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Relationship between the self-concept and physical activity towards the prevention of chronic illnesses

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Abstract

The objective of this work is to verify the relationship between the self-perception of health and the self-concept of physical appearance in adolescents, in order to check their influence on the physical activity they perform with the aim of preventing chronic illnesses. To this end, an observational, cross-sectional descriptive study with analytical components was carried out. Opportunistic activity, in which young people, between the ages of 16 and 22, were recruited from 5 secondary schools of the municipality of San Cristóbal de La Laguna, on the island of Tenerife (Spain). Data were collected through the General Health Questionnaire, the Rosemberg Self-esteem Scale, and the physical exercise habits test physical activity questionnaire for adolescents-A, revealing the first 2 that most percentage of responses were grouped on the positive side. The physical exercise habits test physical activity questionnaire for adolescents-A described that the most commonly performed physical activity was walking (75%).

Abbreviations: GHQ = general health questionnaire, PA = physical activity, PAQ-A = physical activity questionnaire for adolescents, WHO = World Health Organization.

Keywords: adolescent, lifestyle, nursing research, self-concept

1. Introduction

Problematic behaviours in adolescence have been widely studied due to an increase in adolescents' negative self-perception.[1] Self-esteem and self-concept that young people have about themselves decisively influence the development of their identity and the way in which these individuals think, behave, and relate to others.[2,3,4] The self-concept is defined as a cognitive construction and, as such, there are social factors involved in its formation, being considered an indicator for a proper physical, cognitive, behavioral, emotional, and social functioning.[2,5,6] At the same time, self-esteem is defined as a global self-evaluation of one's own value as a person and is linked to the self-concept of the individual, as this as a factor that changes as the person establishes new relationships and roles in vital areas of his/her life.[3] These concepts have been associated with emotional stability, sociability, responsibility, psychological adjustment, a greater life satisfaction, and good academic performance. There is also a direct relationship between the increase of perceived self-concept and personal acceptance, generating an improvement in self-esteem, in such an extent that physical appearance is considered a predictor of self-esteem.[5]

On the contrary, lack of self-esteem has been identified as a risk factor included in the multi-causal background that may lead to adolescent suicide.[7] Adolescents who are vulnerable to suicide attempts due to low self-esteem perception are related to problem-focused coping styles,[8] and ineffective coping strategies when dealing with difficult circumstances such as bullying[9] and cyberbullying involvement,[10] internet addiction,[11] body dissatisfaction,[12] gender dysphoria,[13] bereavement after the suicide of a significant other,[14] among others. The complex context of suicide ideation covers physical-biological, mental-psychological, cultural-social, and spiritual factors.[15] From the biological approach, prolactin and thyroid hormones levels should be measured when assessing the risk of suicide, as they may play an important role in the complex compensatory mechanism to correct reduced central serotonin activity.[16]

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Currently, importance has been given to research and the implementation of education programmes to foster emotional and social development, as well as training in values. In this way, positive adolescent development is promoted by addressing a plot of competencies, values and skills to generate a successful future towards the adult stage.[1,17,18] The adolescent positive development model includes resources and assets (personal, family, school, or community) that provide the necessary support and experience for the promotion of the positive development of the adolescent.[17,19] Health professionals must be able to get to know and understand the developmental process that occurs during adolescence, as it is essential to address this issue accordingly and know how to carry out interventions of promotion, prevention, treatment, rehabilitation, as well as learn to educate parents on how to support young people in achieving their objectives.[20]

According to the World Health Organization (WHO), depression and anxiety disorders are estimated to affect more than 300 million people of all ages in the world. Anxiety is the ninth leading cause of illness among adolescents aged 15 to 19 years, and the sixth for those aged 10 to 14 years.[21] In Spain, 67.5% of the population occasionally attends their health centre due to an anxiety or mental state disorders. For this reason, there are numerous studies that support the practice of physical exercise in the treatment for psychological disorders reduction. Physical self-concept is recognised as a relevant marker of health during adolescence, because a weak physical self-concept is a predictor of psychological health problems such as anxiety about physical appearance, low self-esteem, and dissatisfaction with life.[6,17,22,27] Physical self-concept is related to healthy living habits, enhancement of social integration, autonomy, and the self-concept, and it is inversely associated with the consumption of narcotic drugs and eating disorders.[2,17,23,24,26,28]

Interventions aimed at physical activity (PA) have a positive effect on children and adolescents, increasing their self-concept and self-worth.[29] Children and adolescents who participate in PA are more likely to develop psychological well-being, self-image, satisfaction with life and happiness. On the other hand, they are also more likely to avoid psychological ill-being, depression, stress, negative affect, and total psychological distress.[30] PA also relates to better a perception of health-related quality of life among the youth.[31]

Diet and PA are key elements in the prevention of eating disorders and associated diseases such as metabolic and cardiovascular disorders, and in improving self-esteem.[6,24,25,32,33] In addition, associations have been found between ongoing PA practice and a more selective attention, inhibition of inappropriate responses, flexibility in thinking, and a better memory capacity that directly influences the academic performance of the adolescent.[24]

WHO has developed the Global Recommendations on Physical Activity for Health as a preventive measure for chronic disease. The aim of this action is to advise the frequency, duration, intensity, type and total amount of PA per age group: youth (from 5 to 17 years), adults (from 18 to 64), and elderly (over 65 years of age).[34]Table 1 summarises these recommendations. Nevertheless, 42% of Spanish citizens do not perform any kind of PA.[22] Overweight and obesity represent a major public health problem among the general population, especially among adolescents, since 1 out of 3 adolescents is overweight, and 1 out of 20 is obese, which increases morbidity and mortality.[2,6,32,35] Weight gain negatively influences the self-concept in adolescents, generating depression, apathy, feelings of inferiority, and low self-esteem.[2,6] Therefore, in Spain, the "Strategy for Nutrition, PA, and Prevention of Obesity and for Health" was implemented.[36] It includes, among its main objectives, the promotion of PA for children during the school day. This strategy is focused on the positive development of the adolescent and aims to provide them with competencies, values and skills that empower them for a successful transition towards the adult age.[1,36]

Thus, given the importance of PA regarding self-esteem and development in adolescents, and considering the preventive measures taken, it is necessary to assess the PA adolescents perform and their perception of the self-concept so as to evaluate the relationship between these 2 variables.

2. Methods

For the design of the study, an exhaustive literature search was carried out in the databases PubMed, Scielo, Dialnet, and Virtual Health Library through the Library of the University of La Laguna, Spain.

Table 1

WHO recommendations on physical activity. Source of own elaboration.

	Teenagers	Adults	Older Adults
Physical Activity	Games, sports, commuting, leisure activities, physical education or programmed exercises, in the family, school or community context.	Leisure activities, walking or cycling, occupational activities (job), housework, games, sports or programmed exercises in the daily family and community context.	Leisure activities, walking or cycling, occupational activities (when the person is still working), housework, games, sports or scheduled exercises in the daily activities, family, and community context.
Time	60 min/d, at least 3 times a week.	At least 150 min per week to practice aerobic physical activity, of moderate intensity, or 75 min of vigorous aerobic physical activity each week.	150 min per week of moderate aerobic physical activities, or some type of vigorous aerobic physical activity for 75 min. Adults with reduced mobility should perform physical activities to improve their balance and prevent falls 3 d or more a week. When older adults cannot perform the recommended physical activity due to their state of health, they will remain physically active to the extent that their own status allows.

WHO = World Health Organization.

Participants gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki and an informed consent was requested from all participants, as well as the corresponding permission from the institutions involved. In addition, measures were taken so that data were anonymous during data collection and analysis.

2.1. Design and procedure

Observational, cross-sectional, descriptive study with analytical components.

The recruitment and data collection was carried out during the Health Week celebrated in 5 secondary schools from San Cristobal de la Laguna, Tenerife (Spain). Adolescents from 16 to 22 years who attended to the programmed activities were invited to participate.

Data collection was carried out through the General Health Questionnaire (GHQ-12), the Rosenberg Self-Esteem Scale, and the PA Questionnaire (PAQ-A).

2.2. Population and sample

The total population of adolescents in the Canary Islands was 154,976 people between 16 and 22 years of age.[37] The sample size calculated for a confidence level of 95%, accuracy of 3%, and 15% of sample loss calculation was 191 participants. A convenience sample procedure was followed, obtaining 204 participants.

2.3. Inclusion criteria

Adolescents and young people aged between 16–22 years of age from secondary schools of San Cristóbal de la Laguna attending the *Health Week* programmed activities.

2.4. Exclusion criteria

Participants with a psychic disease or who are not in full possession of their mental faculties.

2.5. Non-Spanish speakers

People who did not give their consent.

2.6. Variables

- Demographic data: age, sex, and study centre.
- Psychological well-being.
- Self-esteem.
- PA.

2.7. Questionnaires

- Q1 GHQ-12: it is a self-administered questionnaire that assesses the psychological well-being of the individual in the last 6 months, with a Likert scale of 4 options from "never" to "always". The scoring is from zero to 3. A higher score would indicate greater severity of symptoms of anxiety, social dysfunction, loss of confidence and self-esteem, and/or depression.[38]
- Q2 Rosenberg Self-Esteem Scale: It is the most used psychological instrument to measure a person's satisfaction with him/herself (self-esteem). It is composed of 5 positive items and 5 negative ones, which are scored with a Likert scale from 0 to 3 points. Results between 0 and 16 indicate low self-esteem.[39]
- Q3 PAQ-A: It was designed to assess adolescents' PA during the last 7 days in different established time ranges to identify at what time of the day and week they were most active. It consists of 9 questions that assess different aspects of the PA performed by the adolescent through a 5-point Likert scale. This questionnaire will allow to know whether adolescents will comply with the WHO recommendations mentioned above.[36]

2.8. Statistical analysis

The statistical programme SPSS 22.0 was used. The descriptive analysis was done by using measures of central tendency and percentages. Factor analysis was applied to different questionnaires with the aim of identifying underlying factors of self-perception, self-concept, and self-perception of health and PA. For this, an analysis with Varimax rotation was performed provided that the Bartlett test of sphericity is positive. When factors were identified, which we understand as subscales, their reliability was analysed with a Cronbach α.

This was complemented by an analysis of correlation between the variables to identify possible evolutions shared by some of them; although they do not show cause and effect, they involve some type of relationship. Bivariate Pearson correlations were performed.

An inferential analysis with contrast of hypotheses was added to identify differences assignable to any of the variables: student *t*-test was used for means contrast, and the Kruskall-Wallis test when comparing more than 2 groups for a 95% confidence interval and a 0.05 α.

3. Results

3.1. Descriptive sample

The sample obtained was composed of 204 cases, of which 45.09% were women and 45.09% were men. There was a 9.82% percentage of non-response. The median age was 17. The participants attended 5 secondary schools of the municipality of San Cristóbal de La Laguna. These results are described in detail in Table 2.

3.2. Descriptive of the questionnaires

The descriptive results of the questionnaires are detailed in Tables 2–4. The reliability of the questionnaires answers obtained a Cronbach α of 0.40 for the GHQ, Cronbach α of 0.72 for that of Rosenberg, and Cronbach α of 0.87 for the PAQ-A.

In the case of the GHQ-12, the most common percentage of answers for each of the questions was grouped on the positive side, reflecting the self-perception of good health.

The Rosenberg Self-Esteem Scale showed results in line with the previous test, i.e. most adolescents tend to be in the positive part of self-esteem (Table 4).

The PAQ-A described that the most commonly performed PA was walking (75% of the total), followed by running (63%), and dancing (51%), and other less frequent activities such as football, volleyball, basketball, and racket sports. 2.9% of respondents did

Table 2

Sociodemographic descriptive results of the sample.

		Female							Male							
		Age							Age							
		Not answered n (%)	16 n (%)	17 n (%)	18 n (%)	19 n (%)	21 n (%)	22 n (%)	Not answered n (%)	16 n (%)	17 n (%)	18 n (%)	19 n (%)	21 n (%)	22 n (%)	Total n (%)
Centre	SS1	5	8	0	0	0	0	0	0	3	3	0	2	0	0	21 (10.3)
	SS2	1	7	4	0	0	0	0	0	2	1	0	0	0	0	15 (7.4)
	SS3	0	0	10	1	1	0	0	0	0	12	3	0	0	0	27 (13.2)
	SS4	6	11	6	1	0	1	1	0	13	7	2	2	0	0	50 (24.5)
	SS5	2	1	1	1	0	0	0	1	4	4	4	2	0	0	20 (9.8)
	Not answered	6	24	11	3	0	0	0	1	11	5	6	3	1	0	71 (34.8)
Total n (%)			51 (25)	32 (15.7)	6 (2.9)	1 (0.5)	1 (0.5)	1 (0.5)	2 (1)	33 (16.2)	32 (15.7)	15 (7.3)	9 (4.4)	1 (0.5)	0 (0)	
20 (9.82)				92 (45.09)							92 l45.09)				204 (100)	

Table 3

General Health Questionnaire (GHQ-12).

Descriptive					Factorial analysis: Components *		
	n	Much less than usual	Less than usual	Same as usual	More than usual	Trust	Worth
Have you been able to concentrate on what you were doing?	201	2.1%	8.5%	78.7%	10.6%	**.670**	-.162
Have your own concerns made you lose a lot of sleep?	200	15.4%	30.9%	41%	12.8%	.004	-.192
Have you felt you are developing an important role in life?	202	5.3%	14.4%	56.9%	23.4%	**.547**	-.015
Have you felt capable of making decisions?	203	1.6%	8%	51.6%	38.8%	**.593**	.089
Have you constantly felt tense and overwhelmed?	201	10.1%	25%	43.6%	21.3%	-.110	.011
Have you felt you are not able to overcome difficulties?	200	13.3%	36.2%	35.1%	15.4%	.187	**.387**
Have you been capable of enjoying the regular daily activities?	202	0.5%	9.6%	61.7%	28.2%	**.652**	.134
Have you been capable of properly addressing your problems?	202	3.2%	12.8%	61.2%	22.9%	**.697**	.266
Have you felt unhappy or depressed?	200	26.1%	27.7%	36.2%	10.1%	.011	-.754
Have you lost self-confidence?	200	10.1%	30.3%	30.3%	29.3%	.057	**.748**
Have you seen yourself as a useless person?	201	1.6%	22.9%	30.9%	44.7%	.263	**.714**
Do you feel reasonably happy considering the circumstances?	201	1.1%	8%	57.4%	33.5%	**.632**	.239
Reliability. Cronbach α			0.40			0.71	0.61

GHQ = general health questionnaire.

* Kaiser-Meyer-Olkin sample adequacy measure: 0.770. Bartlett's test of sphericity. Approx. chi-square: 425.564; gl.: 66; Sig.: 0.000. Extraction method: Analysis of main components. Rotation method: Varimax normalisation with Kaiser. a Rotation has resulted in 5 iterations. Total explained variance 50.97%.

not perform any PA. Two new variables were created from the first question and the possible activity alternatives, classifying the PA prescription protocol of the Canary Islands Health Service by tables. The first 1 distinguished any type of exercise starting with "none", and the second one considered exercise as moderate or intense (Table 5). 34.3% of the participants performed more than 7 weekly sessions of moderate exercise, and 12.7% intense exercise. (Table 6)

Table 4

Rosenberg self-esteem scale.

Descriptive						Factorial analysis: Components *
	n	Strongly disagree	Disagree	Agree	Strongly agree	Negative
In general, I'm satisfied with myself.	204	1.1%	10.6%	63.3%	25%	.329
Sometimes I think I'm not good at anything.	204	1.1%	19.1%	44.7%	35.1%	.697
I have the feeling that I have some good qualities.	203	0%	5.3%	70.7%	23.9%	-.022
I can do things as well as any other person.	204	0%	8.5%	68.6%	22.9%	.180
I feel I don't have a lot to feel proud of.	204	1.6%	18.6%	44.7%	35.1%	.651
Sometimes I feel completely useless.	204	2.7%	17%	38.3%	42%	.802
I have the feeling I'm a worthy person, at least the same as the rest.	203	0%	9.6%	68.1%	22.3%	.326
I wish I had more self-respect.	203	27.1%	35.6%	28.7%	8.5%	-.659
In short, I usually think I'm a failure.	204	2.7%	5.9%	37.8%	53.7%	.708
I have a positive attitude towards myself.	204	2.1%	12.8%	50.5%	34.6%	.396
Reliability. Cronbach α			0.72			0.80

* Kaiser-Meyer-Olkin sample adequacy measure: 0.877Bartlett's test of sphericity. Approx. chi-square 671.151; gl.: 45; Sig.: 0.000. Extraction method: Analysis of main components. Rotation method: Varimax normalisation with Kaiser. Rotation has resulted in 3 iterations. Total explained variance 55.39%.

Table 5

PAQ-A. Descriptive of physical activity frequency.

	n	No	1–2 times/week	3–4 times/week	5–6 times/week	7 times or more
Skipping	191	83.8%	10.5%	4.2%	1%	0.5%
Skating	190	90%	6.3%	2.1%	1.1%	0.5%
Playing games such as "tag" or "chasing"	186	86%	9.1%	4.8%	0%	0%
Cycling	190	67.9%	18.9%	7.9%	2.6%	2.6%
Walking (as exercise)	194	24.7%	20.6%	21.1%	12.9%	20.6%
Running/footing	188	36.7%	22.3%	23.9%	9.6%	7.4%
Aerobic/spinning	190	74.7%	14.7%	7.4%	2.1%	1.1%
Swimming	191	88%	7.3%	2.6%	1%	1%
Dancing	196	49%	27.6%	11.7%	5.6%	6.1%
Badminton	188	96.8%	2.7%	0%	0.5%	0%
Rugby	188	93.6%	6.4%	0%	0%	0%
Skateboarding	187	88.2%	7%	3.7%	1.1%	0%
Soccer/futsal	191	56.5%	17.8%	11%	5.2%	9.4%
Volleyball	192	82.8%	8.9%	3.1%	2.1%	3.1%
Hockey	189	97.4%	1.6%	1.1%	0%	0%
Basketball	192	71.4%	14.6%	6.3%	4.7%	3.1%
Skiing	188	100%	0%	0%	0%	0%
Other racket sports	190	90%	5.3%	1.6%	0.5%	2.6%
Handball	188	93.1%	3.2%	1.6%	1.6%	0.5%
Athletics	189	88.9%	6.3%	1.1%	2.1%	1.6%
Muscle-building/lifting weights	191	54.5%	18.3%	17.3%	5.2%	4.7%
Martial arts (judo. karate. ...)	188	91%	3.2%	3.7%	1.1%	1.1%
Other	182	64.3%	12.1%	12.6%	4.9%	6%
Reliability. Cronbach α sports: 0.76						

Table 5 PAQ-A Descriptive of physical activity questions

						Factorial analysis Components *	
						Weekly frequency	**Being sick**
In the last 7 d, during PE classes, how many times were you very active, by intensively playing, running, jumping, throwing?						.424	-.174
n	I wasn't/ don't do PE	Almost never	Sometimes	Often	Always		
202	2.5%	3%	17.3%	35.6%	41.6%		
In the last 7 d, what did you normally do at lunch time (before and after eating)?						.183	.570
n	Sit (talk, read, class work)	Wander or be around	Run or play a bit	Intensively run and play all the time			
158	68.4%	23.4%	5.7%	2.5%			
In the last 7 days, immediately after school until 6pm, how many days did you play any game, do sports, or dance very actively?						.781	.032
n	None	Once in the last week	2–3 times in the last week	4 times in the last week	5 times or more in the last week		
163	24.5%	16%	30.7%	17.2%	11.7%		
In the last 7 d, how many days from mid-afternoon did you do sports, dance or play games very actively?						**.844**	.065
n	None	Once in the last week	2–3 times in the last week	4 times in the last week	5 times or more in the last week		
162	19.1%	16%	31.5%	20.4%	13%		
In the last weekend, how many times did you do sports, dance or play games very actively?						**.707**	.234
n	None	Once in the last week	2–3 times in the last week	4 times in the last week	5 times in the last week		
163	27%	28.2%	30.7%	8.6%	5.5%		
Which of the following sentences best describes how you felt this week? Read the 5 sentences before making a decision.						**.844**	.188
n	All or most of my time was dedicated to activities that require little physical effort	I sometimes (once or twice) did physical activities in my spare time	I often (3–4 times a week) did physical activities in my spare time	I quite often (5–6 times a week) did physical activities in my spare time	I very often (7 or more times in the last week) did physical activities in my spare time		
160	20%	28.1%	28.1%	15%	8.8%		
Were you sick this week, or did anything prevent you from doing physical activities?						-.092	**.814**
N	Yes	No					
196	23.5%	76.5%					
Reliability. Cronbach α questions				0.74		0.79	0.9

Table 5 PAQ Activity by days of the week

	n	None	Little	Normal	Quite a lot	A lot
Monday	198	9.6%	22.7%	36.4%	21.7%	9.6%
Tuesday	192	8.9%	17.7%	38.5%	28.6%	6.3%
Wednesday	196	6.6%	23.5%	36.2%	26%	7.7%
Thursday	193	8.8%	22.8%	32.6%	26.9%	8.8%
Friday	197	11.2%	18.3%	28.9%	31%	10.7%
Saturday	196	14.8%	23.5%	27.6%	19.9%	14.3%
Sunday	193	24.9%	37.3%	20.2%	10.9%	6.7%
Reliability. Cronbach α days a week						0.81
Reliability. Cronbach α Total						0.87

PAQ = physical activity questionnaire.
* Kaiser-Meyer-Olkin sample adequacy measure. 0.788.
Bartlett's test of sphericity. Approx. chi-square 255.144, gl.: 21; Sig.: 0.000.
Extraction method: Analysis of main components.
Rotation method: Varimax normalisation with Kaiser. Rotation has resulted in 5 iterations.
Total explained variance 55.245%.

3.3. Factorial analysis

The complete factorial analysis is described in Tables 2–4. The Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett test of sphericity are presented; they were significant in the 3 questionnaires to study. An orthogonal rotation with Varimax normalisation was performed to ensure that the juxtaposition of the found factors was minimal.

The factorial analysis of the GHQ-12 questionnaire identified 3 different categories (Table 2): one that described trust, another one that described worth perception, and finally, concern. The total variance explained was 50.97%. The reliability of the 3 factors was: Cronbach α 0.71, 0.61, and 0.81 respectively. In these 3 cases, the reliability was higher than that of the complete questionnaire.

The Rosenberg Self-Esteem Scale identified 2 factors in the factorial analysis: 1 that we called negative Rosenberg, and another 1 which was positive. The total variance explained was 55.39%. The reliability of both factors was: Cronbach α of 0.80 and 0.43.

For the analysis of the PAQ-A, the 7 Licker-type answer items were used. In this case, 2 factors were isolated: on the 1 hand, the item formed by the 5 questions regarding weekly PA and, on the other hand, that formed by 2 questions that describe their feeling sick. The total variance explained was 55.24%, and the reliability of each factor is 0.79 and 0.9, both above the total of the 7 questions: 0.74. All the factors found were used as variables for correlation analysis and means contrast.

3.4. Correlations between questionnaires

The correlation analysis included questionnaires and their mean scores, the different factors identified and those mentioned in the preceding section, as well as the variables created for the analysis of the type of exercise (Table 7).

Large or medium correlations were found between the factors of the questionnaires and their main results. There were medium correlations between the GHQ-12 and the Rosenberg. There were no correlations between both the GHQ-12 and the Rosenberg and the PAQ-A and its different sub-factors and variables.

3.5. Hypotheses contrast tests

Hypotheses contrast tests for answers to the questionnaires according to age, sex, and study centre are described in Table 8. For the age analysis, it was decided to divide the participants into 2 groups according to the median, which is located in 17 years of age.

There were statistically significant differences regarding the student *t*-test as for:

(1) Age. For the variables: "GHQ-12", "some exercise", and "moderate exercise". In the 3 variables, it was shown that the older the participant, the better the results.
(2) Sex. For the variables: "GHQ-12 concern", "some exercise", "intense exercise", "PAQ-A summary of weekly exercise". In this case, men obtained the best results.

In the case of the centres, to compare the different groups, it was decided to use the Kruskall-Wallis test. There were statistically significant differences for the variables "GHQ-12 trust", "GHQ-12 concern", "total Rosenberg", "positive Rosenberg", and "intense exercise".

4. Discussion

As shown in the results, self-perception of health measured with GHQ-12, self-esteem measured through the Rosenberg scale, and PA assessed by the PAQ-A test seem to show a positive picture of this methods. However, statistically significant differences were

Table 6

Distribution by type of exercise.

	YES n (%)	NO n (%)	0 times a wk n (%)	Between 1 and 7 sessions a wk n (%)	More than 7 sessions a wk n (%)
Exercise	198 (97.1)	6 (2.9)			
Moderate Exercise	194 (95.1)	10 (4.9)	10 (4.9)	94 (46.1)	70 (34.3)
Intense Exercise	154 (75.8)	50 (24.5)	50 (24.5)	102 (50)	26 (12.7)
Moderate and Intense	150 (73.5)	54 (26.5)			
Moderate and Intense	150 (73.5)	54 (26.5)			

Table 7

Correlations.

		GHQ Total	GHQ-12 Trust	GHQ-12 Worth	GHQ-12 Concern	Total Rosenberg	Negative Rosenberg	Positive Rosenberg	Some exercise	Moderate	Moderate S/N	Intense	Intense S/N	PAQ weekly	PAQ sick
GHQ Total	C. Pearson	1													
	Sig. (bil.)														
GHQ-12 Trust	C. Pearson	**.826**	1												
	Sig. (bil.)	.000													
GHQ-12 Worth	C. Pearson	**.343**	.000	1											
	Sig. (bil.)	.000	1.000												
GHQ-12 Concern	C. Pearson	.158	.000	.000	1										
	Sig. (bil.)	.029	1.000	1.000											
Total Rosenberg	C. Pearson	**.485**	**.452**	**.354**	-.139	1									
	Sig. (bil.)	.000	.000	.000	.057										
Negative Rosenberg	C. Pearson	.208	.197	**.330**	-.298	**.617**	1								
	Sig. (bil.)	.004	.007	.000	.000	.000									
Positive Rosenberg	C. Pearson	**.491**	**.469**	.199	.016	**.724**	.000	1							
	Sig. (bil.)	.000	.000	.006	.832	.000	1.000								
Some exercise	C. Pearson	.156	.188	.044	-.017	.208	.141	.189	1						
	Sig. (bil.)	.032	.009	.546	.814	.003	.045	.007							
Moderate	C. Pearson	.208	.235	.027	-.041	.219	.074	.240	**.511**	1					
	Sig. (bil.)	.008	.003	.735	.606	.004	.338	.002	.000						
Moderate S/N	C. Pearson	.130	.111	.167	-.014	.163	.118	.145	**.574**	**.569**	1				
	Sig. (bil.)	.074	.126	.021	.845	.021	.096	.040	.000	.000					
Intense	C. Pearson	.098	.169	-.037	-.107	.162	.125	.154	**.785**	**.353**	.192	1			
	Sig. (bil.)	.207	.028	.638	.169	.032	.100	.041	.000	.000	.010				
Intense S/N	C. Pearson	.121	.171	-.034	-.013	.168	.111	.153	**.912**	**.320**	.187	**.846**	1		
	Sig. (bil.)	.095	.018	.646	.854	.017	.118	.030	.000	.000	.007	.000			
PAQ weekly	C. Pearson	.136	.177	-.053	-.064	.207	.111	.209	**.431**	**.526**	**.306**	**.366**	**.365**	1	
	Sig. (bil.)	.109	.038	.538	.455	.011	.180	.011	.000	.000	.000	.000	.000		
PAQ sick	C. Pearson	.121	.094	.060	-.044	.199	.079	.166	-.010	.042	.069	-.009	-.047	.000	1
	Sig. (bil.)	.155	.270	.483	.608	.015	.342	.043	.907	.632	.402	.918	.568	1.000	

High > 0.7
Medium > 0.4 < 0.7
Low < 0.3 < 0.2

PAQ = physical activity questionnaire

Table 8

Differences by age, sex, and centre.

	Age				Sex				Centres
	Age group	n	Mean	T equality of means Sig. bil.	Sex	n	Mean	T equality of means Sig. bil.	Kruskal-Wallis
GHQ-12	≤17a.	155	34.47	**0.01**	Female	84	34.66	0.78	0.19
	>17a.	35	36.11	**0.01**	Male	87	34.81	0.78	
GHQ-12 Trust	≤17a.	155	-0.05	0.13	Female	84	-0.09	0.30	**0.01**
	>17a.	35	0.22	0.08	Male	87	0.07	0.30	
GHQ-12 Worth	≤17a.	155	-0.01	0.72	Female	84	-0.10	0.15	0.06
	>17a.	35	0.05	0.74	Male	87	0.12	0.15	
GHQ-12 Concern	≤17a.	155	-0.01	0.85	Female	84	0.14	**0.02**	**0.04**
	>17a.	35	0.03	0.84	Male	87	-0.21	**0.02**	
Total Rosenberg	≤17a.	165	30.77	0.56	Female	91	30.61	0.33	**0.03**
	>17a.	36	31.17	0.49	Male	90	31.15	0.33	
Negative Rosenberg	≤17a.	165	0.01	0.82	Female	91	-0.03	0.50	0.84
	>17a.	36	-0.04	0.80	Male	90	0.07	0.50	
Positive Rosenberg	≤17a.	165	-0.04	0.25	Female	91	-0.05	0.40	**0.02**
	>17a.	36	0.17	0.31	Male	90	0.07	0.40	
Some exercise	≤17a.	167	1.67	0.08	Female	92	1.62	**0.01**	–
	>17a.	37	1.84	**0.03**	Male	92	1.82	**0.01**	
Moderate Exercise	≤17a.	141	1.29	**0.01**	Female	76	1.29	0.28	0.30
	>17a.	33	1.57	**0.01**	Male	80	1.39	0.28	
Moderate Exercise S/N	≤17a.	167	.94	0.12	Female	92	0.96	0.47	–
	>17a.	37	1.00	**0.01**	Male	92	0.95	0.47	
Intense Exercise	≤17a.	144	.83	0.17	Female	77	0.61	**0.01**	**0.01**
	>17a.	34	1.00	0.19	Male	83	1.12	**0.01**	
Intense Exercise S/N	≤17a.	167	0.74	0.19	Female	92	0.65	**0.01**	**0.01**
	>17a.	37	0.84	0.15	Male	92	0.88	**0.01**	
PAQ-A Summary of weekly exercise	≤17a.	125	-0.08	**0.02**	Female	68	-0.21	**0.01**	0.53
	>17a.	24	0.41	**0.02**	Male	67	0.23	**0.01**	
PAQ-A Feeling sick	≤17a.	125	-0.05	0.17	Female	68	-0.15	0.22	0.49
	>17a.	24	0.25	0.13	Male	67	0.06	0.22	

GHQ = general health questionnaire, PAQ-A = physical activity questionnaire for adolescents.

found for some of the variables in relation to age, sex, or the study centre.

The differences found by age with respect to GHQ-12 suggested that the older the person, the better health the self-perception. We may take this as a starting point for further research, as the causes or factors for which students under 17 years of age have a worse health self-perception are ignored. The other differences found by age refer to moderate and weekly exercise, again favouring over 17-year-olds.

The differences found by sex showed that women are more concerned about health, according to the "GHQ-12 concern" factor, and that they do less exercise than men. Again, further studies should confirm these findings and further develop the fact that women have a worse self-perception of health than men and perform less PA. In particular, the results were worse for intense exercise.

As for the observed differences between centres, there was a worse perception of health and self-esteem and less intense exercise. In our analysis, the centres have been anonymised, so we can only expose the findings. Again, another line of research opens; in this case, research in our field makes us think of socio-cultural and economic inequalities on the 1 hand, and differences in school equipment on the other.

The differences described suggest that routinely PA, as a healthy habit, should be reviewed for these age groups in order to integrate and maintain it in the student's weekly routine. It does not seem advisable to establish differences by age, sex, and centres regarding PA.

The sample size was 204 subjects (n = 204) with a profile in terms of sex and age similar to the general Canarian adolescent population.[37] Therefore, for the expected values of the different questionnaires, the sample reached was within the necessary range for the extrapolation of the results to the Canarian population. If further studies with the same methodology were carried out in other geographical areas, the present study could provide data on the study's greater representativeness.

Further interesting findings of this study are the factors found as regards the GHQ-12 questionnaire, the Rosenberg scale, and the PAQ-A. These factors allowed the study of correlations and differences according to age, sex and centre in a more exhaustive way than with the exclusive use of the main results.

There was no correlation between the variables studied as for the GHQ-12, Rosenberg, and PAQ-A. This result is striking because different studies associate self-esteem and well-being with PA.[29–31] In this study, this relation does not seem to be represented, though.

The PAQ-A identifies walking as PA, while population health studies equal this PA to moderate exercise 3 days a week.[40] Studies on sedentary lifestyle are linked to obesity studies and the need to balance the caloric expenditure in relation to the ingestion. In this sense, it should be said that it would be advisable to study the caloric expenditure in relation to the PA carried out and whether the validation of a tool may add more exact data regarding this relationship. Subsequent studies should include the variables size, weight, and abdominal perimeter.

Following this relationship, it is also surprising that in the Canary Islands, having in this age group a prevalence of obesity higher than the national average, the perception of health is good, and the PA performed seems adequate.[41–43] It seems that healthy habits information given to this age range does not affect real healthy habits, due to ignorance, motivation, or lack of means.

The limitations of this study could be grouped into 2 categories. On 1 hand, the study variables and, on the other hand, the characteristics of the sample. As for the study variables, the need to add some questions explaining differences in perception and differences in habits should be evaluated. For example, the study could be expanded with psychosocial measuring tools and instruments that explore healthy habits beyond PA. Regarding the statistical analysis, correlation tests were performed, further regression analyses in order to verify whether there are some possible predictors of self-perception of health and self-concept of physical appearance among adolescents that could improve the results and which are suggested for future research. Regarding the sample, although the sample size seems appropriate, it is important to add sociodemographic characteristics that allow identifying subgroups with special characteristics, as the differences indicated by centres seem to prove. However, these limitations do not diminish the value of the findings or of the achievement of the research objectives.

Authors conclude that the adolescents surveyed have a good self-esteem and self-concept, a good perception of health, and that they had habits of active PA. Differences were found according to age, as elder participants had a better self-concept and performed more PA per week. Regarding sex, women were more concern about their health, but their PA was less intense. According to our findings, self-concept and self-esteem were not related with PA. Further research is required to deeper explore the impact of these variables on PA as regards this population group.

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