

RELATIONSHIP BETWEEN PERCEIVED ATHLETIC COMPETENCE, MATURATIONAL STATUS AND PHYSICAL ACTIVITY IN BOYS AND GIRLS

RELAÇÃO ENTRE COMPETÊNCIA ATLÉTICA PERCEBIDA, ESTADO MATURACIONAL E ATIVIDADE FÍSICA EM RAPAZES E MOÇAS

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RESUMO

A Prática Organizada de atividades físicas (PO) é um tipo de atividade física realizada por programa organizado com frequência e duração, sob a supervisão de um adulto (professor ou treinador), e envolve algum tipo de demonstração do seu desempenho, que pode ser por meio de competições e/ou festivais. Este estudo teve como objetivo investigar a relação entre a Competência Atlética Percebida (CAP) e o tempo gasto em Práticas Organizadas em esportes, lutas e danças, considerando o estado maturacional e o sexo de adolescentes. Neste estudo transversal e correlacional participaram 213 rapazes e moças com idade entre 13 e 16 anos. A CAP e as PO dos indivíduos foram avaliadas por meio de questionários. O estado maturacional foi determinado pelo cálculo do pico de velocidade de crescimento. Correlações bivariadas e parciais foram realizadas para análise dos dados. Os resultados mostraram que independentemente do estado maturacional dos indivíduos, houve uma relação positiva entre a Competência Atlética Percebida e o Total de Práticas Organizadas para rapazes e moças ($\rho = 0,40$, $p < 0,01$). Neste estudo, a relação entre a Competência Atlética Percebida e o tempo gasto nas Práticas Organizadas, durante a infância até a adolescência, pareceu ser um evento independente do estado maturacional.

Palavras-chave: Desenvolvimento do adolescente, Desempenho atlético, Atividade física, Sexo.

ABSTRACT

The Organized Practice of physical activities (OP) is a kind of physical activity carried out in an organized program of frequency and duration, under the supervision of an adult (teacher or coach), and involve some kind of demonstration of performance which may be competitions and/or festivals. This study aimed to investigate the relationship between the Perceived Athletic Competence (PAC) and the time spent in Organized Practices in sports and dance, considering the adolescent maturational status and sex. In this cross-sectional and correlational study participated 213 boys and girls aged between 13 and 16 years. The Perceived Athletic Competence and the Organized Practices of the individuals was assessed by questionnaires. The maturational status was determined by calculating the peak growth rate. Bivariate and partial correlations were performed. The results showed that regardless of maturational status of individuals, there was a positive relationship between Perceived Athletic Competence and total Organized Practices for boys and girls ($\rho = 0.40$, $p < 0.01$). In this study, the relationship between Perceived Athletic Competence and time spent in Organized Practices during childhood until adolescence appeared to be an independent event from maturational status.

Keywords: Adolescent development, Athletic performance, Physical Activity, Sex.

Introduction

The Organized Practice of physical activities (OP) is a kind of physical activity carried out in an organized program of frequency and duration, under the supervision of an adult (teacher or coach), and involve some kind of demonstration of performance which may be competitions and/or festivals^{1,2}. The OP is conducted systematically and deliberately in order to improve performance on specific motor skills and the contexts of sports practices, fights/martial arts and dances are typical ones for OP amongst adolescents. Since proficiency in motor skills, is linked to the perpetuation of positive outcomes related the lifespan physical and psychological health and such proficiency depends on practice^{3,4} it is plausible to consider that OP is an environmental constraint^{5,6}, associated to a full and healthy development of adolescents.

Among the several psychological benefits provided by OP, this study highlights that a good Perceived Athletic Competence (PAC) can be a result of this practice. The PAC has been defined as the perception of the individual in performing sports skills, including outdoor games and demonstrating his athleticism⁷. Some studies have showed of the importance of PAC in the persistence of children and adolescents in the physical activity^{3,8,9} and high levels of PAC reinforce positive expectations for success, effort and choice of challenging tasks⁸. A recent study shows that children who maintain high levels of physical activity remain with their PAC stable over the years¹⁰, however, it is still unclear how this relationship occurs in adolescence. The PAC is an important behavioral variable and, because a person is an open system^{11,12} and his/her nature and dynamics are in continuous transactions with the environment, the PAC influences and is influenced by other constraints of the perceptual-motor system.

Thus, individual, environmental and task constraints can change the perceptual-motor performance of individuals, bringing consequences of the development of other behavioral aspects^{5,6}. Individual's physical characteristics such as height, body mass, maturational status, as well as behavioral variables such as motivation and perceptions of competence, may lead to different patterns of interaction between the constraints and change the organization of the movement used by individual in order to achieve his/her goals^{13,14}. The sex seems be an important individual constraint in studies with adolescents and OP, since several studies have shown that boys report more positive attitudes toward physical activity^{15,16} and participation in sports^{17,18} than girls. Likewise, in the studies investigating the PAC of adolescents, the boys showed higher scores than girls¹⁷⁻²⁰. Specially highlighting the relationship between OP and the PAC, boys and girls who practiced sports have exhibited higher levels of PAC when compared to those who did not had practiced²¹⁻²³.

Also in adolescence, the maturational status is another individual restriction which can affect behavioral variables such as the self²⁴ and the PAC²⁵⁻²⁷. The maturational status seems to be particularly negative for the girls because they are subject to most remarkable bodily alterations coming with puberty and sexual maturation (e.g. deposition of body fat, enlargement of the breasts and menarche). In fact, adolescents with higher maturational level may have lower levels of PAC, as the bodily changes seem affect negatively their perceptions of competence^{24,25,27}. Considering the effect of maturational status on the difference between the sexes in proficiency in motor skills, a variable that seems to be directly related to PAC, a recent study emphasizes the need to verify the influence of maturation when investigating adolescents²⁸.

Finally, studies that compared the PAC between adolescents who were involved or not in OP, have limited the assessment for the current OP of the adolescents^{21,29,30}, disregarding their historical of practices. Since this study follows the concepts proposed in developmental systemic would, it is considered that the history of a system is a relevant factor to their current state. Thus in a developmental point of view, it can be expected that the cumulative OP can reinforce the positive cycle proposed by Stodden et al.³. Thus, the present study aims to investigate the PAC of adolescents and their relationship with the OP, considering (a) the total time spent in those practices during childhood and adolescence, and (b) the variables of individual constraints: sex and maturational status.

Methods

This is a cross-sectional study³¹, approved by a local Ethics Committee, registration CAAE: 22545613.5.0000.5207). The population studied was adolescents from a private school of the city of Olinda, northeastern Brazil. For this study non-probability purposive

sampling was performed. So, with the support of the school administration, all school adolescent students were invited to participate. The inclusion criteria for sampling checks were as follows: a) be 13-16 years of age; b) those whose parents or guardians signed the Term of Free and Informed Consent.

Participants

The research terms were delivered in all classes of 7th to 10th grades. Among the students ($n=265$) who fulfilled all inclusion criteria, were excluded from the sample the subjects that: a) were not in school on the day of data collection ($n=21$); b) individuals who were outside the age range defined from this study ($n=29$); and c) individuals who had any physical disability and/or mental (and this information was confirmed by school administration) ($n=2$). The final sample consisted of 213 adolescents (Table 02).

Procedures

Data collection was carried out on the school premises during the summer of 2014 and the data collection lasted three weeks. The questionnaires were applied in the classroom by trained researchers who replied any doubts. The questionnaires evaluated: a) Perceived Athletic Competence (PAC); b) Organized Practice sports, martial arts and dances (OP). Finally, individual anthropometric measurements of the participants were taken in a private room.

To measure the PAC was used the Self-Perception Profile for Adolescents version³², translated and validated for Brazilian adolescents³³; it showed good quality psychometric with internal consistency indices ranging from $\alpha = 0.60$ to $\alpha = 0.88$. For PAC domain indicates a Cronbach's $\alpha = 0.80$. The questionnaire assesses adolescents from 13 to 18 years old and consists 45 questions that are divided into eight specific fields of perceived competence (education, social, athletic, physical appearance, work, dating, behavioral conduct and friendship) and a specific domain related to global self-esteem. For the present investigation, the five questions concerning the PAC were used, corresponding to the questions of numbers 03, 12, 21, 30 and 39. For the score of PAC variable, we used the sum of the data concerning the five questions about PAC, which could range from 5 to 20 points.

The OP was assessed by a questionnaire validated and proposed for this study, the Questionnaire of Organized Physical Activity in sports, martial arts and dances for adolescents³⁴. The instrument allows knowing the type and the time spent in OP of physical activities in sports, martial arts and dances and it was still possible to add others organized physical activities that were not on the list. It considers current practices (in the last 6 months from the day of the data collection) and also those that were previously performed (during the period of early and later childhood and early adolescence). The week frequency (days), the duration (minutes and/or hours) of each session and the total practice time (months) are measured in such questionnaire. Besides, there is a question about if the individual performed this practice during the vacations, with the aim of cashing the months in which those activities were not practiced and to avoid overestimation in the time spent with OP.

The questionnaire allows a categorical measure (if the participant do/did or not OP - previously, currently or in both options). The total OP (previous and current) was estimated by the sum total time of practice in months of all activities (represented by the unit: months/modalities), subtracting a month practice per semester from those adolescents who reported not practice during the vacations. A previous study showed satisfactory validation and reproducibility levels in this questionnaire³⁴, with content validity coefficient (CVC) over 80%; correlation test retest $\rho = 0.68$ ($p < 0.001$) for the total time of current practice, and

$\rho = 0.75$ ($p < 0.001$) for the total time of previous practice; and Kappa's reproducibility index ranging from $k = 0.37$ to $k = 0.95$ ($p = 0.002$).

Anthropometric measurements of weight, height and trunk-cephalic height were done following the procedures for anthropometric data measures proposed by Beck et al.³⁵ and Petroski³⁶. The main researcher and one assistant were trained to collect data in order to make it objective, reliable and fast. The agreement between raters was calculated in a pilot study, with acceptable reliability levels above 80%. These data served to characterize the sample and to calculate the Growth Velocity's Peak (GVP), which determined the adolescents' maturational status as proposed by Mirwald et al.³⁷. The negative GVP values indicated that the adolescent was in a less advanced maturational status, while the positive values indicated the adolescent was in more advanced one.

Data analysis

Data was tested by histogram analysis and Kolmogorov-Smirnov test, which showed the absence of data's normality. The Mann-Whitney test was used to verify the difference between sexes; the effect size was calculated through Cohen's D test (d), adopting the following range values for interpretation: insignificant (< 0.19), small (0.20 - 0.49), medium (0.50 - 0.79), large (0.80 - 1.29) and very large (> 1.30)³⁸. Bivariate correlation analysis (Spearman) with the total sample, was used to verify the relationship between PAC (interval variable measured in dots) and the total time spent in OP (reason variable measured in months); and the relationship between PAC and the maturational status (reason variable measured in months) of boys and girls. Partial correlation analyzes were performed (Spearman) to check the relationship between PAC and the total time spent in OP of boys and girls. The maturational status of these individuals was the adjustment covariate. All analyzes were performed with the program SPSS 17.0, setting $p < 0.05$ as a significance level.

Results

The Table 1 shows the data of the sample's characterization, according to the sex. There was not statistically significant difference for age ($Z = -0.602$, $p = 0.55$) and BMI ($Z = -0.140$, $p = 0.89$). However, there was statistically significant difference in body mass ($Z = -4.001$, $p < 0.01$; $d = 0.45$) and height ($Z = -7.322$, $p < 0.01$; $d = 1.08$) with higher values for boys. Also, there was a difference for maturational status with superiority for girls ($Z = -12.315$, $p < 0.01$; $d = 2.96$); and a difference for PAC with superiority for boys ($Z = -4.170$, $p < 0.01$; $d = 0.35$). But, there was not statistically significant difference for Total OP ($Z = -0.067$, $p = 0.95$).

Table 1. Sample characterization of the age, body weight, height and BMI of boys, girls and total of adolescents. Olinda-PE

Variable		Boys (n = 85)	Girls (n = 128)	Total (n = 213)
Age (years)	Med (IQR)	14.31 (1.48)	14.44 (1.34)	14.42 (1.38)
Body Mass (kg)	Med (IQR)	55.40 (12.90)*	50.20 (10.70)*	52.00 (12.60)
Height (m)	Med (IQR)	1.67 (0.11)*	1.58 (0.06)*	1.61 (0.11)
BMI (Kg/m ²)	Med (IQR)	19.36 (3.48)	19.94 (3.88)	19.74 (3.74)
Maturational Status (years)	Med (IQR)	-0.39 (1.31)*	3.28 (1.20)*	2.46 (3.50)
Perceived Athletic Competence (score)	Med (IQR)	14.00 (5.50)*	12.00 (6.00)*	13.00 (6.00)
Organized Practice (months)	Med (IQR)	48.00 (67.00)	45.00 (79.50)	45.00 (75.00)

Note: n = number of subjects, Med = median, IQR = interquartile range, BMI = body mass index, *Statistically significant difference between the sexes ($p < 0.01$)

Source: Authors

The results of the bivariate correlations showed a positive and moderate relationship between PAC and total OP ($\rho = 0.40$; $p < 0.01$) (Figure 01), and a negative and low relationship between PAC and maturational status ($\rho = -0.26$; $p < 0.01$) (Figure 2).

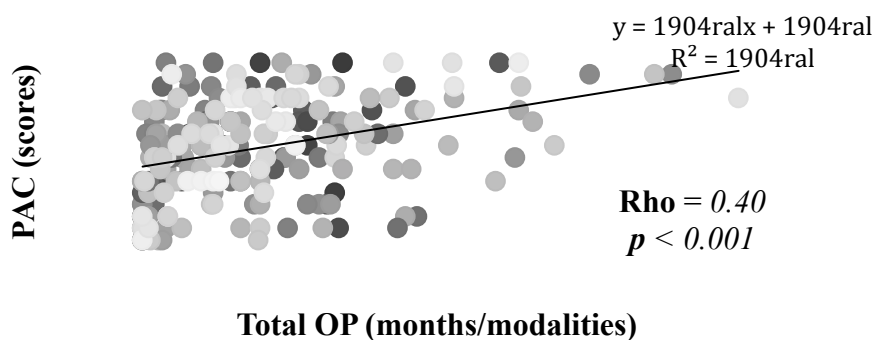


Figure 1. Correlation between Perceived Athletic Competence (PAC) and total time spent in organized practice in sports, martial arts and dances (Total OP) of adolescents with 13 to 16 years. Olinda-PE

Source: Authors

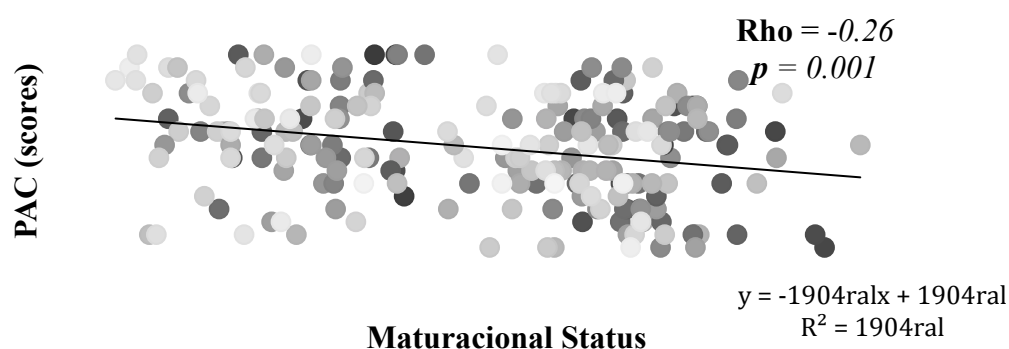


Figure 2. Correlation between Perceived Athletic Competence (PAC) and maturational status of adolescents with 13 to 16 years. Olinda-PE

Source: Authors

After the bivariate analysis, it was held a partial correlation between the PAC and the total OP, controlling the effect of maturational status of boys and girls, as a covariate. The results showed a positive and moderate relationship between PAC and total OP for both boys ($\rho = 0.40$, $p < 0.01$), and for girls ($\rho = 0.40$, $p < 0.01$).

Discussion

This study aimed to investigate the PAC of adolescents and their relationship with the OP, considering (a) the total time spent in those practices during childhood and adolescence (total OP), and (b) the variables of individual constraints: sex and maturational status.

The results of the bivariate correlations revealed a positive relationship between PAC and total OP, thus, the more time spent practicing OP, the greater the PAC score. In spite of this research is a cross-sectional study, it is important to highlight that the evaluation of the

total OP was analyzed from the childhood of individuals; this assessment took into account both the current and the previous practice of adolescents, allowing know retrospectively the individual practice and to analyze the cumulative practice. This result permits to say that the PAC was positively related to the history of the practice of adolescents. In this sense, it seems that the more time devoted to the OP, greater the PAC of those adolescents.

These results support some findings of previous studies involving organized sports practice and physical activities. In a cross-sectional study boys and girls who were actively involved in organized sports practice showed higher PAC²¹, as well as those involved with physical activities reported higher PAC scores²². By using a longitudinal design with children in later childhood, the Papaioannou et al.⁸ study showed the earlier practice of exercise or sports was beneficial for both PAC and on task orientation. Also, Barnett et al.³⁹ reported that high perception of competence in sports (PAC) in children increased the chances of participation in physical activity in adolescence. In sum, the positive association between PAC and OP, appears to go further, as these results suggest that the PAC can determine the future participation in OP or in physical activities. The individual constraints (PAC, in this study) can establish a relationship with the environment constraints (OP, in this study) and change or improve the active adolescent's behavior.

In the theoretical model of Stodden et al.³, as mechanism of mutual influence, individuals with greater participation in physical activity (in the case of this study, OP) increase your chances of experiencing good executions, increase his or her perception of competence and remain involved in such practices. In the perspective of biological and developmental systems¹¹ it is what is called "positive feedback" because a feature of the system can positively to reinforce another feature that reinforces the first, and both tend to increase over time in a relationship synergistic like "win-win". In this case, the more time spent on OP, more opportunities to become conscious himself/herself competent in the physical domain, and thus more involvement with this practice it will be encouraged. And a recent study emphasizes that regular physical activity helps in promoting health and improving quality of life of children and adolescents, as well as being essential for maintaining this habit into adulthood⁴⁰.

Concerning the maturational status, which can be another individual constraint, the results of this study showed a negative, low and significant correlation between PAC and maturational status. Grounded in the literature review, it was expected the more advanced in maturity stage the individual was, he/she would be present lower PAC scores due to the changes in physical factors affecting the judgment of their competence^{24,25,27}. O'Dea and Abraham²⁴ investigated various areas of perceived competence and the maturational status of 462 boys and girls from 12 to 14 years and observed that there was an interaction between sex and puberty, with lower scores on PAC in post-pubescent boys and post-menarche girls, this is, individuals in more advanced maturation stages reported lower PAC scores.

The literature is emphatic about the influence of maturational status of individuals in later stages of maturation, especially females^{25,27}. In our sample, a remarkable fact was the girls are in the later stages of maturity (with individuals up to 7 years after GVP) and, so, it is plausible to assume a possible control by the maturational status on the relationship between PAC and total OP of boys and girls, to avoid this from becoming a confounding factor. The partial correlation analysis showed the influence of maturational status of individuals in the PAC, both for those in the earlier (boys) and later (girls) stages of maturation.

For the girls, this result is supported by the study of Craft et al.²⁵ which evaluated the maturational status and physical perceptions of competence in 12-year-old girls (n=46) and their results suggested that post menarche girls were at risk of lower PAC. Cumming et al.²⁷ investigated the PAC and the maturational status of 222 girls between 10 and 14 years and

found that the girls who were in the higher maturational status generally reported lower levels of PAC. However, in the present study, the girls maintained a moderate and positive relationship between the PAC and the total OP.

As for the boys, their maturational status influenced the relationship between the PAC and the total OP, even those who had not been evaluated as the higher maturational status ones. This result was not expected, since in the study of O'Dea and Abraham²⁴ only the boys who were in post-pubertal stage reported low scores of PAC. The influence of the maturational status in the individuals' active behavior appears mostly in the later stages of biological maturation^{24,26}, especially among female ones^{25,27}. Indeed, the physical changes during puberty and sexual maturation period appear to be very striking in young women. Thus, could be speculated that such changes as increased volume of the breasts and the deposition of body fat, may adversely affect the female participation in OP. Nonetheless, the findings of this research suggest that individual and environmental constraints analyzed influenced the PAC of girls and boys.

As a limitation the sample studied showed a higher concentration of boys in less advanced stage of maturity and girls in later stages. Since the present study investigated only adolescents aged 13 to 16 years, future studies can try to minimize it investigating a greater range of ages. It is also worth noting that the results of this study are presented from a cross-section design, and that has restrictions to establish true cause-effect relationships between variables. Thus, the evidence will always be limited to the relationship between the variables, but generating causal hypotheses.

Conclusions

The relationship between PAC and total OP, taking into account the maturational status of these adolescents, was positive and moderate for both boys and girls. Also, those relationships was an independent event from maturational status.

This research conducted analyzes that considered both individual (sex and maturational status) and environmental constraints (organized practice) in the evaluation of a behavioral variable (PAC) in adolescents. This shows the trend to study more broadly the phenomenon of active and healthy motor development. In addition, should be emphasized as a differential that the proposal to assess the OP in different contexts (sports, martial arts and dance) and take into account both the current practices along the previous ones composing a history of organized practices (total OP), in order to allow to understand the developmental process of organized practice among adolescents.

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