RESEARCH ARTICLE

PHYSICAL CONDITION, PHYSICAL SELF-CONCEPT AND ACADEMIC ACHIEVEMENT IN ADOLESCENCE

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ARTICLE INFO	ABSTRACT
	The objective of this study was to understand physical self-concept and how it relates to the variables physical condition, academic achievement, age, and gender. With a total of 1533 participants, 46,44% are boys, aged between 12 and 17 years old, 3rd cycle, from the Algarve region, Portugal. Physical condition, academic achievement and physical self-concept were assessed. It was found that physical condition and physical self-concept have a statistically significant relation, globally and in both genders. The averages between female and male participants differ significantly, with boys' averages being higher. The association between physical self-concept and academic achievement at a global level was positive, weak, but significant at a significance level of 0,05. In boys and girls, the correlation is equally significant, positive, and weak. Age influences in a statistically significant and opposite way the physical self-concept in the overall sample and at the female level.

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INTRODUCTION

Adolescence is a period of our ontogenesis, where profound transformations of different natures take place, such as: physical; emotional; cognitive; motor and social (Berger, 2016; Craggs, Corder, von Sluijs, & Griffin, 2011; Rudroff, Keasey, Melanson, McQueen, & Enoka, 2013). According to Steinberg (2005), adolescence is a special period, of high vulnerability as a consequence of mismatches between brain development, cognitive and behavioural systems, which present different *timings* underlying biological and psychological control processes. Idea reinforced by van der Cruijsen Peters, van der Aar and Crone (2018). And it is precisely in this age group, more specifically between 12 and 17 years old, the age period that comprises the sample of the present study. On the other hand, Marques, Mota, Gaspar and Matos (2017), found out that in recent years interest in the study of physical fitness has increased, being associated with psychosocial aspects of health. For García – Sánchez, Burgueno-Menjibar, López Blanco, and Ortega (2013), a high body mass index and a reduced aerobic capacity are associated with a worse physical self-concept. Specifically, body fat correlates negatively with physical self-concept, while physical condition correlates positively.

Remember that the objective of the present study is to find out how the relation between physical condition/physical self-concept and physical self-concept/academic achievement is established, in the overall sample and according to the gender of the participants. To know how physical self-concept differs between males and females. And, also, to determine whether age influences physical self-concept. Adolescence refers to a universe of changes at various levels, in which body mass index and fat mass index constitute important predictors of changes in perceptions of the body. Cruz, Santos, and Rodrigues (2016), consider it to be a process in which psychosocial variables play a decisive role, with the physical self-concept construct being one of the most relevant. According to Gárcia-Sánchez *et al.* (2013), self-concept refers to the labels that an individual attributes to themselves, which may be related to physical attributes, behavioural characteristics, and emotions. Self-concept can also be understood as a subjective judgment of the perception of competence in each domain, for example: physical, emotional, social, family, or academic (Reigal-Garrido, Becerra-Fernández, Hernández-Mendo, & Martin-Tamayo, 2014). Several studies (eg. Revuelta, Esnaola, & Goñi, 2016; Zurrita-Ortega, Álvaro- González, Castro-Sánchez, Muros, & Viciana-Gráfono, 2015), found that the practice of regular physical activity improves physical self-concept, with

girls having more negative self-perceptions than boys, early on, around 11 years of age. If we prepare girls for success in a lifelong participation in physical activity, the situation can be reversed. Balsalobre, Sánchez, and Suárez (2014), Fernández-Bustos, González-Marti, Contreras, and Cuevas (2015), concluded that adolescents with greater physical perceptions are males, have a lower body mass index, are satisfied with their weight, and have a better body image. They also exercise more regularly. On the contrary, girls, with a higher body mass index, are dissatisfied with their weight, their body image and do not exercise. According to Suchert, Hanewinkel and Isensee (2016), reducing screen time in adolescents could be a very promising approach to preventing obesity and promoting a positive physical self-concept. To Balsalobre *et al*. (2014), physical self-concept plays a key role in the development of the level of physical condition, the associations between gender and factors that determine physical self-concept, advocate the importance of improving physical condition. Physical self-concept strategies can be based on the idea that better results obtained in physical fitness tests generate a predisposition to improve physical self-concept.

In the several studies carried out (eg. Gárcia-Sánchez *et al.,* 2013; Zsakai, Karkus, Utczas, & Bodzsar, 2017) the results obtained suggest a combined effect between body composition and physical self-concept, and it is important to take the body composition variable into consideration. Also, other studies, (eg. Contreras, Fernández, Garcia, Palou, & Ponseti, 2010; Grao-Cruces, Fernández-Martínez, Teva-Villén & Nuviala, 2017. b), consider that school programs should be considered, starting with preventing excess weight in adolescence and reinforcing physical self-concept. Still in this logic of approach, Grao–Cruces, Fernández-Martinez and Nuviala (2017.a), observed that adolescents with low muscular strength and aerobic power had lower physical self-concept values. It should be noted that aerobic power and body mass index have a positive association with all subdomains of physical self-concept in both genders. And BMI (body mass index) appears inversely associated with self-concept factors: physical condition, appearance, physical competence, and self-esteem, in both genders. According to Revuelta *et al*. (2016), physical self-concept and physical activity can occur bilaterally, although the model that proposes physical self-concept as an influential and dynamic factor is a better fit, within the conception of a hierarchical model.

Silva, Costa, Nunes, Rodrigues and Maciel (2017), observed the tendency for physical self-concept values to increase progressively in relation to the level of physical activity, with the lowest physical self-concept values referring to the level of physical inactivity, and the highest values belong to individuals with greater physical activity. Boys also have higher physical self-concept values than girls. There is then a tendency for physical self-concept to increase, in accordance with the increase in physical activity. Corroborating this study, Grao-Cruces, Fernández-Martínez, Teva-Villén and Nuviala (2017, b)*,* carried out a study with 1736 young people, 902 girls, aged between 12 and 16 years old, from Andalusia. The participants who joined the school sports program had a more positive physical self-concept and also revealed greater intentionality to be active, compared to those who did not join the program. Using the same logic of reasoning, Contreras *et al.*, (2010), found in participants who

practiced sport regularly, at least once a week, higher values in self-perceptions, at the level of general self-concept and in all subscales of physical self-concept. It should also be noted that the most significant differences occurred in sporting performance and physical condition. For Contreras *et al*. (2010), students in Physical Education have many opportunities to try new *skills*, exposing their skills in front of others, receiving *feedback* about your appearance in case of success or failure. Furthermore, Physical Education is an educational context that can change young people's physical self-concept in a more positive way. Physical self-concept is situated in a dynamic, evolutionary perspective, and it is possible to consider the importance that the universe of social activities, particularly those that take place at school, have on physical self-concept, with special emphasis on the connection between physical condition/physical self-concept, being this relation differentially assumed in the boy/girl *interface*. Idea already highlighted in some studies (eg, Balsalobre *et al*., 2014). Balsalobre *et al*. (2014), Cruz *et al*. (2016), and Kulsreshtha (2016) regarding the physical self-concept of boys *versus* girls, found a positive and higher physical self-concept in boys on average, compared to girls. Boys were also more interested in physical exercise. According to Boiché, Chalabaev and Sarrazin (2012), consider that adolescence is a period in which sexual stereotypes are reinforced, particularly stereotypes related to sport among girls.

Dolene (2015), in order to observe differences between adolescents who practice sports and those who do not, regarding physical self-concept, male *versus* female, found that participation in sports is more associated with a positive physical self-concept, with boys have higher *scores than girls*. In this study, although the differences were smaller in participants who practiced sport, gender differences regarding physical self-concept tend to decrease with a higher connection to sport. In summary, in this analysis of some studies about the physical self-concept of boys *versus* girls, the differences between the genders seem to be very clear, which become more accentuated as the adolescent age progresses, just as the higher levels of physical self-concept are equally well demarcated in boys, compared to girls, in almost all areas that form the physical self-concept.

Pellicer-Chenoll, Garcia-Massó, Morales, Serra-Año, Solana-Tramunt, González, and Toca-Herrera (2015), considered that the triad constituted by the relation between physical activity, physical condition, and academic achievement in adolescence, has not received due attention from researchers. In the study´s Pellicer-Chenoll, *et al*. (2015), it was observed that participants with high energy expenditure and better physical condition have lower body mass index, as well as high academic achievement. However, in areas where teenagers consume less energy, they show worse physical condition, high body mass index (*BMI*) and low academic achievement. These authors also argue that increasing physical activity in schools can contribute and be an important ally in order to "fight" against sedentary lifestyles and the resulting consequences for public health and implicitly for academic achievement. Silva, Costa, Rodrigues and Maciel (2017) observed a significant and negative correlation between self-concept and academic achievement ($r = - 0.157$; $p < 0.05$); general school ($r = - 0.298$; $p < 0.01$); self-concept and mother tongue ($r = - 0.271$; $p < 0.01$); mathematics ($r = - 0.161$, $p < 0.01$) and general ($r = - 0.123$;

$p < 0.01$). The authors also concluded that very active individuals have greater academic achievement (lower failure rate) than the rest. According to Pinto, Pigozzi, Vettori and Vezzani (2017), educational contexts that emphasize personal challenge, self-efficacy and personal growth are positively related to academic results. Girls present a predictive association, conception of learning as a superior co-constructive and cultural process, compared to boys. As can be seen, more studies are needed to analyze the association between the variables physical self-concept and academic achievement, which also justifies the relevance and importance of the present study.

MATERIALS AND METHODS

SAMPLE: It was decided to focus the study on a convenience, stratified and representative sample of 13 municipalities in the region of Algarve, Portugal, based on students in the third cycle of regular education schools. In the research regarding the association of the variables physical condition/physical self-concept, there were 1533 participants, 712 (46.44%) of whom were male. Ages are between 12 and 17 years old.

INSTRUMENTS

Description of the instruments used for data collection: Sociodemographic characterization – According to the nature of our study, and taking into account the objectives of this research, it was considered pertinent to carry out a brief sociodemographic characterization. Physical Self-Concept Descriptive Questionnaire - briefly presents the psychometric characteristics of this instrument, original version of the instrument - *Physical Self- Description Questionnaire*, which was called the Physical Self-Concept Descriptive Questionnaire. Assessment of Physical Condition - Physical condition was assessed using an instrument called *Fitnessgram*, which consists of a physical fitness program for health, aimed at the young population attending Portuguese schools at 2nd and 3rd cycles and secondary classes. Based on a set of physical fitness tests at the respective ages, according to Bai, Saint-Maurice, Welk, Allums-Fearstherton, Candelaria and Anderson (2015), motor performance was assessed at three possible levels:

- Anyone who is in a high-risk area and needs to improve;
- One that is associated with some risk and also needs to improve, but is not such a serious case;
- Above or within the healthy zone values.

OBTAINING ACADEMIC ACHIEVEMENT

In order to obtain academic achievement, the arithmetic average of the nine subjects included in the curriculum was calculated.

DATA ANALYSIS

SPSS (Statistical Package for the Social Sciences), version 25.0, IBM's Windows environment, was used. Regarding sample characterization procedures, the average and standard deviation were determined. We chose to apply a parametric test, the *One-Factor ANOVA test.* Later, to find out where the differences were, the test was used *Post-Hoc, Bonferroni test.*

To verify the existence of significant differences between females and males, the *T Student test was used*. To determine the correlations between the variables physical self-concept and academic achievement, the Pearson *r test was* used. The effect size was also determined based on *Cohen* 's *d* and $\eta^2_{coefficients}$, depending on the statistical test. A significance level α of 0.05 was considered.

Other procedures: The standards in terms of research ethics were also complied with. Therefore, an authorization was requested from these official entities: National Institute for Data Protection; Ministry of Education; Regional Education Delegation and Directors of the School Groups that allowed us access to the data. Authorizations from Parents and informed consent from students were also considered, as well as strict data confidentiality being maintained.

RESULTS

The present study, in the first part, focuses on a total of 911 participants, 474 of whom were female. According to the total values referenced in table 1 of global physical self-concept, referring to the healthy zone, it is higher than the zone of some risk and this is also higher than the high-risk zone. The One-Factor *ANOVA* statistical test was used to compare the means at a global level and a statistically significant result was obtained ($p < 0.05$). According to the value of η^2, the effect size can be considered high. In order to determine where the differences between means took place, we used the *Post-hoc,* test by *Bonferroni.* And significant average differences were observed between healthy zone/some risk zone, healthy zone/high-risk zone, and some risk zone/high-risk zone (table 1). Table 2 present the result of the Bonferroni multiple comparison test for global participants. In order to verify whether physical condition and physical self-concept are statistically related, in male participants, the *One-Factor ANOVA* statistical test was also used, obtaining a statistically significant result ($p < 0.05$), (table 2). Table 3 present the result of the Bonferroni multiple comparison test, for male. According to table 3, there are significant differences between the healthy zone and areas of high-risk and some risk, and between the zone of some risk and high-risk. Table 4 presents the result of the Bonferroni multiple comparison test for women. Regarding female participants, and also using the statistical test *called One-Factor ANOVA*, a statistically significant result was also obtained ($p < 0.05$). *Post-hoc* was then applied in order to determine where these differences occurred (table 4). Table 5 presents the characterization of male and female participants, in terms of global physical self-concept. According to table 5, the average physical self-concept assumed by male participants differs from that of female participants. To determine the differences between male/female physical self-concept, using the statistical technique *T - Student test* for independent samples, a significant average difference was obtained according to the result: $t = 12.341$; $df = 996.898$; $p < 0.001$. Male participants have a higher average value than female participants.

Physical self-concept and academic achievement: With an effective in 984 participants, 462 of whom were male, aged between 12 and 17 years old. In order to determine whether physical self-concept is associated with academic achievement (average across subjects), *Pearson* 's correlation

Table 1. Characterization of the sample, regarding physical condition/physical self-concept values

Physical condition	N	M	DP	F	P	η^2
Global Sample				79,316	0.001***	0.15
Healthy zone	580	4.45	0.81			
Zone of some risk	173	3.92	0.84			
High-risk zone	158	3.60	0.81			
Male				35,790	0.001***	0.14
Healthy zone	314	4.70	0.68			
Zone of some risk	56	4.28	0.83			
High-risk zone	66	3.90	0.79			
Women				33,176	0.001***	0.12
Healthy zone	265	4.14	0.85			
Zone of some risk	117	3.74	0.78			
High-risk zone	92	3.36	0.75			

*Note: * p <0.05; ** p <0.01; *** p <0.001*

Table 2. Result of the Bonferroni multiple comparison test. Global participants.

		Average difference	Sig.
Healthy zone	Some risk	0.53	0.001***
Healthy zone	High-risk	0.84	0.001***
Some risk	High-risk	0.31	0.002**

*Note: * p <0.05; ** p <0.01; *** p <0.001*

Table 3. Result of the Bonferroni multiple comparison test. Male

		Average difference	*Sig.*
Healthy zone	Some risk	0.43	0.001***
Healthy zone	High-risk	0.77	0.001***
Some risk	High-risk	0.13	0.024**

Note: * p <0.05; ** p <0.01 *** p <0.001

Table 4. Result of the Bonferroni multiple comparison test. Women

		Average difference	*Sig.*
Healthy zone	Some risk	0.40	0.001***
Healthy zone	High-risk	0.77	0.001**
Some risk	High-risk	0.38	0.003**

Note: * p <0.05; ** p <0.01 ** *p <0.001

Table 5. Participants' physical self-concept values (male/female)

Physical Self-Concept	N	M	DP	t	P	Cohen's d
Male	468	4.53	0.77	12,341	<0.001***	0.781
Women	531	3.89	0.86			

Note: * p <0.05; ** p <0.01; *** p <0.001

coefficient was used, and a significant ($p < 0.05$) *and positive* correlation was obtained, although this correlation is considered weak at a global level, since the value obtained in the correlation is ($r = 0.191$; $p = 0.001$). Regarding males, the correlation is positive and significant ($p < 0.05$), but weak ($r = 0.193$; $p = 0.001$). For females, it is equally positive and significant and slightly higher than for males, but still weak ($r = 0.229$; $p = 0.001$). At a global level regarding the eleven subdomains that make up the global physical self-concept, there is a positive and significant correlation ($p < 0.05$) between the subject means and all eleven sub-dimensions that make up the Physical Self-Concept Descriptive Questionnaire instrument. Regarding males, no statistically significant relation was found ($p > 0.05$) in the subdomains: global physique and strength. In females, the correlations are statistically significant ($p < 0.05$) in all eleven subdomains.

Physical Self-Concept and Age: Using the *r* of *Pearson*, it was found that at the global sample level, age is correlated with the participants' physical self-concept ($r = - 0.099$, $p = 0.002$).

In males, there was no significant correlation ($r = - 0.056$; $p = 0.227$) and in females, the correlation was negative and significant ($r = - 0.140$; $p = 0.001$).

DISCUSSION

Physical self-concept can be looked at as a psychosocial variable that influences adolescent behaviour and can also contribute to different types of health. In the constant adaptations that the period of adolescence is prodigal, according to Cruz *et al*. (2016), physical self-concept is a critical aspect, being different when it comes to male *versus* female subjects, which is in line with the results obtained in our study. From this perspective and according to Pellicer-Chenoll *et al*. (2015), participants with high energy expenditure and better physical condition have lower body mass indexes, as well as high academic achievement, which corroborates the results obtained in the present study. And the opposite happens in situations where less physical activity is carried out.

Therefore, it is very important to promote increased physical activity in order to improve your health. For Fernández-Bustos *et al.* (2015) and Mayorga *et al.* (2012), a program structured around specific physical activity can be decisive for positive changes in interpersonal adaptation, global self-esteem, and specific dimensions such as physical perceptions, which are essential variables in the transformations of the *self* during adolescence. In this logic, Fernández-Bustos *et al.* (2015) and Mayorga *et al.* (2012), reinforce the idea that it would be advisable to develop strategies to improve the physical self-concept of overweight students in Physical Education classes.

According to Balsalobre *et al.* (2014), it was observed that physical condition significantly influences physical self-concept. And in boys, physical self-concept has higher values. In fact, the results of the present study demonstrate the positive importance of the physical self-concept *construct* in association with physical condition. According to Kulshrestha (2016), girls' physical self-concept is lower than boys. These differences appear very early, as Mayorga observed *et al.* (2012). Programs should focus on promoting self-perceptions, particularly regarding physical self-concept, as early as possible. For this purpose Beasley & Garn (2013), Grao-Cruces *et al.* (2017.b), Revuelta *et al.* (2016), consider a mechanism feasible that strengthens the relation between Physical Education, global self-concept, and leisure time in physical activity, which will improve the quality of life of adolescent girls and inherently improve general and physical self-concept. The authors also highlight the important work of Physical Education teachers, as if they can explain to students the short and long-term benefits of Physical Education, the impact of this curricular unit on students could be of decisive importance, just as you can help your personal belief system with Physical Education. In this way, there will be a lasting impact on students' physical self-concept. In this logic, Dolene (2015) considers that the results obtained in her research could be useful for reflection in Sports and Physical Education programs, in order to promote more active and healthy lifestyles among adolescents. This idea is also supported by the results obtained in this research. In fact, the results of our research corroborate the literature review, since there is a statistically significant relation between physical condition and physical self-concept, with higher levels of physical condition being significantly related to higher physical self-concept values and vice versa.

According to Grao-Cruces *et al.* (2017.a), vigorous physical activity can help developing a more positive self-concept among young people, which also reinforces the results of the present study, which points to a significant statistical relation between physical self-concept and physical condition. Idea also defended by Revuelta *et al.* (2016), in the relation between physical self-concept and physical activity, and the studies by Grao-Cruces *et al.* (2017, a and b), also point in this direction. When comparing young male *versus* female adolescents, there are several studies that report a higher physical self-concept in boys (eg. Balsalobre *et al.*, 2014; Cruz *et al.*, 2016), are some of the authors who corroborate the results of the present study. Regarding the association of self-concept with academic achievement in the present study, a significant and positive correlation was also found for both males and females, although the correlation can be considered weak (0.193); (0.229) and (0.191) respectively in male, female, and global sample participants.

Silva *et al.* (2017), obtained a positive and significant correlation in a negative direction, which is justified by the fact that they carried out the correlations based on the physical self-concept *construct* and number of school failures; and the present study focuses on the average of the subjects and physical self-concept. In the study by Silva *et al.* (2017), more physically active individuals have a lower failure rate. In the present study, participants with better physical condition (healthy zone) present academic achievement, with a higher arithmetic average. Regarding the relation between the variables age and physical self-concept, the existence of negative, weak, and significant correlations, in which older individuals tend to have lower physical self-concept and vice versa, in the global sample and at the gender level female, requires further research and supporting evidence at the literature review level. In summary: Physical condition and physical self-concept are related. So, physical self-concept is positively influenced by physical condition, presenting lower values when associated with lower values of physical condition and vice versa. The physical self-concept of male participants differs from that of female participants, presenting higher average values. There is a correlation statistically significant, but weak, between physical self-concept and academic achievement in the global sample and females, but in males, in the sub domains: global physique and strength, there is no significant correlation. Older individuals in the global sample and females tend to have a higher physical self-concept and vice versa.

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