Construct Validity, Reliability And Grading Scale Of The General Self-Esteem Test (Gset) In Teenage Students From The Interior Of Perú

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ABSTRACT

The construct validity and reliability of the General Self-Esteem Test (GSET) have been studied. Likewise, a grading scale has been developed for teenage students who reside in the interior of Peru. The participants were 1,171 teenage of both sexes, whose ages ranged from 12 to 18 years. The results demonstrate that the test meets the goodness-of-fit indices and is close to the incremental ones, which partially validates the structure of the original four-domain model. In relation to reliability, the Split half of .72 and the KR20 of .73 allow us to affirm that the reliability is high, therefore, the test maintains good internal consistency. As a final contribution, a unified scale is prepared, because the magnitude of the effect, determined by Cohen's d, calculated for the Mann Whitney U, falls in the range of no effect.

Keywords: Self-esteem, validity, reliability, grading scale.

INTRODUCTION

Self-esteem is defined as the personal assessment that the person makes of their physical and psychological characteristics (Grajeda, 2019). This is considered a hypothetical construct of great relevance for the development of the individuals; which has been demonstrated with different research that relates it to variables such as academic

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performance (Lojano, 2017); emotional intelligence and resilience (Gómez & Jiménez, 2018), social skills (Gualda & Lacunza, 2020; Alfaro, et al., 2023), depression (Segovia & Del Campo, 2022), jealousy and envy (Reidl-Martínez, 2002), stress (Vega & Vega, 2023), etc. Different tests have been designed to examine self-esteem in adolescents. Taking into account a purely psychological approach, we can mention the questionnaire by S. Coopersmith (1967), a test that has dichotomous items, which was reviewed in Peru in different investigations, one of the closest being that of Mesías (2017) who samples to 398 adolescents whose age range was 11 to 15 years belonging to state secondary schools in Huallaga. Their work shows that the test is reliable thanks to the KR of .86, also in its 4 factors the KR varied from .65 to .75. The CFA shows the variance of 50.64% and the CFI is described as .87, RMSEA .042, 90% CI with a variation of .039 to .045 and the TLI was .85. With the same instrument, but in a Lima district called San Juan de Lurigancho, Sauñi (2017) with 720 participants who were teenage students (11 to 17 years old) found a reliability using KR20 of .77 and with the method of halves reaches a .73. The author carried out an exploratory factor analysis, finding the KMO at .78, the variance obtained was 45%, being unifactorial, reducing the test to 16 items, based on the previous analysis that showed very low coefficients. Mamani and Calizaya (2018) carry out a linguistic adaptation to Coopersmith Quechua in students from intercultural, bilingual rural schools in Azangaro, Puno, aged between 8 and 15 years, all Quechua speakers. In this work, a KR20 of .66 was determined for the reliability of the test.

Then, in the south of Mexico city, Reidl-Martínez (1981) developed his self-esteem test, made up of 17 items, developed with the 4-option Likert model. This test is made up of two factors (negative and positive self-esteem) and three dimensions: cognitive, emotional and behavioral. Originally the study took into account only women. Later in 2002, the revalidation was carried out with 1,112 participants, men and women, undergraduate and high school students. The reliability for the total with Alpha was .82. Likewise .82 in negative self-esteem and .78 in negative self-esteem (Guillen and Reidl, 2021). No EFA or CFA studies have been developed, and an attitudinal perspective is postulated since affective, cognitive and behavioral dimensions are mentioned. In Peru, no psychometric studies have been found and in an article published by the same authors in 2021, it is stated that the test should be used only with the adult population.

Next, Pope et al. (1988) built a self-esteem test, aimed at children and another test for adolescents. The items were presented on a Likert scale with three possibilities. The test was structured in two factors (called positive and negative self-esteem) and 5 dimensions (family, social, global, academic, and body). Pope et al., do not work on the psychometric properties to support the test and likewise, no work on validity and reliability has been found in Peru.

Grajeda (2010) designed in Lima the general self-esteem test (GSET) composed of 30 items, of which 24 measure self-esteem divided into 4 domains (physical, academic, social and personal) and 6 the truthfulness of the answers, as such so that those who are corrupting their answers in the test are eliminated. The proposed theoretical foundation is the quadridominal cognitive behavioral theory (Grajeda, 2023), where it is assumed that it "is a hypothetical construct referring to evaluative cognitions about the subjects' own characteristics, capabilities, attitudes and behaviors" (p. 27), its nature would be learned and not innate, and could be modified thanks to experiential experiences during the life cycle and manifesting itself in overt and covert behaviors (Grajeda, 2019). The items are

dichotomous. In 2010 (Grajeda, 2023) describes the validity by judges' criteria, it reached .97 in Aiken's V. Construct validity was determined from the corrected test item correlation, describing indices between .22 and .70, except in items 3 and 28 whose r was less than .20. Reliability was obtained with the Split half reaching .81 in the complete test. Likewise, reliability was also obtained through equivalent tests, with the Coopersmith Test (1967), which reached .87.

When reviewing national and international psychometric studies on GSET, we found that of Ocmin & Segura (2023) who, in the district of Comas, working with 774 adolescent schoolchildren who were in secondary school, with an age range of 12 to 18 years; describe adequate evidence of content and factor validity. They proposed a three-factor model, but they noticed that some items, logically, belonged to one dimension, but nevertheless, were conglomerated in a totally different dimension, so they decided to use the original model composed of four domains. In relation to reliability, the KR20 was obtained and reached .77. On the other hand, based on factorial invariance, they find differences between men and women and because of this, they create two scales.

Later, in Peru, Cerna-Dorregaray (2017) designed the Self-Esteem Scale for adolescents under a humanistic model whose author would be Clemens (1998). The instrument is made up of 35 items, on a Likert scale. The author determined validity with Aiken's V, which ranged from .80 to 1. On the other hand, when correlating each dimension with the test, the coefficients fluctuated from .76 to .81. Regarding reliability, this was .86, both in Alpha and Omega. Taking into account sex, no significant differences were demonstrated. With respect to age, the significant differences had a small effect size (Cohen, 1988). The exhaustively conducted literature does not show research on the psychometric characteristics of this test.

In relation to the Rosenberg Test, it has been widely used in educational and psychological research, but we must clarify that the test was developed by the Doctor of Sociology Morris Rosenberg in 1965, who evidently has a sociological vision of self-esteem, for this reason it is not is described in this study, trying to respect professional ethics, in accordance with articles 7 and 46 of the Code of Ethics and Deontology of our College of Psychologists of Peru (2017). Likewise, regular readers will be able to verify that the same author in his work calls it the self-image scale.

As has been described, there are various tests used to evaluate self-esteem, but in many cases there is no updated work on their construct validity and reliability. Likewise, it is very likely that the standards are obsolete due to the passage of time and the rapid changes that occur in current culture and technology (Aliaga and Giove, 1993), so it would be important to develop current standards. Psychometrics indicates the need to determine the validity and reliability of psychological measurement instruments (Nunnally and Bernstein, 1995). With respect to construct validity, the aim is to determine whether the test complies with the structure that has been theoretically proposed. Regarding reliability, what is sought is to determine to what degree the test demonstrates consistency and/or stability, in short, the quality to measure. In this regard, with the GSET only one work has been found on construct validity, reliability and scale in Lima and none in the interior of the country, making it necessary to determine if the instrument has construct validity, is reliable and what standards would be necessary to be used in teenage student from the interior of Peru.

METHOD

Design

Since the metric characteristics of an instrument are studied, it can be said that an instrumental design has been used (Ato et al.,2013). When studying the metric properties of an instrument, that is, a technique that will be used professionally, it can be said that the research is technological (Sánchez and Reyes, 2015).

Participants

There were 1,171 participants, of which 567 were women and 604 men. The ages ranged from 12 to 18 years. A mean of 14.5 years and a SD that was equal to 1.94 have been calculated. The students belonged to state schools in cities located in the interior of Peru, which were Chiclayo, Huaylas, Pisco, Ica and Nazca. According to the data extracted from the consulted theses, the size of each subsample was calculated with a formula for known populations, which is described in the book by Abad and Servín (1981). Likewise, Arce and Corrales (2023) used random sampling, Cespedes (2023) stratified random, Caccha (2021) random, Aybar (2021) probabilistic cluster sampling, and Gamarra and Puerta (2021) census.

Instrument

The General Self-Esteem Test (GSET) has been used, which is made up of 30 items. It was developed by Alex Grajeda Montalvo in 2010 based on a sample of Lima students, evaluating self-esteem based on a structure of 4 domains (academic, physical, social and personal). The test has a veracity scale. The administration can be individual or collective, in people between 12 and 30 years old. In the original research (Grajeda, 2023), validity was studied thanks to the judges' criteria, resulting in the average Aiken V of .97. Likewise, construct validity was investigated. For this purpose, the corrected item test correlation formula was used, finding indices ranging from .22 to .70, with the exception of 3 and 28. For Aiken (2003, p. 65), correlations greater than or equal to .20 are considered acceptable. Reliability was studied with the Split half, determining .81. Also, from the method of equivalent tests, carried out with the Coopersmith test (1967), a coefficient equal to .87 was obtained.

Procedure

The databases were authorized by the authors of research works that used the GSET in cities in the interior of Peru, during the years from 2021 to 2023, these works were of Gamarra and Puerta (2021) in Pisco, Caccha (2021) in Ica, Aybar (2021) in Nazca, Arce and Corrales (2023) in Huaylas and Cespedes (2023) in Chiclayo. The bases were organized taking into account only the GSET, from which and applying the respective formulas the validity, reliability and grading scale can be described.

Statistical analysis

SPSS 27 and Jamovi version 2.3.18 programs have been used. Initially, confirmatory factor analysis was carried out, based on the robust method, thereby determining construct validity. Subsequently, the Split half and KR 20 methods were used to determine the reliability of this test whose items are dichotomous. Subsequently, after the Kolmogorov-

Smirnov normality test, the differences according to sex were analyzed, using Cohen's d to determine the magnitude of the effect. Finally, a scale has been developed with the 25th, 50th and 75th percentiles, which correspond to quartiles 1, 2 and 3, and are associated with low, medium and high levels of self-esteem.

RESULTS

Table 1 Confirmatory factor analysis of GSET in teenage students from the interior of Peru

χ^2	χ^2/gl	gl	RMSEA [IC 95%]	SRMR	GFI	CFI	TLI	PGFI
Original	2.94	246	.041 [0.023-0.030]	.042	.98	.832	.812	.742
Acceptable values	≤ 3.00	> 100	≤ .05	≤ .08	≥.93	> .95	> .90	≥.55

Table 1 analyzes the construct validity using the CFA. This table shows adequate absolute adjustment indices in all its indicators: χ^2/gl=2.94, RMSEA= .041; SRMR= .042 and GFI= .98 (Cho et al., 2020), which would demonstrate that the model presents an acceptable and even optimal fit since, in the case of GFI, this is greater than .95. Regarding the incremental fit indices, the CFI and TLI are close to the acceptable criterion, but do not reach it, which would indicate that the proposal would not fit the data (Hu & Bentler, 1999). However, the PGFI, which looks at parsimony goodness of fit, has been calculated at .742; exceeding the acceptable value, which would indicate that the model found is acceptable since it has great similarity to the original (Escobedo et al., 2015).

Table 2 Reliability of the GSET in teenage students from the interior of Peru

N° elements	Statistics	Value
24	Split half	.72
24	KR20	.73

Table 2 demonstrates the reliability of the GSET. Palella and Martins (2003, p.181) state that reliability is considered high, because it is between .61 and .80.

Table 3 Differences in GSET for in teenage students from the interior of Peru according to sex

Dimensions and Test	Sex	n	Average range	U de Mann-Whitney	Sig.	d
Academic	Man	604	605,04	159735,500	.043	0.116
	Woman	567	565,72			
Social	Man	604	578,75	166852,500	.435	0.044
	Woman	567	593,73			

Personal	Man	604	596,86	164674,500	.246	0.066
	Woman	567	574,43			
Physical	Man	604	607,52	158235,500	.021	0.132
	Woman	567	563,07			
Self-steem	Man	604	601,23	162036,500	.111	0.093
	Woman	567	569,78			

According to Table 3, no significant differences are found in social and personal dimensions, and in general self-esteem. In contrast, significant differences are observed in the academic and physical domains with an effect size below .2, indicating no effect (Cohen, 1988). Based on these data, it was decided to develop a single grading scale since there are only differences in two domains, but the percentage implication does not reach a significant magnitude at the population level.

Table 4 GSET grading scale for in teenage students from the interior of Perú

Levels	Percentils	Domains				General self-steem
		Academic	Social	Personal	Physical	
Top	75	5-6	5-6	4-6	5-6	18-24
Half	50	4	4	3	4	13-17
Low	25	0-3	0-3	0-2	0-3	0-12

DISCUSSION

The first result determines the structural validity from the CFA. Absolute fit indices have been found that demonstrate the correctness of the proposed model that consists of four domains of self-esteem, since the covariance matrix model found would be equal to the original model. In this regard, adequate absolute adjustment indices have been observed in all its indicators: $\chi^2/gl=2.94$, RMSEA= .041; SRMR= .042 and GFI= .98 (Cho et al., 2020), which would demonstrate that the model presents an acceptable and even optimal fit since, in the case of GFI, this is greater than .95. With respect to the incremental fit indices, the CFI(.832) and the TLI(.812) are close to the acceptable criterion, but do not reach it, which would indicate that the proposal would not fit the data (Hu & Bentler, 1999). However, the PGFI, which looks at parsimony goodness of fit, has been calculated at .742; exceeding the acceptable value, which would indicate that the model found is acceptable since it has great similarity to the original (Escobedo et al., 2015).

With respect to the CFA of the GSET, no works have been found in the interior of the country, however, in Lima, Ocmin and Segura (2023), when working with 774 adolescents from 12 to 18 in a sector of the Comas district, found a $\chi^2/df=1.98$, a RMSEA (.032), an SRMR (.040), a CFI (.925), a TLI of (.916) and a parsimony fit of 1.12 for the original model. These results show a better fit of the model in the Lima sample compared to the research carried out in the interior of the country, so it would be important to continue

researching with the GSET in larger samples, carrying out more analysis of its latent variables and possible proposals that improve the incremental adjustment indices and, as a consequence, the item values improve and are more useful in measuring self-esteem.

In reference to Coopersmith, the indices obtained have a certain similarity to those of Mesías (2017). This author applied the test to 398 adolescents from state schools in Huallaga, whose age range was from 11 to 15. His results show CFI (.87), RMSEA (.042) and TLI (.85). As can be seen, only the RMSEA reaches an acceptable value, since its CFI is not greater than .95, nor its TLI greater than .90 (Escobedo et al., 2015). This allows us to infer that the GSET applied in the interior of the country would present better structural validity indices, especially in goodness of fit.

Another important result is related to reliability. In this research, reliability has been worked through internal consistency, using the split half and Kuder-Richardson (KR-20) formulas, both recommended for dichotomous items (Merino and Charter, 2010). In the case of KR20, a coefficient of .73 has been found and, with respect to the split half, the coefficient has been .72. Both coefficients obtained are considered to have a high level of reliability (Pallela and Martins, 2003). No works have been found on the reliability of the GSET in the interior of Peru. When comparing the results with other studies carried out in Lima, it is notable that the results obtained within Peru are lower, since what Grajeda obtained in 2010 with the method of split half .81. In the same way with the KR20 of .77 obtained by Ocmin and Segura (2023).

In comparison with other self-esteem tests, which have been investigated in the interior of Peru, in the last 7 years, the indices have been higher in the work of Mesías (2017) who, investigating with the Coopersmith inventory, determined a modified Horst's KR20 equal to .86 in students at the secondary level of Huallaga. On the other hand, they have been lower in the thesis of Mamani and Calizaya (2018), who in their linguistic adaptation to Quechua from the Coopersmith in Azangaro, Puno, obtained a KR20 of .66.

Finally, prior to the scale, the differences in men and women were investigated. The results determined significant differences in the academic and physical domains with an effect size below .2, which indicates that there is no effect (Cohen, 1988). Based on these data, it was decided to develop a single grading since there are only differences in two domains, but the percentage implication did not reach a magnitude considered important population wise to develop different scales for each sex. Although men have a slightly greater average range, they do not reach a considerable proportion in the sample, so it would not be feasible to disaggregate the interpretation of the raw scores into standard scores. Due to this, a single grading is proposed, in which the Pc 25 (Low), 50 (medium) and 75 (high) have been considered. In Lima, Ocmin and Segura (2023) find no equity and develop a scale for men and another for women. However, in this research the magnitude of the effect was not determined to make this decision.

CONCLUSIONS

The goodness-of-fit and parsimony indices indicate that the GSET has a 4-domain factor structure, therefore, adequate construct validity.

The GSET has a high level of reliability.

There are significant differences in favor of men and women in the academic and physical domains.

There are no significant differences in the personal and social domains according to sex.

There are no significant differences in general self-esteem according to sex.

No magnitude of the effect is found in the differences according to sex.

A scale of three levels is presented, for the four domains of self-esteem and for general self-esteem.

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Authors Roles
AGM: Research manager,
BBV: Interpretation of results,
JDR: Text writing,
MFC: Correction of style and format of the article,
AQP: Text writing,
YSG: Database organization,
RTF: Analysis of data,
SOS: Processing, data analysis and interpretation,
JPB: Style writing.

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