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Bifactorial analysis of the Rosenberg Self-esteem Scale and relationship between physical activity and self-esteem in adolescents

Análisis bifactorial de la Escala de Autoestima de Rosenberg y relación entre actividad física y autoestima en adolescentes

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Abstract

Self-esteem is a construct of great importance in adolescence that favors the health and psychological well-being of schoolchildren. In this paper, the two-dimensionality of the Rosenberg Self-Esteem Scale (RAS) is analyzed through confirmatory factor analysis, as well as the relationships between the practice of physical activity (PA), Global self-esteem, and the positive and negative dimensions of self-esteem. It was carried out in a sample of 429 students in the high school of the city of Seville (Andalusia). The instruments used were the Physical Activity Questionnaire in adolescents (PaqA, Martínez-Gómez et al., 2009) and the Rosenberg Self-Esteem Scale (EAR, 1965) version of Atienza et al. (2000). The results obtained allow us to accept the two-dimensionality of the scale, as well as good levels of global self-esteem and a tendency to better self-esteem in active adolescents. The practice of PA is associated with the Positive Self-esteem dimension, but not with Negative Self-esteem or Global Self-esteem.

Key words

Physical education; Sport; Psychological factors; Bullying; Psychological well-being.

Resumen

La autoestima es un constructo de gran importancia en la adolescencia que favorece la salud y el bienestar psicológico de los escolares. En este trabajo se analiza la bidimensionalidad de la Escala de Autoestima de Rosenberg (EAR) mediante análisis factorial confirmatorio, así como las relaciones existentes entre la práctica de actividad física, Autoestima Global y las dimensión positiva y negativa de la autoestima. Se llevó a cabo en una muestra de 429 estudiantes de Educación Secundaria Obligatoria y Bachillerato de la ciudad de Sevilla (Andalucía). Los instrumentos utilizados fueron Cuestionario de Actividad Física en adolescentes (PaqA de Martínez-Gómez et al., 2009) y Escala de Autoestima de Rosenberg (EAR, 1965) versión de Atienza et al. (2000). Los resultados obtenidos permiten aceptar la bidimensionalidad de la escala, así mismo se constató buenos niveles de autoestima global y una tendencia a una mejor autoestima en los adolescentes activos. La práctica de actividad física se asocia con la dimensión Autoestima Positiva, pero no con la Autoestima Negativa y la Autoestima Global.

Palabras clave

Educación Física; Deporte; Factores psicológicos; Acoso escolar; Bienestar psicológico.

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Introduction

Self-esteem is a construct of great importance for adolescents, as it is related to psychological well-being and health (Vázquez-Morejón, 2018; Arruza, et al., 2008). This aspect determines or influences, according to Cabrera (2014), behaviors, academic performance, and even whether or not to have a healthy lifestyle.

Adolescence will be a fundamental stage for the development of self-esteem, taking into account that, according to Estévez et al. (2015), it is a period in which physiological, emotional, cognitive, and social changes occur that affect self-esteem. Internal and external factors influence the perception of self-esteem; the latter will acquire great relevance during adolescence due to the influence exerted by the opinions of acceptance or rejection of the people who surround schoolchildren within the family or in the social relationships that occur both inside and outside the educational center (Taberner et al., 2017). Self-esteem gives confidence and security in yourself (Cabrera, 2014) and becomes a protective factor for health and emotional well-being as specified above by providing the adolescent with a better ability to cope and adapt to situations or challenges that arise (Schoeps et al., 2019).

Today, there are numerous episodes of bullying in which having good self-esteem and paying attention to its proper development from childhood could become a very helpful element in reducing the vulnerability of students and the risk of being victims, prevent the appearance of aggressive behavior by others, or reduce the psychological effects produced by situations of harassment.

Numerous works on peer violence identify self-esteem problems in both victims and aggressors (Estrada-Vidal et al., 2022; Núñez et al., 2021; Martínez, et al., 2018; Garaigordobil, 2011). In this sense, Rosenthal and Simeonsson in Rice (2000), the person with good self-esteem or high levels of positive self-esteem is able to feel good about himself without having the need to make others feel bad; On the contrary, people with low self-esteem or high presence of negative self-esteem are characterized by their insecurity, by recurrent thoughts of failure, with a changing, unstable identity, and a greater vulnerability to criticism or rejection.

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On the other hand, the practice of physical activity (PA) provides numerous psychological benefits in states of depression, anxiety, self-esteem, moods or well-being (Taylor, 2012; Kristjansson et al., 2010; Ekeland et al., 2005). Specifically, in relation to self-esteem, the works of Delgado-Floody et al. (2017), Eime et al. (2013), Teixeira et al. (2012), and Taylor et al. (2012) identify that PA or sport increases the level of self-esteem in schoolchildren. On the other hand, a high level of self-esteem has also been identified to have a positive influence on increasing motivation to practice physical activity and sports (Franco et al., 2017).

In relation to the first consideration about improving self-esteem from practice, Guillén and Laborde (2014) state that adolescents who practice PA and sports have greater mental strength, optimism, and perseverance than adolescents who do not. These same authors point out that PA develops a series of personal values, including self-esteem, capacity for effort, perseverance, respect, and solidarity, and at the same time, according to Jodra et al. (2017), contributes to the prevention of the appearance of antisocial behaviors.

Most of the previously referenced studies on PA and self-esteem used the global estimation of self-esteem based on a unifactorial analysis of the Rosenberg self-esteem scale (RSA); however, there are fewer studies that analyze this relationship with the dimensions of positive and negative self-esteem proposed by Atienza et al. (2000), on which the present work intends to make contributions.

The objectives of this study are, first, to analyze the two-dimensional property of the EAR. Second, to know the levels of PA and self-esteem of adolescents and to identify differences in self-esteem depending on the degree of PA, and finally to analyze the possible relationships between the practice of PA, participation in extracurricular sports competitions, and the positive and negative dimensions. of self-esteem.

Material and method

Participants

Sample comprised of 429 secondary school and high school students from educational centers in the municipality of Seville. 55.2% female, with a mean age of 14.45 ± 1.46). Incidental sampling technique. The study was carried out according to the

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Declaration of Helsinki and approved by the Andalusian Biomedical Research Committee (Code 0305-N-19).

Instruments:

The Physical Activity Questionnaire for adolescents (PAQ-A by Martínez-Gómez et al., 2009) was used, which determines PA levels in the last 7 days. This questionnaire consists of 9 questions with a Likert-type scale of 1 to 5 points, for example: “2. In the last 7 days, during physical education classes, how many times were you very active during classes: playing hard, running, jumping, throwing? Response options: Value 1: I did not do/do physical education; 2: Hardly ever; 3: Sometimes; 4: Often; 5: Always.

The final score is obtained from the arithmetic mean of the nine questions from which the cut-off points established by Benítez-Porres et al. (2016), to determine when an adolescent is considered active or not active. This questionnaire has a Cronbach's α reliability coefficient of 0.83, which is 0.86 in the present study.

To determine self-esteem, the Rosenberg Self-Esteem Scale (EAR, 1965) version of Aienza et al. (2000) was used. This questionnaire includes 10 items, five positive statements to determine the degree of self-confidence or personal satisfaction, and five negative statements about the degree of self-hatred or personal devaluation. The answers use a Likert-type scale with values from 1 (strongly agree) to 4 (strongly disagree). This questionnaire has a Cronbach's α of 0.77 and for this study, in the unifactorial model, it was 0.83.

Process:

At the beginning of the study, a meeting was held with the center management teams to inform them about the project and request authorization for its development. Subsequently, Physical Education teachers, families, and students were informed through an informative document and the delivery of informed consent to families.

Subsequently, data was collected through the aforementioned questionnaires.

Data Analysis

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The unidimensional analysis of self-esteem "Global Self-esteem" was performed from the total score obtained in the EAR according to the self-esteem classification established by Rosenberg (1965). The quantitative variable was classified into a new variable for the values: 'High self-esteem', considered normal self-esteem for total scores between 30 and 40 points; 'Average self-esteem' for scores between 26 and 29, where there are no serious self-esteem problems, although it should be improved, and 'Low self-esteem' for scores below 25 points.

The two-dimensional analysis of the EAR differentiates, according to the studies by Owens (1993), Huang and Dong (2012) and Atienza et al. (2000), the dimension "Positive self-esteem" (first five items of the questionnaire) and "Negative self-esteem" (last five items). To assess the suitability of the scale, a confirmatory factor analysis was performed using a robust method according to the results of the Mardia coefficient and normality. The Satorra-Bentler chi-square scale divided by degrees of freedom was used. The value of the root mean square error (RMSEA) had to be less than or equal to 0.09.

Descriptive analysis of the variables "PA", "Competitive practice", "Global self-esteem", "Positive self-esteem", and "Negative self-esteem" was carried out through a study of means and standard deviations.

From the metric variable of the PA level, a new dichotomous nominal variable 'active-nonactive' was created and the results were presented using frequencies and percentages.

The inferential analysis of the variables "active-nonactive", "participation in extracurricular competition", and "Global self-esteem" was performed using Pearson's Chi-square.

According to the results obtained in the Kolmogorov-Smirnov normality test, a correlation analysis of the variables PA, extracurricular competition, and positive and negative self-esteem was carried out using the Spearman coefficient. The effect size of the correlation applied the indices determined by Cohen (1988) of $r = 0.1$; $r = 0.3$ and $r = 0.5$ to determine a small, medium, or large effect, respectively.

The statistical programs used were EQS 6.2 for Windows for factor analysis of the scale, G* Power version 3.1.9.7. to calculate effect size and statistical power and SPSS

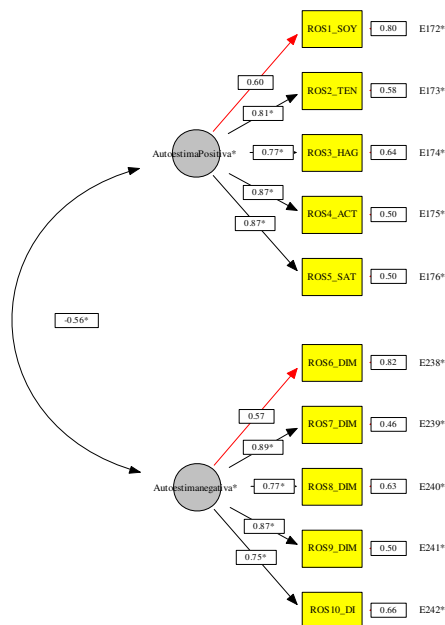
Original article. Bifactorial analysis of the Rosenberg Self-esteem Scale and relationship between physical activity and self-esteem in adolescents. Vol. 8, n.º 3; p. 423-441, september 2022. <https://doi.org/10.17979/sportis.2022.8.3.9152>

version 26.0 (IBM Corp, Armonk, NY, USA) for Windows to perform descriptive and correlational analysis of the data.

Results

With respect to the first objective of the study "to analyze the properties of the two-dimensional self-esteem scale in the population under study", the results of the confirmatory factor analysis, in application of the robust method as a nonparametric test according to the values obtained from the coefficient of Mardia and normality, showed an optimal fit of the scale in two dimensions (see Figure 1). The Chi-square values of Satorra-Bentler= 125.85; 34 degrees of freedom; p= 0.000 and RMSEA= 0.083.

Figure 1. Confirmatory factor analysis of the Rosenberg self-esteem scale in two dimensions 'Positive self-esteem' and 'Negative self-esteem'



Results of the second objective "to know the levels of PA, practice of extracurricular competitive sports, and self-esteem of adolescents":

Original article. Bifactorial analysis of the Rosenberg Self-esteem Scale and relationship between physical activity and self-esteem in adolescents. Vol. 8, n.º 3; p. 423-441, september 2022. <https://doi.org/10.17979/sportis.2022.8.3.9152>

The descriptive values of the study are shown in Table 1.

Table 1. *Descriptives of the sample.*

	Mean	Standard deviation	Min.	Max.
Age	14.45	1.465	12	18
Level of physical activity	2.39	0.649	1.13	4.59
Global self-esteem	31.22	6.004	10	40
Positive self-esteem	16.82	3.088	5	20
Negative self-esteem	10.59	4.140	5	20

Regarding physical activity levels (Table 2), it was found that 83.9% of the sample did not reach sufficient levels of PA and therefore were considered not active.

Table 2. *Active and non-active subjects based on the score obtained in the Paq-A*

	Frequency	Percentage
NOT ACTIVE	360	83.9
ACTIVE	69	16.1
Total	429	100

Only 22.4% of the sample participated in extracurricular competitive sports. This type of practice was greater in the active adolescents group, present in 46.4% of the subjects in this group, as shown in Table 3. In the group of non-active adolescents, 17.8% participated in extracurricular competitions during the week, but this type of activity was not enough to reach minimum PA thresholds and therefore to be considered active.

Table 3. *Differences in participation in extracurricular competition in active or non-active subjects*

	Compete in extracurricular sports		Total	p
	Not	Yes		
NOT ACTIVE	82.2%	17.8%	100%	0.001
ACTIVE	53.6%	46.4%	100%	
Total	77.6%	22.4%	100%	

Original article. Bifactorial analysis of the Rosenberg Self-esteem Scale and relationship between physical activity and self-esteem in adolescents. Vol. 8, n.º 3; p. 423-441, september 2022. <https://doi.org/10.17979/sportis.2022.8.3.9152>

Regarding the self-esteem analysis, the obtained means showed high or normal values in this variable (see Table 1), with high values for Global Self-esteem and the Positive Self-esteem dimension (M= 31.22 and M= 16.82). respectively) and low values on the negative self-esteem dimension (M= 10.59).

Results of the third objective "Identify differences in self-esteem based on the degree of PA as well as the possible relationships between variables":

The unidimensional analysis of self-esteem based on the degree of activity did not show significant differences (Table 4), however a tendency to better self-esteem (higher percentage at the high level) was observed in active adolescents with respect to that obtained by subjects who are not 5.5 points.

Table 4. Levels of global self-esteem in active or non-active subjects

	Self-esteem level ¹			Total	p
	Low	Medium	High		
NOT ACTIVE	19.2%	21.1%	59.7%	100%	0.685
ACTIVE	15.9%	18.8%	65.2%	100%	
Total	18.6%	20.7%	60.6%	100%	

Note: ¹ Unidimensional analysis of self-esteem

The correlation analysis between the variables "Active / Non-Active", "Participation in extracurricular sports competition", and the dimensions "Positive self-esteem" and "Negative self-esteem" (Table 5) showed that the level of PA has a positive relationship with low magnitude with the positive self-esteem dimension ($r= 0.137$ $p= 0.004$) with a median effect size of 0.370 and a statistical power of $1-\beta= 0.99$. However, PA is not related to negative self-esteem. Likewise, participation in extracurricular sports competitions does not correlate with any dimension of self-esteem.

Original article. Bifactorial analysis of the Rosenberg Self-esteem Scale and relationship between physical activity and self-esteem in adolescents. Vol. 8, n.º 3; p. 423-441, september 2022. <https://doi.org/10.17979/sportis.2022.8.3.9152>

Table 5. Correlations between level of physical activity and positive and negative dimension of self-esteem

		Active/Not active	Participation in competition	Global self-esteem	Positive self-esteem dimension	Negative self-esteem dimension
Active/Not active	r	1	0.252**	0.042	0.137**	-0.037
Participation in extracurricular competitions	r		1	0.085	0.052	-0.016
Global self-esteem	r			1	0.640**	-0.744**
Positive self-esteem	r				1	-0.329**
Autoestima negativa	r					1

Note: Spearman correlation coefficient. ** significance < 0.01

Discussion

According to the results obtained from PA, the percentage of active adolescents is very low (less than 20%) compared to other studies such as those of Smouter et al. 2019 (where it is 41.8%) or Martínez-Baena et al. (2016). This may be due to the inclusion in this study of high school students, who have a lower level of activity than high school students, coinciding with the trend specified by most studies that as the age of the population is reduced, PA.

Regarding the results obtained from self-esteem, the data of the global mean and percentages of self-esteem levels indicate that, in the majority, the adolescents studied have good self-esteem with values very similar to those obtained by the work of Franco et al. (2017), Estevez et al. (2015) in adolescents from different Spanish populations and Smouter et al. (2019) in Portugal. The percentage of students with high self-esteem (60.6%) is much higher than that obtained by Pereira et al. (2022) in a population of 1209 students in centers in Brazil where this level of self-esteem is only obtained by 28.4%. These differences in assessments would imply carrying out new studies taking into account the possible gender differences found in many jobs in which women have a worse perception of self-esteem compared to men.

Original article. Bifactorial analysis of the Rosenberg Self-esteem Scale and relationship between physical activity and self-esteem in adolescents. Vol. 8, n.º 3; p. 423-441, september 2022. <https://doi.org/10.17979/sportis.2022.8.3.9152>

Regarding the differences in self-esteem depending on the level of PA, a higher percentage of adolescents with normal or high self-esteem was obtained in active subjects. No relationship was found between PA and global self-esteem, unlike the results found in numerous studies (Delgado-Floody et al., 2017; Zurita et al., 2017; Zamani et al., 2016; Goll et al., 2014; Kristjánsson et al., 2010). However, in the present study only an association of PA is found with the positive dimension of self-esteem and not with the negative dimension. This lack of relationship is also highlighted by Smouter et al. (2019).

However, participation in extracurricular sports competitions has no relationship with better or worse values of self-esteem, unlike the work of Eime et al. (2013) or Erkut and Tracy (2002).

Based on the results, it is considered necessary to continue to advance in the analysis of the variables, segmenting the data according to gender. Likewise, taking into account that the sample has a low percentage of high school students, it would be necessary to increase the percentage of these subjects and to identify differences in self-esteem and PA to verify if, actually, as the age of schoolchildren increases, fundamentally as of 16 years of age, self-esteem increases. Another interesting line of work is to compare PA and self-esteem values based on the type of school, differentiating schools with students at greater risk of social exclusion from those who do not.

Conclusions

In relation to the objectives of the study, we can conclude that there is a well-adjusted bifactorial model of the Rosenberg self-esteem scale. The self-esteem values found are high despite the low level of physical activity of the population studied. Active adolescents have better global self-esteem than non-active ones; however, a greater practice of PA is only related to better values of positive self-esteem and vice versa.

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