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Self-Esteem, Self-Concept and Academic Performance in Middle-School Students According to their Sport Context

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Abstract: *Introduction: Academic performance is favored in students who practice sports with body contact and develops an increasing value in self-concept when a comparison is established with those who don't are engaged in sports without body contact. Methods: This study aimed to analyze and relate variables of self-concept, self-esteem and other variables such as aerobic capacity (VO2 max), handgrip strength and academic achievement, within the modalities that they practiced, with and without body contact. 132 middle-school students between 10 and 11 years old (69 boys and 63 girls) who attended the 5th and 6th grades participated. Results: It was found a mean level of behavior, physical appearance, school competence, social acceptance and higher academic performance in the group without body contact. A T-test was applied on self-concept variables, self-esteem, aerobic capacity (VO2 max) and academic performance, and the Mann-Whitney test on physical appearance variables and handgrip strength, finding only differences in the behavior variable, with a value of a = 0.014. A linear regression analysis was also presented in order to identify the best predictors of academic performance Conclusions: The practice of sports with body contact promotes a significant increase in behavior levels, compared to students without body contact, however the practice of this type of sports doesn't show higher levels of self-esteem and academic performance, once compared to other students practicing sports without body contact. The best predictors identified were global self-concept, school competence and aerobic capacity.*

Keywords: *Self-concept, Self-esteem, Academic performance, Sports Context, Children.*

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Introduction

With the society evolution, it is possible to observe that pedagogical perspectives, nowadays, privilege the child. The child becomes the center of concerns and attention, becoming the "starting point, the center and the end" of the pedagogical action, so that "all subjects must be at the service of their children" development. They are instruments that are valid insofar as they serve the needs of growth" (…) their purpose (is) (…) "self-realization" (Agostinho et al., 2015). According to UNICEF (1989, cited by Ruiz-Casares, Collins, Tisdall & Grover, 2017) in the Convention Child Rights article 12, the importance of children participating as active subjects, is considered people with the right to express themselves freely, participating in decision-making processes, decision in the most varied subjects (family, school or community) so that they can be relevant for their future lives. Allied to this right of children to express themselves, there is also the idea that the child "have the right to be heard and that their opinions be considered relevant, in any process that affects them" (UNICEF, 1990, cited by Ruiz-Casares et al., 2017, p. 12). By this, the child began to be placed at the center of all the action, in order to privilege some aspects of it. Making children the center of pedagogical work is crucial, not just with young children, but at all educational levels. Physical activity related to children is an important feature in their fitness condition, as well as mental and cognitive assessments, promoting better conditions of acceptance among their peers, developing better aspects of self-esteem and personal image. Individuals who are physically active have better chances for lower blood pressure and a more favorable lipidic profile compared to children with more sedentary behaviours. According to Bois, Sarrazin, Brustad, Trouilloud & Cury (2005) the expression of physical activity is highly appreciated in our current days because it has so many definitions, raising many questions and several opinions to define it precisely.

It is important to emphasize "that sometimes there is some confusion regarding the definition of what self-concept and self-esteem are, since they are two components that gather the "self", and that are closely related, where this relationship between self-concept and self-esteem reveals that both are dimensions of a single reality, that is, the cognitive (self-concept) and the affective (self-esteem)", (García & Musitu, 2011). Self-esteem is intended as an emotion of intrinsic satisfaction that identifies a level of efficiency and of a certain self-confidence of being social accepted. Having this self-confidence results in different assessments according to their self-perception about the person that they are and the person they wish

to become (Harter, 2012). The development of studies for variables that influence self-esteem have been shown important aspect, since that personal beliefs among children and adolescents with more self-confidence and a their one personal good image have a higher ability in increasing self-efficacy (Anastácio & Carvalho, 2006).

Oliveira & Moreira (2009) have identified that individuals who are physical active have higher levels of self-esteem, rather than others who are not. Higher levels of self-esteem are shown physical activities occur more than three times a week, with 1 hour duration (Hopkins et al., 2012). The practice of physical activity "allows you to raise self-esteem levels, by developing skills with appropriate strategic ways to solve with higher success in tasks performed". Oliveira & Moreira (2009) states that a good self-esteem is related to positive patterns of physical capacity. Children who have better physical fitness tend to have a better body image compared to others who do not practice any or little exercise".

Tomporowski & Ellis (1986), practicing sports in schools, helps the development of muscular tension, which is a facilitator for successfully complete psychological tasks. Their investigation, showed that participants that practiced sport had better acquisition, evolution and ability of syllables related to learning process and memory ability with pairs, and higher perception for execute math tasks and better efficacy in color tests when compared to other participants performing tasks under usual conditions.

Some studies point that muscle strength is an important variable in the for prediction and monitoring of processes, where information regarding the musculoskeletal condition and his physical general condition is very relevant (Eichinger et al., 2015). Muscle strength is the persons capacity to maintain levels of strength and resistance for a particular period. It can be developed through aerobic work, strength and resistance exercises. The muscle power variable is very relevant for autonomy and personal life quality. The variable of handgrip strength is identified as a good marker of muscle strength and power, with a positive relation with the central nervous system pointed as an absence for possible diseases (Eichinger et al., 2015), like hypokinetic ones, in individuals of different age groups (Ruiz et al., 2017). Also, losing motor capacity having less muscle capacity, could lead to less autonomy presented and used for daily living activities (Oliveira & Moreira, 2009).

Carvalhosa (2012) stated that is exists a positive and healthy relation in learning, mental health and concentration followed by a period of exercise with a very good connection relating exercise and the absence of risk behaviors. The author also refers that a good heart rate promotes blood

circulation, developing higher levels of brain oxygen that stimulates brain function. These last effects will lower stress levels, increases mood, and favors a relaxing feeling and results in higher academic achievements in school. Also, high levels of good cardiovascular capacity are positively related to better academic achievements.

According to Cruz et al. (2016), body image involves much more than just physical appearance, it also includes multiple psychological perspectives of the individual about his own body. These perspectives reflect the individual's own perceptions and attitudes, more precisely, in the concerning the thoughts, beliefs, feelings and behaviors in relation to your body.

The practice of physical exercise is understood as a very good factor in satisfaction with body image. Even if it is not within the aesthetic standards stipulated by the media, the adolescent feels higher self-esteem due to the morphological changes caused by physical exercise (lean mass gain and fat mass loss), considering that the body fat is a neglected factor in our society (Silva et al., 2014). Batista et al. (2016) states that the level of satisfaction with body image is more positive in individuals who are involved in sports activities, compared to those who are not. practice any type of physical activity. There is still a difference between the practicing individuals who enter competitions and those who only participate in activities of leisure, presenting the first satisfaction with the inferior body image.

According to Batista (2011), practicing individual sports enhances a significantly higher school performance in students, once compared to the ones who practice team sports, and the characteristic typology of the sport practiced by students does not prove to be a benefit factor for performance. Academic performance, although, like self-esteem and self-concept, academic performance is favored in students practicing sports where body contact exists. The practice of sports by students that have body contact, increases self-concept levels once a comparison it's made with students without body contact activities (Batista, 2011). Eccles, Barber, Stone & Hunt (2003) state that participation in team sports, is a promoting factor for academic success, however, leads to greater involvement for social inappropriate behaviors.

Methods

The study is quantitative, observational, descriptive and cross-sectional. Data were collected for 5 consecutive days during the morning periods in 2022. The collected data were immediately processed in the following month, a period that coincided with the interruption of the Easter holidays.

General objective

The objective of this investigation intends to evaluate and analyze the practice of sports with and without body contact among practitioners and the academic performance of them in middle-school students, considering the implications that self-concept, self-esteem, aerobic capacity and handgrip strength exert on students' academic performance.

Specific objective

To compare the levels of self-concept (school competence, social acceptance, athletic competence, physical appearance and behavior), self-esteem, aerobic capacity (assessed by the mile test) and handgrip strength (using a dynamometer) in the academic performance of students of 5th and 6th grade, according to the sport practiced, with or without body contact.

To determine predictors of academic performance in these groups of students.

Research hypothesis

Based on the defined objectives, the formulation of hypotheses values clarity and distinction. Thus, the elaboration of the hypotheses will serve as a guide to help in the understanding, elaboration of the results and conclusions of this research.

Hypothesis 1: Students practicing sports with body contact have a level of self-concept (school competence, social acceptance, athletic competence, physical appearance, behavior), self-esteem, handgrip strength, aerobic capacity (VO2 max) and higher academic performance compared to students of sports without body contact.

Hypothesis 2: Self-concept, self-esteem, aerobic capacity and handgrip strength exert a positive and significant mediating effect on academic performance according to the practice of physical exercise.

Participants

In terms of sample eligibility criteria, we considered 5th and 6th grade students, who did not have any disabilities or failed students at any stage of their school career, that is, students who were not attending that school year for the first time. By this, we considered an intentional sampling (convenience).

The students participating were a total number of 132 (N=132) where 69 (52.7%) were male and 63 (47.3%) female, aged between 10 and 12 years old (11.96±0.98), attending a public school, at the 5th and 6th grades.

Fifth and sixth grade students' classes were randomly selected, with 54 fifth grade children (40.9%) and 78 sixth grade children (59.1%) participating. In table 1 is shown the number of practitioners according to the sport context.

Table 1. Frequency and percentage of the number of practitioners of sports with and without contact.

Sport context	Sport type	Frequency	Percentage
Sports with contact	Football	15	11.4
	Handball	13	9.8
	Futsal	6	4.5
	Karate	6	4.5
	Rink hockey	8	6.2
	Ballroom Dancing	13	9.8
	Tennis	6	4.5
	Athletics	7	5.3
	Volleyball	8	6.1
	Badminton	6	4.5
Sports without contact	Swimming	12	9.1
	Equitation/horse riding	8	6.1
	Figure skating	11	8.3
	Bicycling	8	6.1
	Ballet	5	3.8
	Total of sports practitioners	132	100

Source: Author's own conception

According to table 1, of the 137 students who were studied, the sports most practiced by students as a regular practice of extracurricular physical activity, football, handball and ballroom dancing appear at the top of preferences with 15 and 13 practitioners, followed by swimming (12) and figure skating (11). At the threshold of 5% comes the practice of karate, tennis, Futsal and Badminton. The remaining sports appear with values below these ones and Ballet has only 5 practitioners. Regarding the sport context, 46.2% of students practice sports without body contact and 53.8% with body contact.

Data collection assessements

To initiate the process, the first action was the submission for the approval by the Scientific Council and Ethics Committee of the faculty, with a writen request for the School Director asking clearance to develop the

investigation. After the approval was granted, a meeting with teachers was set, explaining the goals of this investigation and how much classes of these grade were attending the school, in order to ask them for their collaboration. In this application, the purposes, study pertinence and guarantees were given that the information provided were anonymous and confidential. After this, was scheduling a map visits, and the investigators moved to school and handed the scale to students in the 5th and 6th grade classes whose parents authorized their participation through informed consent. Student's academic performance was assessed and calculated through the arithmetic mean of students grades, in each discipline that students were attending, during the academic year, delivered by teachers at the end of each period. For the assessment of self-concept and self-esteem, a scale was used to analyse students' self-concept and self-esteem values in terms of the variables presented. The scale used was constructed by Susan Harter (1985) from the Perceived Competence Scale for Children (Harter, 1985). This scale, originaly, had three subscales designed to assess three specific domains of self-concept and one designed to assess self-esteem, two specific domains were added, resulting in the Self Perception Profile (Harter, 1985), consisting of a total of six subscales. In 1992, the scale was administered to a wider population in order to analyze its psychometric properties. Based on the results obtained by Martins, Peixoto, Mata & Monteiro (1995), some items were reformulated and others replaced, resulting in the version of the scale used for this study.

Scale structure

The scale is divided in six dimensions, according to five sub-categories for the variable self-concept and one sub-category for self-esteem variable. In the first sub-category: 1. School Competence – This variabel assesses child's own perception of his competence or capacity about his school performance. 2. Social Acceptance. This varaibel assesses child's perception of his own acceptance by his peers and the sensation of being popular amomg them. 3. Athletic Competence. This variable assesses child's perception on his capacity for sports activities and/or outdoor activities. 4. For Physical Appearance variable it assesses the child's perception on his appearance, according to their weight, height and physical appearance. 5. Behavior. This domain assesses the child's perception according to his behaviour. For this investigation, the self-concept variable has resulted from the quotient of all the others sub-categories of this variable calculated by the following formula:

Level of Self-concept = (SC+SA+AC+PA+B)/5.

The self-esteem variable has one specific domain of global self-esteem.

1. Self-esteem. Assesses what the child prefer for itself as a person. If she is happy about her behaviour. It gives a certain judgment of its value and is therefore does not have a specific sub-category of competence. This self-esteem variable is calculated by the partials that results from that sub-catagory. Each of these domains have six subscales, results in a total of 36 domains.

Aerobic Capacity

For this variable the One Mile Running Test was used, it was developed by George et al. (1993), and its applied as a submaximal exercise test to estimate maximum oxigen intake. The main goal requires that the student run a mile (1609 meters). If he cannot cover the entire distance running, he can walk in the shortest possible time. Before the test, a warm up of 3-5 minutes is mandatory. This test initiates by saying "Ready, Go". When a student reaches the finish line he is notified about the time achieved in the race. It is possible to apply this test to groups of 15 to 20 people at a time, dividing the group in two and forming pairs. While the group runs the test, their teammates count the laps and keep track on the time served during the race. This One Mile Running Test must be recorded in minutes and seconds. If the student does not complete the full distance, 99 minutes and 99 seconds will be registered as the time achieved. To measure maximum oxigen intake, it was applied the next equation (Welk et al., 2011).

VO_2máx (ml/Kg/min) = 0,353 x distance - 1,121 x age + 45,619

Bulb dynamometer for hand grip strength evaluation

For the evaluation of handgrip strength a bulb dynamometer was used for data collection. In this evaluation students need to ensure a maximum strength possible, which includes the measure of maximum handgrip showed in the dynamometer (Nicolay & Walker, 2005). This variable was evaluated with a dynamometer that allows a movement of squeezing a pear-shaped rubber (Saehan 5008, Korea) having a specific dial in kilograms and presson Bars. The first task was to record the participant dominant hand. Then, measurements were taken from both hands of each

student, with an orthostatic position, mantaining both arms in extension alongside with their body. While the student is squeezzing the pear-shaped rubber, he cannot hold the dynamometer against his body. This single-repetition movement requires maximum grip contraction when performed. Participants are instructed to make the maximum strenght contration in the dynamometer for three seconds, allowing to observe the information in the equipment dial. This maximum strength is recorded with the higher value registered in these two executions.

Academic Performance

For data collection in this variable, we used the grid of systematic registration of the academic performance of the students in the disciplines of Portuguese, Math, Civic Education, Personal Study, Sciences, Foreign Language, History and Geography, Drawing and Painting, Music and Physical Education. The results were registered at the end of 1st, 2nd and 3rd academic periods, through the classification of the students grades in each curricular unit, making a sum of all of them, dividing the total value by the number of those curricular units, with five different classifications: very weak (1), weak (2), Sufficient (3), Good (4) and very good (5).

Statistical procedures

In terms of statistical data analysis, the computer programme SPSS version 21.0 was applied for descriptive and inferential statistics. For statistical inferences purposes, a normality test was assessed to test the normal distribution of the data, verified by the Kolmogorov-Smirnov test. This tes of normality is used to analize if the observations of the participants properly fit a normal or non-normal distribution. In order to analyze the reliability of the Self-Concept Scale where we proceeded to the evaluation of internal consistency, more specifically of Cronbach's Alpha, performed in all sub-categories. It´s usually accepted an α value between 0.6 to 0.7, which indicates an acceptable reliability and if higher than 0.8 will be a very good reliability (Cid et al., 2012). Also, T-student test was applied to analyze the statistical significance between the groups under study. A linear regression analysis by modules was also carried out to determine which variables under analysis would be predictors of academic performance.

Results

After all analyses of these variables, presented in table 2, according to the sport context, it was analyzed that on the sub-catgories of school competence, social acceptance, physical appearance and behavior, that students who practice sports without body contact have higher mean values, respectively, (M=2.57±0.70), (M=3.06±0.43), (M=2.97±0.74) and (M=3.08±0.61) than practitioners of sports with body contact (M=2.45±0.68), (M=3.03±0.50), (M=2.89±0.78) and (M=2.68±0.64), respectively. In the variable athletic competence, the mean values are higher in practitioners of sports with body contact. When analyzing the self-esteem variable, the mean values of athletes of sports with body contact present slightly higher mean values (M=3.22±0.69) when compared to the mean values of practitioners of sports without body contact (M=3.21±0.60). The same trend was observed in the global self-concept variable, obtaining the respective values of (M=2.80±0.45) in the group without contact and (M=2.74±0.38) in the group with body contact. Its observable a higher value in athletes of body contact sports (M=44.47±4.90) compared to other athletes in sports with no body contact (M=44.06±3.85) in the VO2max for aerobic capacity. For handgrip strength, athletes in sports with body contact have higher values (M=13.78±4.15) when compared to athletes practicing sports without body contact (M=13.45±3.42). According to academic performance, individuals practicing sports without body contact have values a little higher (X=3.85 ± 0.65) compared to the ones who practice sports with body contact (M=3.82±0.57).

Table 2. Means, Standard Deviation and significance values of the dimensions of school competence, social acceptance, athletic competence, physical appearance, behavior, self-esteem, VO2 max, handgrip strength and academic performance, according to the sport with or without contact.

Variables	Sport context				Total			
	Sports without body contact		Sports with body contact					
	Mean	SD	Mean	SD	Mean	SD	Sig.	Cronbach Alpha
School competence[1]	2.57	0.70	2.45	0.68	2.53	0.69	0.57	0.84
Social acceptance[1]	3.06	0.43	3.03	0.50	3.05	0.45	0.97	0.60
Athletic competence[1]	2.50	0.69	2.63	0.75	2.54	0.71	0.38	0.79
Physical appearance[2]	2.97	0.74	2.89	0.78	2.94	0.75	0.88	0.83
Behavior[1]	3.08	0.61	2.68	0.64	2.94	0.65	0.01*	0.83
Global Sef-concept[1]	2.80	0.45	2.74	0.38	2.78	0.42	0.57	--
Self-esteem[1]	3.21	0.60	3.22	0.69	3.21	0.63	0.90	0.78
Aerobic capacity[1]	44.06	3.85	44.47	4.90	44.22	4.24	0.55	--
Handgrip strength[2]	13.45	3.42	13.78	4.15	13.57	3.67	0.64	--
Academic performance[1]	3.85	0.65	3.82	0.57	3.84	0.61	0.75	--

[1] T-test
[2] Mann Whitney Test
*p≤0.05
Source: Author's own conception

By analyzing the values exhibited by both groups in this context, its observable a mean level of behavior, physical appearance, school competence, social acceptance and higher academic performance in favor of the second group, which leads us not to reject hypothesis 1. For statistically purposes, a T-test for the self-concept categories was applied, also for self-esteem, aerobic capacity (VO2 max) and academic performance, and the MannWhitney test on the variables of physical appearance and handgrip strength and there are only differences in the behavior variable, with a value of $\alpha = 0.014$.

According to the context of sport, a variable that, in this study, is provided by the characterization of the practice of the sport in which the student is included. This variable assumes two categories: sports with body contact (sports where body contact is an integral part and allowed by the sport rules) and sports without body contact (sports where body contact is not an integral part and allowed by the sport rules). According to this aspect, the practice of team sports, even though it raises self-concept levels, indicates that, if not connected to individual sports, leads to lower self-concept levels. It reveals that, sports practice with body contact develops an increasing improvement in self-concept levels when compared to others who practice sports without body contact. Apparently, practicing at least one sport it will raise self-esteem levels. Practicing individual sports did not prove to be a determinant factor of significantly higher level of self-esteem in students who practice team sports. It seems that the results presented support the fact that practicing sports with body contact can enrich self-esteem levels, however these sports practice may not promote a significant increase in self-esteem in students who practice sports with no body contact. Students who practice sports with body contact have higher self-concept values compared to students who practice sports without body contact. The practice of sports with body contact seems to favor the level of self-esteem, as higher values were obtained compared to students who choose to practice sports without body contact.

The practice of individual sports did not prove to be a determinant factor for higher levels of self-esteem in students that practice team sports. Descriptive results can support that the practice of sports with body contact in the enrichment of self-esteem levels. Practicing this type of sports does not promote a statistically value in self-esteem once compared to students practicing sports without body contact.

Since we did not find significant differences in the variables compared according to the context of body contact, we chose to perform a linear regression analysis on the entire sample to determine predictive variables on academic performance.

Table 3. Linear regression for global self-concept, school competence, social acceptance, athletic competence, physical appearance, behavior, global self-esteem, aerobic capacity and handgrip strength as predictors for academic performance.

Variables		Beta	T	P	R^2
Global Self-concept	School competence	0.617	6.290	0.000	0.412
	Social acceptance	-0.026	-0.262	0.794	
	Athletic competence	-0.055	-0.571	0.570	
	Physical appearance	-0.078	-0.780	0.438	
	Behavior	0.113	1.147	0.255	
Global Self-esteem	Self-esteem	0.008	0.074	0.941	0.000
Self-concept	School competence	0.623	7.336	0.000	0.388
	Social acceptance	0.139	1.288	0.201	0.019
	Athletic competence	-0.001	-0.008	0.993	0.000
	Physical appearance	-0.040	-0.366	0.715	0.002
	Behavior	0.264	2.552	0.012	0.070
Aerobic capacity	VO_2 max	0.322	3.152	0.002	0.104
Strength	Handgrip strength	0.059	0.554	0.581	0.003

Source: Author's own conception

A linear regression test was performed to find out if Self-Concept is a good predictor for academic performance represented by R2 symbol. Results in table 3 reveals that global self-concept can explain 41% (R2=0.412), with a Beta value=0.617 for school competence and in behavior a Beta value=0.113. The Beta value is always good closer to zero. However social acceptance (-0.026), athletic competence (-0.055) and physical appearance (-0.078) have negative values, as the Beta value when negative, explains an inverse relation. Global self-esteem category explained =0% (R2=0.000) for academic performance, with a Beta value=0.008. In the sub-categories for Self-concept, its observable that school competence explains 39% (R2=0.388), having a Beta value=0.623. Social acceptance is responsible for 2% (R2=0.019) in academic performance. However, athletic competence and physical appearance cannot explain academic performance, since R2=0.000 has negative Beta values of -0.001 and -0.040. Behavior sub-category explains 7% (R2=0.07) whit a Beta value =0.264. Continuing this table analysis, its observable that aerobic capacity (VO2 max) can explain 10% (R2=0.104) of academic performance. Beta value is equal to 0.322, and the handgrip strength represents 0.3% (R2=0.003) with a value of Beta=0.059. Global self-concept was, therefore, the variable that best explained the variance of results in predicting the academic performance of

the assessed students. According to these results, it leads us not to reject hypothesis 2.

Discussion

In the view of the objectives presented, its presented in this part some interpretative lines regarding literature. The study reveal that practicing of sports without body contact develops a significant increase in self-concept levels, in the behavioral dimension, compared to students who practice sports with body contact. This evidence is contrary to the study by Batista (2011) where the levels of global self-concept were significantly higher in students who practice sports with body contact. Although the results of the descriptive analysis are favorable for those who practice sports with body contact that can potentiate self-esteem levels, does not promote a significant increase in self-esteem levels compared to students who practice sports without body contact. In terms of academic performance, despite the fact that students who practice sports without body contact have higher values of academic performance, but the values are not statistically significant. The values corresponding to academic performance are supported by Batista (2011) who also observed values without statistical significance, but favorable to students who practiced sports with body contact. Aerobic capacity and handgrip strength are favored by practicing sports with body contact, showing non-significant higher values. Batista's study (2011) revealed that the Judo sport (sport with body contact) had an influence on the self-concept, self-esteem and school performance of judokas, with a growing trend.

The study by Cruz et al. (2016) made it possible to identify differences in terms of self-concept and self-esteem. The global results observed indicate dimensions that are highly valued in the school context, seeming to indicate a high potential of these students who practice nautical modalities (without body contact) in the pursuit of academic tasks, a situation evidenced in this study as well. The same situation was found in the study by Silva et al. (2014) in soccer practitioners (with body contact) in which athletes perceive the influence of sports practice on self-esteem and self-concept, and also on peer and interpersonal relationships, and that in general, sports practice influenced school performance. Still with reference to school performance, it was identified in the study by Maciel et al. (2107) that this variable was never compromised and even increased in students practicing extra-curricular basketball sports (with body contact).

In terms of self-esteem and comparing practiced sports, the study by Feliciano (2010) showed that this variable in sports without contact that he

evaluated (cycling, swimming, skateboarding, walking and aerobics) obtained a lower value in relation to sports with contact that evaluated (soccer, futsal, handball, basketball, dance and martial arts). However, both in one context and in another, it presents values higher than those found in our study for this variable. Batista (2011) obtained similar results favorable to students who practiced sports with body contact, but without showing statistical significance. We also highlight the results of Frade (2012) where he evaluated the extra-curricular sports practice in the academic performance of students. In this study, in the sports studied with and without body contact, they favored the academic performance of students, according to their school evaluations, and the highest value of performance was manifested in sports with body contact, a fact that was not verified in our study, where the mean value of students with non-contact sports was slightly higher. Akçakoyun (2018) in his study didn´t had any statistical differences in self-esteem values of wrestlers (with body contact). There were significant differences in the physical self-perception, among team athletes and combat athletes and dancers (with body contact also). It was evidenced that both type of sports (individual and team sports) had a positive effect on self-esteem levels with different outcomes.It has also been determined by the author that there were no significant relationship handball players (with body contact) self-esteem levels, but their self-esteem values were higher. A statistically significant difference was found between the social and the academic self-esteem in students participating in sports such as football, tennis and basketball. There were no statistical differences in self-esteem, by the athletes that played basketball, handball or football.

In another study of Meerah and Maslan (2017) with football players (with body contact), it was observed that the relationship among self-concept and academic performance showed a weak outcome, with a weak positive correlation between these two variables. It seems that self-concept and academic performance are mutually linked and enhanced, with increasing gains between these two. According to our self-concept study and academic performance, these are higher in the students who practice sports without contact. These last findings are in line with Wretman (2017) who found a very good relationship between students participation in school sports and academic performance. Students' increases in self-esteem found to directly influence achievement by practicing sports such as basketball and football. Also a positive relation between these variables was found in tennis players (sport without body contact). Similar findings were also found in Mouissi & Hofmeister (2017), where the scores of self-concept and self-esteem were very positive influenced by students who practiced football,

volleyball and athletics. However, those variables were different according to the context of each sport with higher values for sports with contact.

It should be understand that the relationship between self-concept and academic performance show a dynamic relationship depending on the age group. Batista et al. (2016) based on studies such as Burns (1979) highlight the existence of a bidirectional relationship between school results and self-concept during schooling. According to this author, in the first years of schooling, the child attaches great importance to the successes or failures that he can obtain, and the accumulation of these will exert a great influence on the formation of the self-concept. At a later stage, the self-concept becomes decisive in the way the child sees school, thus influencing their school results. The study by Aroni et al. (2019) where positive effects were evidenced by parents; the practice of Judo presents multiple benefits for their self-concept, self-esteem and academic performance. These results are in line with Batista et al. (2016) finding who emphasizes that Judo practice promotes a significant evolution in self-concept and academic performance development, also enhances a very good tendency on students' self-esteem by practicing this type of sport. The results obtained for knowing the predictors for academic performance were favorable, founding that global self-concept is a good predictor of academic performance, since R2=0.41, that is, the global self-concept explains 41% of data variance, followed by school competence that explains 39%, with R2=0.39. Having a lower level of prediction, the aerobic capacity, explains 10% of academic performance, where R2=0.104. Also behavior and the number of weekly training sessions and social acceptance respectively explain 7%, 5% and 2%. Academic self-concept, is in fact, a very good predictor of academic performance, in which extracurricular activities are influencing factors for students' academic performance (Marsh & Yeung, 1997 cited by House, 2000). Studies from Lipscomb (2007) and Trudeau and Shepard (2008) showed that practicing regular and continuous physical activities will develop competences that can help students to increase their academic performance. Self-esteem and self-concept are positively associated with academic performance, motivation and attitudes towards school (Choi 2005; Marsh & Craven, 2006; Valentine & DuBois, 2005; Peixoto & Almeida, 2010), however according to Harter (1999 cited by Peixoto & Almeida, 2010), one should distinguish between self-concept and global self-esteem since the magnitude of the relationship between academic performance and global self-concept and self-esteem differs where studies have shown stronger relationships with self-concept rather than self-esteem (Hoge et al., 1995;

Lyon, 1993; Marsh, 1987; Muijs, 1997; Skaalvik & Hagvet 1990, cited by Peixoto & Almeida, 2010).

Study limitations

As is common in most investigations, we found some limitations, namely the size of the sample that we would have liked to be more extensive, however, the non-authorization by some parents, loss of authorized informed consents and/or forgetfulness of the students, helped to lower the number of students.

When obtaining the students' evaluation grids, we were only provided with the evaluations of the final students' grades (1 to 5), so the evaluations obtained in the written tests in percentage values were difficult, and consequently never delivered by the teachers, which would have been an important and more specific differentiating factor.

Future research

In future investigations, we believe that it would be valuable and relevant to investigate the self-concept, self-esteem, aerobic capacity and handgrip strength and academic performance associated with the practice of extracurricular physical exercise. It would also be useful to extend the investigation to a larger number of adolescents with the application of these methods in several areas of the country, analysing if there were any differences.

Associate self-concept variables and their dimensions, self-esteem, aerobic and strength capacity and academic performance with morphological variables such as weight, energy metabolism, body mass index or percentage of fat and muscle mass with an understanding whether there is a relationship between these variables .

Also study the inclusion of motivational beliefs, social support and possible influence of the family in the practice/choice of sports that would allow a more comprehensive analysis of the reasons that lead to the practice of physical exercise or the lack of it.

In a forthcoming study, we would like to proceed with the application of an electroencephalographic evaluation to obtain data (stimuli) that would reveal the areas of the brain that are activated with the practice of physical exercise and by this be able to associate with the different disciplines in a school context.

Practical applications

Given the results obtained, we want to emphasize that the practice of physical activity is beneficial, not only for physical health, but also for these analysed factors, and the implementation of this physical activity in childhood should be considered a priority in our society, as it reveals itself as essential for the positive development of the child.

It seems to be beneficial to practice both modalities with and without body contact since the academic performance values are quite similar. Considering that in both types of sports, aerobic capacity is a determining factor that can predict academic performance, it is important that coaches in the different sports develop their work on behavioural aspects and at the same time strengthen the perception of school competence in children, as their development enhances the global self-concept in children, which exerts a considerable predictive factor on academic performance at these ages.

Conclusions

In the context of the middle-school students evaluated, the practice of sports with and without body contact did not prove to be a significant variable in self-concept levels, self-esteem, aerobic capacity, handgrip strength and academic performance.

Students practicing sports without body contact showed significantly higher levels of behavior than students who practice sports with body contact.

The global self-concept, school competence and aerobic capacity were, respectively, the three main significant predictors of the academic performance of the evaluated middle-school students.

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