Relationships between physical fitness and physical self-concept in Spanish adolescents

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Abstract

The objective of this study is to ascertain whether there is a direct association between physical fitness and the factors that determine the physical self-concept. The sample consisted of 53 schoolchildren of 14-15 years old. To evaluate the physical fitness, three tests were used. To evaluate the physical self-concept, the Physical Self Concept Questionnaire was used. An association was found between endurance and strength as components of physical fitness and the factors that determine the physical self-concept in the sample. Therefore, the adolescents achieving better scores on these tests will have a better physical self-concept. The same applies to the factors that determine the physical self-concept when they are related to each other, but not when they are related to flexibility.

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1. Introduction

The changes that occur in adolescence have an important influence on the development of a person, molding him or her into an adult (Shahar, Henrich, Blatt, Ryan and Little, 2003). Puberty is a major biological change during which there is a rapid increase in height, weight and a significant modification in body composition that will define how the human being will be physically and physiologically in adulthood, since the first stage is understood as the precursor of the second one (Richter, 2006). According to WHO (World Health Organization), the adolescent period is from 10 to 19 years old.
1.1. Physical fitness and health in adolescence

The physical fitness is related to the ability to perform physical activity (Caspersen, Powell and Christenson, 1985). But there are many factors that might affect this ability to perform physical activity. Among them, physical inactivity and low physical fitness are determinant factors in the occurrence of certain diseases which are a major concern in today’s society, as it is the case of obesity (Moliner-Urdiales et al., 2010; Ochoa et al., 2007; Vicente-Rodriguez et al., 2008). Aerobic capacity and muscle strength are important indicators and predictors for disease and cardiovascular mortality risk. With this in mind, it is worth mentioning that the onset of this type of diseases, which mostly occur in adulthood, usually start appearing in early childhood or adolescence (McGill et al., 2000). Indeed, for some cases indicators of cardiovascular disease risk have been found for this age group (McGill et al., 2000; Warnberg, Moreno, Mesana, Marcos and Grp, 2004). Some of them can even predict future morbidity and mortality, as it is the case of childhood overweight (Must, Jacques, Dallal, Bajema and Dietz, 1992).

Similarly, some authors established in their research that the role of low physical fitness as a cardiovascular risk factor outweighs even the role of other well-established factors, such as dyslipidemia, hypertension or obesity (McGill, 1990).

The study of these factors during the adolescent period is, therefore, crucial for the diagnosis and prevention of the conditions associated with cardiovascular disease in adults. In this regard, several transversal studies have shown the relationship between physical fitness level and other cardiovascular risk factors in childhood and adolescence (Ekelund et al., 2001; Nielsen and Andersen, 2003). Similarly, important longitudinal studies have found that the level of physical fitness in adult life and the presence of other conventional cardiovascular risk factors (hypercholesterolemia, hypertension, etc.) are determined by the level of physical fitness that people have in childhood or adolescence.

It is noteworthy that the components of physical fitness can be divided into two groups: the former is related to health (consisting of cardiorespiratory endurance, muscular strength and endurance, body composition and flexibility) and the latter to sport performance (consisting of agility, equilibrium, coordination, speed, power and reaction time) (Caspersen et al., 1985).

Following this line of research and according to the Toronto Model of Physical Fitness, Physical Activity and Health, there is a close relationship between Physical Fitness and Health. As a result, the amount and type of physical activity will determine the level of physical fitness and, at the same time, the level reached will determine the type of activity to be performed (Shephard and Bouchard, 1994). Taking this into consideration and according to several studies, the physical self-concept plays a key role in the development of this level of physical fitness which can allow or cannot allow the realization of certain types of activities within a specified period of time and which can increase the positive influence it will have on the person’s health (Ceschini, Andrade, Oliveira, Araujo, and Matsudo, 2009; Martinek, Cheffers and Zaichkowsky, 1978).

Consequently, to evaluate the future cardiovascular risk as early as possible, the above-mentioned assessment must necessarily begin in childhood or adolescence.

1.2. Physical self-concept and physical exercise

For decades, researchers have tried to relate self-esteem to a healthy lifestyle in adolescence. The line of research carried out in this regard argues that young people with low self-esteem perform particular behaviors which jeopardize their health. However, those with high self-esteem perform healthier behaviors. But despite the sheer variety of work in this area, the results obtained are confusing and inconclusive, thus implying that self-esteem may not be a valid predictor in the study of health behaviors. For this reason, nowadays there are many authors who suggest that the dimensions of self-concept are useful for this purpose (Pastor, Balaguer and Garcia-Merita, 2006).

Making reference to self-concept and, at the same time, establishing its relationship with physical exercise means to deal with one of the most popular lines of current research. The numerous benefits that the practice of physical activity produces at a physical and a physiological level have been already mentioned, but it is also worth highlighting the benefits that this practice produces at a psychological level (Steptoe and Butler, 1996; Wankel,
But, despite its benefits to self-esteem, various studies agree that sedentary lifestyles are still very common (Moliner-Urdiales et al., 2010; Vicente-Rodriguez et al., 2008). Therefore, it would be interesting to think whether a direct relationship between these two variables may be possible. Physical inactivity is the result of poor self-esteem and self-perception of adolescents or, instead, is the cause of it.

Physical care and body image, especially in adolescence, is a social fact nowadays (Morrison, Kalin and Morrison, 2004; O'Dea and Abraham, 2000). In adolescence, self-esteem problems arise from the large amount of changes experienced by the body at that age. This, along with the natural desire to be accepted, leads adolescents to make continuous comparisons with others. In addition, there is a direct relationship between the increase of perceived competence and personal acceptance, thus favoring the development of self-esteem. Both aspects, body and appearance, are also considered to be the most influential predictors of self-esteem (Moreno, Cervello and Moreno, 2008). Therefore, in their study these authors point out that different factors need to be taken into account when it comes to physical self-concept.

The physical changes experienced by the body during the adolescent stage influence significantly on the personal and social identity of the individual. For this reason, the process of formation of physical self-concept can be considered to be inherent to this age and can also influence on physical-sports habits that, at the same time, will influence on the physical aspect and the state of adolescent health. From the above, it is possible to conclude that a good body image can be associated with a good self-concept and, likewise, with a more active and less sedentary lifestyle.

1.3. Objectives of the study

- To ascertain whether sex affects the different factors that determine the physical self-concept in all its variants in schoolchildren aged 14-15.
- To ascertain whether there is a direct association between physical fitness (endurance, strength and flexibility) and the factors that determine the physical self-concept in the sample.

2. Method

2.1. Characteristics of the population and sample

This research was a pilot study in adolescents aged 14 to 15 years old from two schools. The sampling was non-probabilistic, intentional and by convenience according to a number of inclusion and exclusion criteria. It was intended to cover the same range of ages. Similarly, the sex variable also kept an equitable balance between the number of men (28) and women (25). The total was n = 53.

2.2. Procedure and design

The research was carried out by performing a quantitative study of transversal descriptive design, following the ethical standards recognized by the Declaration of Helsinki (revision of Hong Kong, September 1989) and in accordance with the Good Clinical Practice recommendations of the EEC (document 111/3976/88 July 1990) and the Spanish legal regulations that regulate clinical research on humans (Royal Decree 561/1993 on clinical trials).

Prior to conducting the study, training tests were performed by the researchers involved in the project for the standardization, validation and study of the reliability of the measure.

2.3. Variables and materials used

2.3.1. Instruments and physical fitness assessment

Three tests integrated within the battery EUROFIT (Institute of Sciences of Physical Activity and Sport, 1992), validated and standardized by the Council of Europe, were applied in the following order:
• “Back saver sit and reach”. With the subject seated on the floor and using a standardized support, it was possible to define the maximum distance reached with the tip of their fingers by flexion of the trunk (Chillon et al., 2010). Such test indicates the amplitude of movement or flexibility.

• Hand Dynamometry. By making use of a digital dynamometer Takei TKK 5101 (range, 5-100 kg) the maximum hand grip strength in both hands was assessed (Ruiz et al., 2006).

• Course-Navette test. This test assessed the maximal aerobic capacity by means of an indirect-incremental-maximum field test, a 20 m shuttle run test, by using the equations proposed to estimate maximal oxygen consumption (VO2max) (Ortega et al., 2005). The subject starts the test by walking and finishes it by running from one point to another and by making the change of direction at the rhythm indicated by an audible signal that is progressively accelerating. The reliability and validity of this test to predict VO2max in children and adolescents have been thoroughly demonstrated.

2.3.2. Instruments and physical self-concept assessment

With the purpose of evaluating the physical self-concept, we made use of a previously validated questionnaire which had already been employed in various studies. This was the Physical Self Concept Questionnaire (CPSQ), modified and adapted to Spanish (Moreno et al., 2008).

It is an instrument consisting of 30 items and five factors that divide the physical self-concept in Physical Fitness, Body Appearance or Perception, Perceived Competence, Physical Strength and Self-esteem. The answers are given on a Likert scale from 0 to 5 ranging from strongly disagree to strongly agree. The reliability coefficient of the questionnaire is .93 (Esnaola, Infante and Zulaika, 2011).

2.4. Statistical analysis

The statistical comparison tests to be used include an analysis of estimation of normality through a Kolmogorov-Smirnov test. Depending on the results obtained, the average test is adapted where appropriate (Student's t-test or U-Mann-Whitney-Wilcoxon) to make a comparison between two groups, and an ANOVA or independent samples k-test is used to compare multiple groups. The complete statistical analysis was carried out by making use of SPSS v14.0.1 for Windows XP.

3. Results

3.1. Sex in connection with the factors that determine the physical self-concept

The conclusion to be drawn from the analysis performed by a nonparametric KS-1 test in SPSS is that all values were above ‘05 (p>0’05), thus fulfilling the normality criterion with which to conduct an inferential evaluation. The variable “physical self-concept” was selected for all its factors (physical fitness, appearance, perceived competence, perceived strength, self-esteem and general self-concept) in order to contrast with the sex variable. All the values were higher in boys than in girls. In the independent samples T-test, the homogeneity of variance test provides through F of Snedecor a statistical significance or associated p-value higher than 0.05 in all cases, thereby assuming the homogeneity of variances.

3.2. Physical fitness level and factors that determine the physical self-concept with each other

For the analysis of the other variables, the procedure of bivariate correlations through Pearson’s linear correlation coefficient was used. In the output provided by SPSS, it is possible to observe that it is a symmetric matrix that takes all unit values from its own diagonal, where variables manage to associate with themselves. What is shown for each pair of variables is the selected correlation coefficient (r), the contrast significance (p), taking into account that the lower its value is, the more reliable the information provided by the correlation coefficient will be (one asterisk when p <0.05 and two asterisks when p <0.01), and the number of missing cases (N).
In this sense, it is important to point out that the number of missing cases for all related variables is the same as that of the sample (N = 53).

In the case of the physical fitness factor, the correlation coefficient (r) has two asterisks when it is related to the next factors: appearance, perceived competence, perceived strength, self-esteem, general self-concept and the two tests that measure the strength and endurance to assess the level of physical fitness. It then correlates with these factors, which are higher only if the physical fitness factor is higher too.

The appearance factor has two asterisks when it is related to the general self-concept, although it has only one when it is related to the variable that intends to measure the Course Navette. Therefore, Course Navette test correlates with self-concept in such a way that the one with a higher score gets better values of self-concept.

Perceived competence also shows two asterisks when it is related to perceived strength, self-esteem, general self-concept and physical tests that measure the variable strength and endurance. Perceiving more competence allows, at the same time, to perceive more strength, self-esteem, general self-concept and to obtain better results in strength and endurance.

The same happens when the perceived strength is related to self-esteem, general self-concept and the tests that measure strength and endurance. But the test “Back saver sit and reach” does not correlate with self-concept.

Self-esteem has two asterisks when it is related to general self-concept and Course Navette test. The same holds true for general self-concept, but only when it is related to the endurance test. This correlation shows that the fact of having more self-esteem and general self-concept makes possible to achieve better results in endurance tests.

On the other hand, as far as the relationship between tests to measure physical fitness is concerned, the test that measures flexibility in the left leg shows two asterisks when it is related to the right leg and the test that measures the strength when it is related to the one that measures the endurance. Therefore, there is a correlation on the basis that the higher the flexibility in the left leg, the higher the flexibility in the right leg and the better the results obtained in strength test, the better the results in the endurance test and vice versa.

4. Discussion

4.1. According to the sex of the sample

There is no statistically significant association between sex and the factors that determine the physical self-concept (physical fitness, perceived competence, self-esteem, appearance, perceived strength and general self-concept), because in the test of independent samples the average of each of the mentioned variables for men and women is not below the significance alpha level = 0’05.

This comes into conflict with the statement made by Esnaola, Rodriguez and Goni (2010) and by Pastor, Balaguer and García-Merita (2006), who argued that men usually show more significant differences than women in all dimensions of the physical self-concept.

In this sense, it is true that the variables cannot be extrapolated to the rest of the adolescent population because they do not correlate significantly. However, according to these authors, the variables closest to signification are namely physical fitness and self-esteem, whereas self-concept and appearance are the most distant variables to signification. In the same way, physical fitness, competence and self-esteem have values of 3 or almost 3 in the Lickert scale in the case of men, these being the highest values. When it comes to the other factors, the value of the boys is always higher than the value of the girls.

4.2. According to the physical self-concept and the physical fitness of the sample

As far as the factors that determine the variables “self-concept” and “physical exercise” are concerned, there is a correlation between each other, thus obtaining coefficients even below 0’01 in the vast majority of cases. In this sense, from the results obtained it is evident that physical fitness correlates with the next factors: appearance, perceived competence, perceived strength, self-esteem and general self-concept; appearance with the factor general self-concept; perceived competence with perceived strength, self-esteem and general self-concept; and finally perceived strength with self-esteem and general self-concept. These results concur with those obtained in the
studies conducted by Lau, Cheung and Ransdell (2008) and with the dimensions of self-concept (Pastor et al., 2006).

Given that all the values shown by Pearson’s correlation coefficient are positive, it is possible to deduce that the relationship between the variables is directly proportional. Consequently, the higher the concept of physical fitness, the higher the appearance, perceived competence and strength and the higher the self-esteem and self-concept of adolescents. In the same way, the better the appearance, the better the self-concept. Also, the higher the perceived competence is, the higher the perceived strength, self-esteem and self-concept will be. The same holds true for the self-esteem, since the better the self-esteem, the better the self-concept. It is also the same as regards higher values of perceived strength, which will provide a better esteem and concept.

From the results obtained, it is worth mentioning that those tests that measure strength and endurance are directly related to the next factors: physical fitness, competence, perceived strength and general self-concept, as long as their correlation coefficients are below 0.01. Since, as in previous correlations, the Pearson coefficient is positive, the relationship will be directly proportional. Accordingly, it is easy to deduce that the higher the strength and endurance, the higher the perception of physical fitness, competence and strength. They will also have a better self-concept. This coincides with the results of several studies (Carraro, Scarpa and Ventura, 2010; Du Toit, Venter and Potgieter, 2005; Lintunen, Leskinen, Oinonen, Salinto and Rahkila, 1995).

It is also evident from the results that there is a direct relationship between endurance and appearance. Although, in this case, the significance is lower than that observed for the rest when p = 0.05, it can be said that the higher the endurance, the better the appearance and vice versa. The same applies to the self-esteem, although the significance is higher when p < 0.01.

Moreover, there is no correlation between flexibility and strength or between flexibility and endurance. However, regarding the variable flexibility, it is possible to deduce that the higher the flexibility of the left leg, the higher the flexibility of the right leg and vice versa. There is also a relationship between strength and endurance, so the higher the strength, the higher the endurance, and the same applies the other way round.

5. Conclusions

The variable sex has not a significant effect on the different factors that determine the physical self-concept in all its variants in the population under study, although boys have better values of self-concept than girls.

There is a relationship between endurance and strength as components of physical fitness and the factors that determine the physical self-concept in the sample in such a way that the students with higher scores on these tests will have higher self-concept. The same holds true for the factors that determine the physical self-concept when they are related to each other, but not when they are related to flexibility.

The conclusion to be drawn is that it is then important that physical fitness is valued as a positive factor for physical and mental health, since, as shown by the study at hand, it can bring positive effects on physical self-concept.

Therefore, it is necessary to conduct future investigations of a longitudinal nature with a larger sample and an experimental proposal which includes a program to improve physical fitness. The purpose is to obtain a cause-effect relationship by performing a pre-test and a post-test, given that the size of the sample and the fact that it is a descriptive study have been the two main limitations of this study and may have had an influence on some of the unexpected results.

It is also important to deal with the physical fitness together with strategies to promote the adolescents' physical self-concept, because the higher the self-concept, the better the results obtained in tests of physical fitness and the higher the predisposition to perform them.

In this sense, the main conclusions drawn from this study are that the better the self-concept, the better the physical fitness in strength and endurance and vice versa. For this reason, we propose to develop future research pathways which work with certain techniques to enhance physical self-concept in adolescence through the improvement of physical fitness, either through Physical Education lessons or through extracurricular physical activity programs. It would be interesting to know to what extent certain intervention programs through physical activity can have an influence on self-concept and physical fitness.
References


