competence associated with the capacity and efficiency that a person considers having and (2) the self-worth associated with the degree to which people view themselves with value. This two-dimensional proposal to understand self-esteem is related to people's value, and it recognizes personal aspects that are valued positively by the person (Tafarodi & Swann, 2001).

According to Rosenberg (1965), an essential characteristic of the human being is the ability to see himself, be an observer, and observe at the same time. This author mentions that people have attitudes towards different objects, and self-image is the individual's attitude towards himself, with certain content, direction, intensity, importance, salience, coherence, stability, and clarity. For Rosenberg, self-esteem was related to the perception that a person has of himself compared to the dominant groups he refers to (Kohler, 2003).

Unlike attitudes towards other objects, attitudes towards themselves are characterized by being unique. The evaluation depends on the person who evaluates himself. In addition, they are reflective, considering that the subject and the object of attitude are the same people; supposedly, there is a motivation that such an assessment is more positive and essential for the individual and has more impact on aspects related to mental health, such as positive and adaptative emotions, cognitions, and actions. In this sense, an association of high positive self-esteem is considered beneficial for the individual and the group to which they belong (Cast & Burke, 2002).

Although this self-portrait results from a reflective process, its construction is developed in the social sphere through the interactions of the individual with significant others throughout his life. That is, self-evaluation can come from evaluations that are a reflection or interpretation of the reactions of others towards the individual; even the historical conditions of each society influence its formation. Self-esteem addresses the directional and intensity dimension of the attitude towards oneself; in other words, it is interested in the degree of acceptance or rejection of favorable or unfavorable opinions (Rosenberg, 1965).

Studies have linked the concept of self-esteem with variables of a very diverse nature, for instance, with social support and life satisfaction (Murillo & Salazar, 2019; San Martín & Barra, 2013), or with positive relationships between them and the detection of self-esteem as a significant predictor of satisfaction with life (Ruiz et al., 2018). In the study by Cast & Burke (2002), it was found that the higher self-verification and self-esteem a person has, the lower the levels of depression, anxiety, and hostility they possess.

Depression and suicidal ideation have been negatively associated with self-esteem (Ceballos-Ospino et al., 2015; Montes & Tomás, 2016), although other studies also found that self-esteem and suicidal ideation or risk are not related in any way (Andrade & Gonzáles, 2017; Andrade-Salazar et al., 2017).

In variables related to the school context, it has been analyzed their mediating role between social support, academic performance, and emotional exhaustion (Li et al., 2018); the professional perspective (Lopes et al., 2013); and the acceptance in sports classes (Estévez et al., 2015).

Self-esteem in the political sphere was approached to predict the perception of political inclusion in young people living in poverty (Castro et al., 2020). Its association with sociodemographic variables such as sex, age, or ethnicity has also been evaluated (Da Silva & Dos Santos, 2020; Sigüenza et al., 2019). It has been linked to dental disorders (Sharma et al., 2007) and as a means of evaluating experimental designs (Calero et al., 2016).

Some of the studies mentioned above have used different versions of the original Rosenberg scale, which is considered one of the most widely used means to measure self-esteem (Kohler, 2003). Since its creation, it has been adapted and validated in more than 50 countries (Ceballos-Ospino et al., 2017). These validation efforts arise from the need to verify its usefulness in different groups (Kohler, 2003).

In its original version, the scale has 10 items, half-written in a direct sense and half inversely with a response format of ordinal scaling (Likert) of four options, going from totally agree to totally disagree. Among its main characteristics, the original scale was one-dimensional; all items were counted to obtain a single self-esteem score.

Some studies that evaluated the instrument's psychometric properties confirmed the scale's unidimensionality (Góngora & Casullo, 2009; Vázquez et al., 2004). However, other studies found a different factorial solution. For example, in the Colombian context, Cogollo et al. (2015) and Ceballos-Ospino et al. (2017) found bifactorial solutions, namely, a dimension that integrated direct questions and another that included inverse questions. In the first study, they named the dimensions as self-confidence and self-loathing, respectively, while in the second study they were named positive and negative self-esteem.

Other studies additionally contrasted other factorial solution models for the scale. For example, Souza & Cunha (2019) contrasted the fit indices of eight different models in a sample of Brazilian university students, finding that a bifactorial model (of direct and inverse items) and a general factor with all items presented the best psychometric properties. Similar results were reported by Ventura et al. (2018), who tested six different models in a sample of Peruvian students. Their findings reported adequate psychometric properties for both the bifactorial and bifactorial solutions with a general factor. Finally, in Mexico, Jurado et al. (2015) carried out a translation and retranslation exercise of the scale for validation with university students. The authors found a bifactorial solution in the process, but two items were eliminated in one of the dimensions to improve its psychometric properties.

From the literature review, it is possible to appreciate the importance of the self-esteem construct, how it has been linked to variables of a very different nature, and the various factor solutions found in validation processes around the world. In addition, the instruments require constant analyses of their psychometric properties in specific contexts and populations to updated scientific evidence of their validity and reliability, the structure of their factors, and the effectiveness of the reagents, among other aspects associated with psychological instruments.

In this sense, the present study aimed to analyze the psychometric properties of the Rosenberg self-esteem scale in a Mexican university students sample and to contrast the adjustment indices of the three different models: 1) a one-factor model that integrates all the items on the scale; 2) a bifactorial model that groups the direct items in one dimension and the inverse items in the other; and 3) a bifactorial model, but with a general factor that integrates all the items. Additionally, a scaling proposal was generated to classify the scores obtained.

Materials and Methods

Design

The research design is instrumental (Ato *et al.*, 2013), considering that it refers to the review of the psychometric properties of the Rosenberg (1965) self-esteem scale.

Participants

A convenience sample (Hernández & Mendoza, 2018) was obtained from 675 university students from three Mexican public education institutions in Coahuila, Jalisco, and Nayarit. Regarding their sociodemographic characteristics, 35.8% were men and 63.3% women (0.9% preferred not to answer the question), with ages between 18 and 56 years (M = 20.2, SD = 3.54), and most participants reported *single* as marital status (96.4%). The students were assigned to academic programs in social sciences and humanities, economic-administrative sciences, health sciences, engineering, exact sciences, and design.

Instruments

Self-esteem scale

This instrument was developed by Rosenberg (1965) and adapted to Spanish by Cogollo *et al.* (2015) and Ceballos-Ospino *et al.* (2015). In Mexico, validations were also identified (de León *et al.*, 2016). It comprises 10 items with a Likert-type response format with four options: from totally agree (4) to totally disagree (1). Half of the items have reverse wording, and to obtain the scores, these response values are inverted to perform a summation. In this case, higher scores indicate higher levels of self-esteem.

Process

Information was collected using Google forms, sharing the link with the study population. In the capture, it was necessary to debug the answers obtained, where those that presented inconsistencies or registry errors were eliminated. The collection was carried out between August and September 2021.

Ethical considerations

The application form began with the statement of the study's objectives, the implications of participation, and the respondent's rights (voluntary participation, confidentiality, anonymity, and abandonment of the study at any time). Additionally, the research team's contact email was provided so that the respondents could request more information related to their participation. Only students who accepted the terms and conditions established in the consent participated.

Likewise, the project was reviewed, endorsed, and approved in the opinion number CEI-000002 by the ethics committee of the University Center of Tonalá of the University of Guadalajara (registered as protocol F-2021-004) to ensure the regulations and ethical principles concerning the conduct of the study are followed.

Analysis of data

A series of confirmatory factor analyzes were carried out with the maximum likelihood (ML) method to contrast the fit indices of three different models: (1) a one-factor model that integrates all the scale items, (2) a bifactorial model that groups the direct items in one dimension and the inverse items in the other, and (3) a bifactorial model with a general factor that integrates all the items (Figure 1). To determine the absolute fit of the models, the X^2 was used, the close fit was identified by the close fit indices (CFI) and Tucker Lewis (TLI), and the residuals were obtained through the mean square error of approximation (RMSEA) and the standardized average residual (SRMR) (Kline, 2015). The Akaike information criterion (AIC) was integrated to evaluate the models' parsimony. Additionally, internal consistency was estimated, and the percentiles of the total score were identified to make a scaling proposal. The analyzes were done in SPSS version 25 and AMOS version 23.
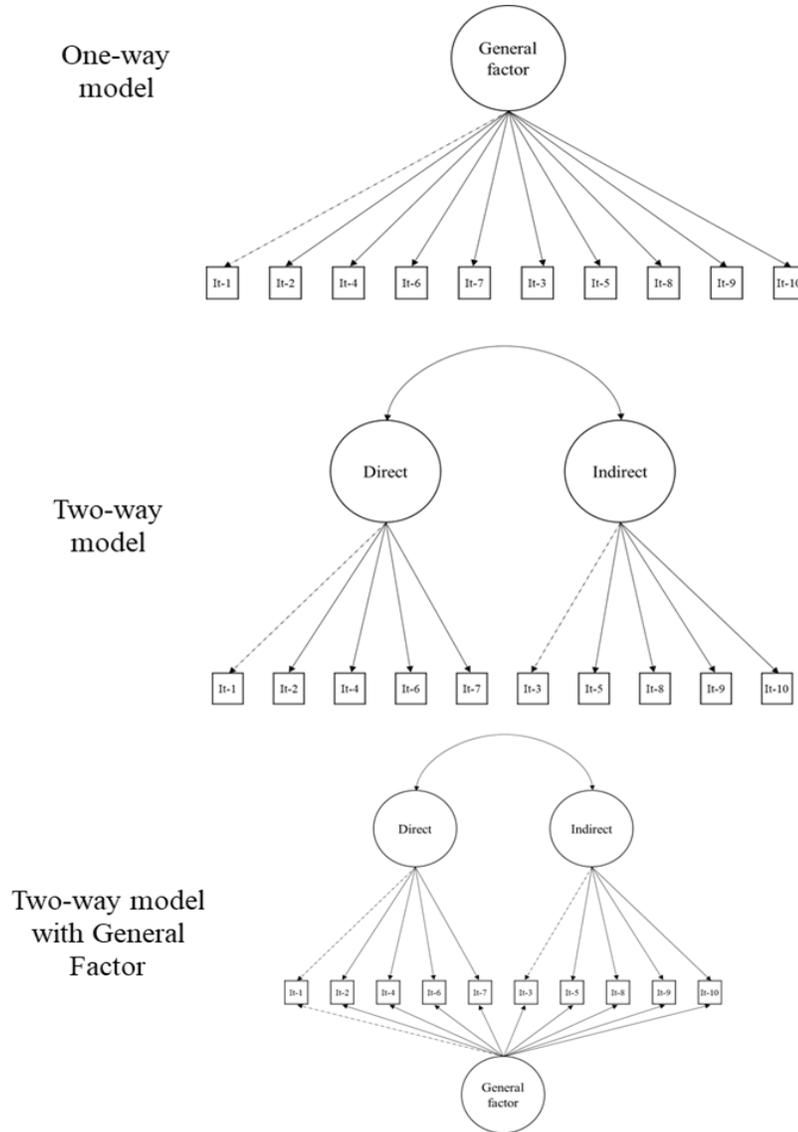
Figure 1. Models to contrast.
Source: Author's own elaboration.

Results

Confirmatory factor analysis

First, the distribution of the reagents was evaluated to determine the appropriate factoring method. Although no multivariate normality was found (MKurt = 15.19, $p < 0.001$; Mskew = 1424.34, $p < 0.001$), the values of asymmetry and univariate kurtosis did not significantly deviate from a normal distribution (Bias $<| 2 |$ and kurtosis $< | 6 |$) (Curran *et al.*, 1996). Furthermore, the Cook distance ruled out that extreme data represent leverage points (Di Cook > 0.02). In this sense, maximum likelihood was used as an estimation method (Curran *et al.*, 1996). Table 1 shows the fit indices obtained for each model.

Table 1. Fit indices by model.

Model	χ^2	p	CFI	TLI	RMSEA	SRMR	AIC
Unifactorial	276.09 (35)	<0.001	0.92	0.90	0.10 [0.09-0.11]	0.04	316.09
Bifactorial	160.28 (34)	<0.001	0.96	0.95	0.07 [0.06-0.08]	0.04	202.29
Bifactorial with general factor	34.71 (24)	0.073	0.99	0.99	0.02 [0.00-0.04]	0.02	96.71

Source: Author's own elaboration.

The bifactorial model with a general factor achieves the desired indicator (χ^2 (35) = 34.71, p = 0.071), considering the absolute fit since the goodness of fit test is expected to be non-significant. The CFI and TLI show acceptable values in all models in the adjustment indices, but the bifactorial model with a general factor presents better adjustment, considering they are closer to 1 (Moral, 2006). Regarding the indicators on the residuals, both the RMSEA and SRMR values are better for the model mentioned above, considering that values lower than 0.08 and 0.05, respectively, are synonymous with a better fit. Finally, the AIC criterion, which penalizes the lack of parsimony, confirms that the bifactorial model with a general factor is the best factorial solution. In this sense, the dimension that integrates the direct items will be called *positive self-esteem*, while the one that integrates the inverse items will be called *negative self-esteem* (Ceballos-Ospino *et al.*, 2017). The score of the general factor will take the name of self-esteem. The complete model is shown in Figure 2.

Internal consistency

The review of the instrument's internal consistency was carried out by calculating Cronbach's alpha. The values for both self-esteem (α = 0.87) and for the dimension positive self-esteem (α = 0.80) and negative self-esteem (α = 0.79) appeared to be adequate (Abad *et al.*, 2011).
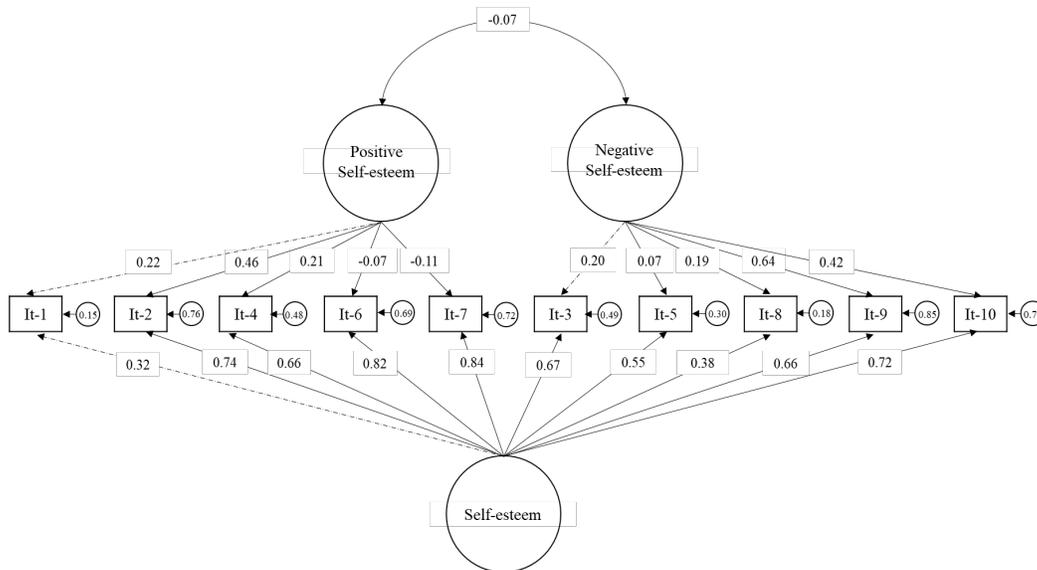

Figure 2. Bifactorial model with general factor.
Source: Author's own elaboration using AMOS.

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Scale proposal

As a final part of the validation process, percentiles of the overall score and the scale factors were identified (Table 2).

Table 2. Percentiles of the self-esteem scale.

Percentiles	Self-esteem	Positive self-esteem	Negartive self-esteem
95	39	20	18
90	38	20	16
75	36	19	13
50	32	17	10
25	27	14	8
10	21	11	6
5	18	10	5
M	30.62	16.32	10.70
SD	6.52	3.22	3.83
n	692	692	692

Note. A summation of all the items was carried out to obtain the total self-esteem score, inverting the values of indirect items (3,5,8,9, and 10). To calculate the negative self-esteem factor, the scores of the items are added without making an investment. In this factor, higher values indicate higher negative self-esteem.
Source: Author's own elaboration.

From the percentiles obtained, it is possible to segment the scores to categorize the responses into three different levels, both in the scale's total score and in the factors (low level: scores below 25th percentile; middle level: those between 25th and 75th percentiles; high level: the scores above the 75th percentile). In this sense, the more significant number of respondents will obtain scores cataloged at the intermediate level, leaving a lower percentage in the positive and negative tails of the distribution. Table 3 shows the proposed classification of scores.

Table 3. Percentiles of the self-esteem scale.

	Self-esteem	Positive self-esteem	Negartive self-esteem
Low	10–26	5–13	5–7
Middle	27–35 c	14–18	8–12
High	36–40	19–20	13–20

Source: Author's own elaboration.

Discussion and Conclusions

The Rosenberg self-esteem scale is an instrument that has been widely used to evaluate the individual's attitude towards himself. However, some investigations around the world have shown different factorial configurations. This study has confirmed the psychometric properties of reliability and validity.

In the first instance, by comparing three different models, it was possible to identify that the bifactorial model with a general factor showed the best-fit indicators. In these analyzes, not only was the absolute fit confirmed through the X^2 test, but the indices of close fit and parsimony were also appropriate.

These findings are similar to those reported by Souza & Cunha (2019) and Ventura *et al*. (2018), who reached similar conclusions when contrasting different configurations. Although other authors speak of a bifactorial configuration (Ceballos-Ospino *et al*., 2017; Cogollo *et al*., 2015), they do not refer to a general factor. Similarly, the results differ from those that support the scale's unidimensionality (Góngora & Casullo, 2009; Vázquez *et al*., 2004).

In this sense, in addition to the general factor, the existence of two dimensions is confirmed: positive self-esteem, made up of the items that address a favorable evaluation of self-perception, and negative self-esteem, which includes the inverse items that allude to a negative perception of the self.

In the second instance, when addressing the scale's reliability, appropriate internal consistency values could be confirmed, both in the general factor and in both dimensions. Finally, the study also presents an appropriate assessment proposal, accompanied by a segmentation of the scores to classify the respondents with low, medium, or high self-esteem.

Although these findings represent an essential contribution to the use of the test in Mexican university students, its limitations must be mentioned. In the first place, the matrix used to generate the factorial solution was the variance-covariance matrix; this was chosen because the asymmetry and kurtosis values did not deviate significantly from normality, without forgetting that such a matrix was also used in previous psychometric studies. However, given that the scale has only four response options, some authors point out that the polychoric correlation matrix is more appropriate to use (Lloret *et al*., 2014). The same observation could be made on the factoring method used (maximum likelihood), although authors such as Curran *et al*. (1996) support its use when the data does not deviate significantly from normal.

Another aspect to consider is that the present work did not translate the original scale as Jurado *et al*. (2015) did, but the translated version of González-Forteza *et al*. (1997, 1993) was used. Although the study included students from three different states of Mexico, the sample cannot be considered representative, so the findings should be taken with some caution.

It would be worthwhile for other studies to include a representative sample, to revise the translation of the original instrument to corroborate lexical adjustment, to consider performing analyses by sex to identify differences between men and women in their levels of self-esteem, and to make sure that the psychometric properties are evaluated in the matrix of polychoric correlations using appropriate estimation methods.

Having valid and reliable instruments for the measurement of relevant psychological variables such as self-esteem strengthens the use of a helpful tool for the development of other research, health promotion programs, interventions in various areas, to mention some of the primary uses and benefits that were sought to contribute with these results.

Acknowledgments

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