Original Article

RELATIONSHIP BETWEEN CHILDREN'S COMPETENCE SELF-PERCEPTION, ACADEMIC PERFORMANCE AND MOTOR PERFORMANCE

RELAÇÃO ENTRE A AUTOPERCEPÇÃO DE COMPETÊNCIA, O DESEMPENHO ACADÊMICO E MOTOR DE CRIANÇAS

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RESUMO

O objetivo deste estudo foi investigar a relação entre a autopercepção de competência, o desempenho acadêmico e motor de crianças do quinto ano do Ensino Fundamental I. Participaram deste estudo 15 meninos e 16 meninas com idade média de 10 ± 0,6 anos. Para a avaliação da autopercepção de competência, utilizou-se a Escala Pictórica de Percepção de Competência e Aceitação Social para Crianças, para o desempenho acadêmico o Teste de Desempenho Acadêmico e para avaliar o desempenho motor aplicou-se a Bateria de Avaliação do Movimento da Criança. Os resultados apresentaram (a) relações moderadas e significativas entre o desempenho acadêmico e a autopercepção (r=0,354; *p*=0,051), e (b) entre o desempenho motor e a autopercepção de competência motora (r=0,377; *p*=0,036). Desta forma, considera-se que a avaliação e a intervenção educacional no conjunto dessas variáveis são aspectos críticos para o desenvolvimento global infantil.
Palavras-chave: Autopercepção. Educação Física. Desenvolvimento infantil.

ABSTRACT

The objective of this study was to investigate the relationship between competence self-perception and academic and motor performance of 5th graders. It had the participation of 15 boys and 16 girls aged on average 10 ± 0.6 years old. For competence self-perception assessment, the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children was used; academic performance was analyzed through the Academic Performance Test; whereas motor performance was assessed by mesa of the Movement Assessment Battery for Children. Results presented (1) moderate and significant relationship between academic performance and self-perception (r=0.354; *p*=0.051), and (b) between motor performance and motor competence self-perception (r=0.377; *p*=0.036). Thus, it is considered that assessment and intervention as to the set of these variables are critical aspects for a child's global development.
Keywords: Self-Perception. Physical Education. Child Development.

Introduction

Self-perception is a personal competence value influenced by a child's socialization process, which differs according to individual characteristics, such as age group, gender and the child's own motivation to perform different tasks, as well as by environmental factors, such as family members' attitude and behavior, teachers' perception and feedback, etc. Susan Harter[1] points out that the concept of perception must be understood as a complex and multi-dimensional psychological entity that mirrors an individual's perception about to what degree he or she is competent or not in several areas, but in an inter-independent way. This means that the same individual may perceive himself or herself as good or competent in some areas, but bad or little competent in other ones – for instance, having a good cognitive competence perception, but a bad or low motor competence self-perception.

Perceived competence is essential to boost motivation in learning because children who perceive themselves as competent tend to persist longer to perform movements precisely. However, if they do not feel satisfied with their performance, or present consecutive flaws, they will likely quit the activity at which they have failed[2,3]. Thus, considering that learning for human beings is a dynamic and complex process, studies highlight the importance of establishing a relationship between perceived competence and motor performance as factors that influence this process[4-6].

Recent researches evidence the existence of strong and positive correlations between motor development and cognitive development[7,8], in the sense that the motor aspect presents itself as an important factor for a child's global development[9]. In this direction, some studies indicate that children with learning difficulties have presented both low academic performance and low motor performance, showing association between the two variables[9,10]. Therefore, it is assumed that children with better academic performance would also present better motor performance at tested skills, characterizing the interdependence of both domains[11,12]. On the other hand, as stressed by the literature, children with low academic performance tend to present, concomitantly, motor difficulties and not to perceive themselves as competent in terms of motor skill performance.

Learning difficulties can be understood as obstacles encountered along the educational process, referring to grasping and assimilation of proposed contents[13]. As for difficulty incidence, studies conducted with international populations suggest that at least 5% of primary school students have these problems[14]. According to the American Psychiatric Association[15], learning difficulties can be diagnosed when an individual's results on duly standardized tests related to reading, math and written expression are substantially inferior to what is expected for his or her age, education and intelligence level. However, different from what was once imagined, in most cases, they cannot be linked to congenital problems, such as intellectual disabilities, global development delay, hearing and visual impairment, or neurological problems[15].

In addition to motor delay, children with learning difficulties have more trouble adapting to classroom demands[11]. About this factor, Gouveia[16] points out that there is a direct relationship between physical exercise, learning issues and self-esteem, and children who perform guided physical activity benefit from a positive influence on both academic learning and self-esteem improvement. Thus, the quality of these interactions will make them conquer autonomy and confidence in their skills, perceiving themselves as competent in many of them[17].

The way that an individual perceives his or her competence becomes a critical variable for academic and motor performance. Therefore, it is to be expected that children with learning difficulties present positive relationships, from moderate to strong, between motor and academic performance and competence self-perception.

Investigations on possible correlations between these variables may have a positive impact on the praxis of professionals who work with children in school context, as well as the training of future professionals within the academic field.

Methods

Participants

A total of 31 children participated in this study (15 boys and 16 girls); they were attending an after-school project, aged on average 10 ± 0.6 years old and enrolled at two schools belonging to the Municipal education network. The kids were referred by the schools' pedagogical teams for having learning difficulties in many areas of knowledge, such as reading, writing and math. Thus, the sample was composed by convenience, according to criteria for group characterization. All children with learning difficulties referred by the pedagogical team were assessed.

The study was approved by the Ethics Committee on Research Involving Humans (Legal opinion No 1.681.499 / CAAE No 56871816.6.0000.5231). Parents or guardians and the children signed a free and informed consent form authorizing and accepting their participation in the investigation.

Instruments

For competence self-perception assessment, the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children (PSPCSA)[18] was applied; For Academic performance assessment, the Academic Performance Test (APT)[19] was employed; and for motor performance assessment, the Movement Assessment Battery for Children (MABC-2)[20] was adopted.

Competence Self-Perception Assessment

To assess the competence self-perception of children with learning difficulties, the PSPCSA, proposed by Harter and Pike[18], was used. This test is composed of 24 items divided into four subscales with six items each. Each subscale refers respectively to: (a) perceived cognitive competence; (b) perceived physical competence; (c) perceived peer acceptance; and (d) perceived maternal acceptance. It consists of a pictorial scale of individual application, that is, the items are presented to the child from an image that supports the text, read by the experimentation. In each situation presented to the kid, there are two response options, which are presented verbally and visually by means of pictures. One of the pictures is shown to the child and demonstrates the result of a competent kid performing a certain task, or who is socially accepted. The other picture is the opposite, that is, the child looks less competent or less accepted. Faced with these two options, the kid must indicate the one that he or she considers to be more like himself or herself. Once a choice is made, he or she is once again confronted with an alternative, in which he or she must decide on the perception he or she has of his or her competence. The results for each item on each subscale range from 1 (low competence) to 4 (high competence). This test has been used in several studies with different populations[2,4,6], which indicated consistency for self-perception assessment. For the material to be used in this study, the questions were translated by the researchers themselves.

Academic Performance Assessment

To assess the academic performance of children with learning difficulties participating in this study, the APT was used[19]. Said instrument seeks to provide, in an objective way, an assessment of fundamental skills for academic performance, more specifically concerning writing, arithmetic and reading. It was proposed to assess 1st-6th graders. However, the test was designed in 1994; therefore, because the Brazilian school curriculum was changed to nine years, the test applies to 2nd-7th graders. It is worth noting that the APT design process was founded on criteria developed from the Brazilian school reality, aiming to fill in gaps as to availability of psychopedagogical measurement instruments, validated and standardized for the country[19].

The instrument broadly indicates what academic learning areas are adequate or hindered in the assessed individuals, with the three subtests being: a) writing – writing proper nouns and words presented isolatedly as a dictate; b) arithmetic – orally solving problems and calculations about arithmetic operations in writing; c) reading – recognizing words isolated from their context.

The test is unique and applicable to all grades, but uses different procedures for comparison/analysis, depending on the child's grade. There are three classifications for academic performance: high, medium and low, in which low classification is indicative of learning difficulties, and the latter can be specific (reading, writing or arithmetic) or general (in case of inferior results on overall APT).

The test was developed and applied to a population of students from Porto Alegre, Rio Grande do Sul, Brazil, by Stein[19]. The instrument has been widely used in studies conducted in different regions of the country and with varied populations, without finding any cultural interference that could hinder the students' performance on the test[21-23].

Motor Performance Assessment

The MABC-2 has been widely used to assess motor development and identify motor difficulties. This test has three sets of tasks, each one targeting a specific age group (Group 1 – 3 to 6 years old; Group 2 – 7 to 10 years old; and Group 3 – 11 to 16 years old).

The tests are divided into three movement categories, namely: Manual Dexterity, Ball Skills, and Balance Skills. Although the same skills are evaluated in all age groups, the tasks are different according to age, taking into consideration the children's development level. For the conduction of this research, tests for Group 2 (7-10 years old) and Group 3 (11-16 years old) were used. In each evaluation, the children performed a set of tasks, composed of eight items, with the first three referring to manual dexterities, the fourth and fifth to ball skills, and the remaining three to balance (static and dynamic). The application time for this test varies between 20 and 30 minutes, depending on whether the child has more or less difficulty with the task and needs a second attempt.

Procedures

Data collection was carried out by the researcher with the aid of a teacher who had a degree in Physical Education and was instructed on collection procedures beforehand. The date and place for data collection were previously scheduled with the coordination of both participating schools. The tests were applied on different days, and the application sequence was randomized among participants.

Statistical Analysis

Each child's scores were used to classify the participants into one of the three tests. For data analysis, results were tabulated in an Excel spreadsheet as to absolute frequency and relative frequency (percentage) of the children's classification on each test. Considering the composition of an intentional sample, the categorial nature of the variables, and because the normality assumptions of the variables were not accepted, the choice was to employ non-parametric statistics. Thus, SPSS for Windows was used (Version 13.0, SPSS Inc.©, Chicago, Illinois), and Spearman's Correlation Coefficient was applied to identify possible associations between results on the three tests. The level of significance was set at $p \leq 0.05$ for acceptance of hypotheses or not.

Results

The self-perception test results indicated that few children were classified with low performance in the categories proposed by the instrument; only for perceived peer acceptance (3.2%) and maternal acceptance (9.7%), they were classified at this level of perception. In addition, the mean obtained with the raw scores of the four areas proposed by the instrument allows observing that most children have a positive perceived competence (67.7%). Table 1 displays these results.

Table 1. Absolute and relative frequencies for the children's classification on the PSPCSA

N=31	Cognitive Self-Perception		Peer Acceptance		Motor Competence Self-Perception		Maternal Acceptance		Self-Perception Mean	
	N	%	N	%	N	%	N	%	N	%
Low	-	-	1	3.2	-	-	3	9.7	-	-
Medium	10	32.3	3	9.7	7	22.6	18	58.1	10	32.3
High	21	67.7	27	87.1	24	77.4	10	32.3	21	67.7

Source: The author

With respect to overall results on the APT, most children (54.8%) were classified with low academic performance, there was a relatively high percentage (41.9%) of children with medium performance, and only one child (3.2%) was found to be at the high level. Table 2 displays the assessed children's classification in each area of knowledge that composes the test, as well as their overall classification.

Table 2. Absolute and relative frequencies for the children's classification on the APT

N=31	Writing		Arithmetic		Reading		Overall APT	
	N	%	N	%	N	%	N	%
Low	17	54.8	16	51.6	7	22.6	17	54.8
Medium	13	41.9	14	45.2	10	32.3	13	41.9
High	1	3.2	1	3.2	14	45.2	1	3.2

Source: The author

The results for motor performance assessment indicated that most children were classified between percentiles > 50-75 (45.2%). It is worth clarifying that none of the assessed kids in this study was classified with overall percentiles below 9, so the children from group 0-25 presented percentiles equal to or higher than 16.

The children had better results on balance skills, with 54.8% of them being classified within percentiles >75-100. The worst results found were on ball skills, as 32.3% of them were classified between percentiles 0-25, while, for manual dexterity, 29% were classified between percentiles 0-25, and 48.4% between percentiles 2-50. Table 3 displays test results for each group of skills and total percentile.

Table 3. Absolute and relative frequencies for classification within MABC-2 percentiles

N=31	Manual Dexterity Skills		Ball Skills		Balance Skills		Total Percentile	
Percentile	N	%	N	%	N	%	N	%
0-25	9	29.0	10	32.3	2	6.4	6	19.3
>25-50	15	48.4	11	35.5	5	16.1	8	25.8
>50-75	7	22.6	3	9.7	7	22.6	14	45.2
>75-100	-	-	7	22.6	17	54.8	3	9.7

Source: The author

To analyze the relationship between variables, Spearman's correlation test was run, showing significant correlation between the following variables: learning difficulties and peer acceptance ($r=.344$; $p=.058$); learning difficulties and competence self-perception mean ($r=.354$; $p=.051$); motor competence perception and motor performance ($r=.377$; $p=.036$); maternal acceptance and motor performance ($r=.423$; $p=.018$); and competence self-perception mean and percentile of ball skills ($r=.440$; $p=.013$). Table 4 displays results for the analyzed variables.

Table 4. Correlation coefficient results for competence self-perception with academic and motor performance

		Cognitive Competence Perception	Peer Acceptance	Motor Competence	Maternal Acceptance	Competence Self-Perception Mean
Writing	r	-.044	.166	-.030	-.151	-.044
	p	.813	.373	.874	.417	.813
Arithmetic	r	.132	-.012	.074	-.069	.264
	p	.480	.950	.694	.714	.152
Reading	r	.145	**.460****	.051	.234	**.374***
	p	.436	.009	.785	.206	.038
Acad. Performance (overall APT)	r	.221	**.344***	-.030	.070	**.354***
	p	.232	.058	.874	.708	.051
Manual Dexterity	r	-.166	-.038	.115	.122	.032
	p	.372	.841	.538	.514	.866
Ball Skills	r	.191	.273	.209	**.363***	**.440***
	p	.304	.137	.259	.044	.013
Balance	r	-.275	.035	.275	.258	.004
	p	.134	.852	.135	.162	.982
Total Percentile MABC 2	r	.035	.144	**.377***	**.423***	.298
	p	.850	.438	.036	.018	.103

Legend: * = $p \leq 0.05$; ** = $p \leq 0.01$
Source: The author

As for academic and motor performance, Spearman's test showed no relationship between the two general variables, neither for the subitems of each test. Table 5 displays these results.

Table 5. Correlation test results for academic performance and motor performance.

		Manual Dexterity	Ball Skills	Balance	Total Percentile MABC 2
Writing	R	.172	.034	-.114	-.068
	P	.353	.855	.541	.718
Arithmetic	R	.194	.200	.108	.238
		.296	.281	.564	.197
Reading	R	.024	.063	-.034	.084
	P	.897	.737	.854	.652
Academic Performance	R	.197	.241	-.129	.101
	P	.287	.192	.488	.587

Source: The author

Discussion

This study aimed to investigate the relationship between competence self-perception, and academic and motor performance of children referred for having learning issues. Based on the consulted literature, the assumption was that positive correlations, from moderate to

strong, would be found between the analyzed variables; however, results showed only low to moderate significant correlations, partially confirming the hypotheses. Even so, it is important to highlight relevant correlations, corroborating some studies[2,4-6].

About self-perception and academic performance, it was possible to observe that 12.5% (R^2=.125) of variability in academic performance was explained by variability in self-perception (or vice-versa). Thus, the remaining 85.5% of variability is explained by other factors, such as psychological, socioeconomical, etc. The fact that there was significant correlation between these variables shows that shared variability is not a result of chance, corroborating with studies that indicate a relationship between academic performance and psychological variables, including self-perception[11,24]. Renick and Harter[24] argue that children with learning difficulties spontaneously compare their academic performance with that of their peers, which may cause them to feel bad about themselves and reinforces the strong connection between self-perception and academic difficulties.

It is known that self-perceiving as competent allows children to feel motivated and persist longer doing the same activities and, consequently, become more competent[25]. In the present study, none of the kids presented low cognitive or motor competence self-perception, but most of them presented low (9.7%) or medium (58.1%) maternal self-perception. This shows that both teachers and parents must be instructed to encourage their children more so that they are successful.

Parental encouragement seems to be an influencing factor for children's motor experience, according to results found that show a significant correlation between perceived maternal acceptance and overall motor performance (MABC-2) (r=.423; *p*=.018). Associated with this correlation, the results of this study show an important relationship between perceived peer acceptance and academic performance (r=.344; *p*=0.58). Currently, it is known that, in order to learn, children need physical, emotional and social balance, and students need to feel valued by both themselves and those who live with them[26]. Studies such as those by Chechia and Andrade[27] stress that parents engaging in their children's school routine favors their learning success, and that children who have family support are better at everyday tasks, develop positive self-esteem and are psychologically better adjusted. In this sense, Ferreira and Marturano[22] indicate that children with academic difficulties and behavioral issues have problems in inter-personal relations, and their parents invest less in their development. Thus, parents who encourage children to exercise more allow them to perceive themselves as more competent as to their skills.

About this family-school-teacher interaction, including the children's mates themselves within the school environment, it is worth noting that there was a moderate and significant correlation between the APT reading domain and peer acceptance and overall self-perception, which seems to indicate that, when children have no reading issues, they tend to perceive themselves as more competent as well. However, the same cannot be said when it comes to writing and arithmetic, because the children had more difficulties in these areas – 54.8% and 51.6%. Altogether, these results allow considering that, perhaps, the encrypted language area, herein represented by writing and arithmetic, has a greater impact on children's competence self-perception aspects. According to Feder ad Majnemer[28], writing difficulties are more common than problems in other areas. In this way, it should be given more attention, since it is a critical skill for adulthood, which further reinforces the need for early observing learning difficulties.

About overall academic performance, 54.8% of the children in this study presented performance classified as low, as per the APT total score, characterizing an estimate of general difficulties. However, 41.9% of the children showed medium performance, while 3.2% obtained high performance on the test, that is, 45.1% of them seem not to be characterized as having learning issues, which, on its own, would not require them to attend

the after-school activities. Some authors point out that early diagnosis by teachers oftentimes label children as incapable or lazy, which aggravates these difficulties. Such a label is usually linked to a poor family-school-teacher interaction, that is, teachers identify the learning problem and hold families accountable for children's failures[13,21]. Nevertheless, still nowadays, it is hard to estimate the exact number of children with said difficulties due to hindrances to the identification of this population[11].

When it comes to motor performance, significant relationship was found between overall motor performance and perceived motor competence (r=.377; p=.036), corroborating with Villcock's findings[25], which show positive relationship between perceived athletic competence, motivational orientation and motor competence. The author suggests that children who perceive themselves as competent are more intrinsically motivated, while those who perceive themselves as little competent tend to depend on extrinsic motivation to perform different tasks, which make them less motorically competent. It is understood that the ability to assess oneself does not develop alone but is built by means of children's motor experiences while interacting with peers, and of instructions mediated by teachers[2].

Studies such as that by Noble *et al.*[29] have considered that doing physical exercise may be a determinant factor for a child to build a positive self-perception, as the authors verified that children participating in sports-related social projects had a greater social self-perception and self-concept in relation to those who did not participate. Still in this regard, Valentini[30] sought to determine the influence of a motor intervention with the mastery-oriented motivation technique on motor development and perceived physical competence, suggesting that factors associated with meaningful, precise and encouraging feedback from teachers led the study participants to develop positive impressions about themselves and about their performance and skills.

Moreover, analyzing correlations between performance in ball skill tasks and competence self-perception mean, significant relationship was identified (r.440; p=.013), indicating that good performance in the execution of these skills positively influences a child's self-perception. Specifically about the motor test, results indicated that 19.4% of the children were categorized within percentiles 0-25, which shows that many of them had low motor performance, especially in manual dexterity (29% - 0-25) and ball skills (32 – 0-25). As per the analysis of motor performance percentile, none of the kids were classified with a percentile lower than 9, so they cannot be characterized as having motor difficulties. However, these results evidence that their performance is inferior to that of more than 75% of same-aged children, showing that their motor competence could be greater.

About academic and motor performance, these results indicated no significant correlation, despite some studies showing correlations between these variables[7,8]. Perhaps, such correlations have not been observed because of the small number of research participants (n=31), or maybe because many children referred for the study did not present learning difficulties.

Finally, notwithstanding the limitations pointed out as to number of participants as well as learning difficulties, it was possible to observe that academic performance, perceived competence and motor performance are important variables for a child's global development and must be studied by several areas of knowledge, contributing to a better education.

Conclusions

Broadly speaking, the results of this study indicated a relationship between academic performance and self-perception. Although competence self-perception can be explained in 12.5% by academic performance (and vice-versa), which is a statistical correlation deemed moderate, several review studies point out that the relationship between these two variables is

important for increasing academic performance. It should be considered that many other factors may be associated with low academic performance, such as inadequate teaching conditions, contents distant from the students' everyday lives, socioeconomical conditions, etc.

Furthermore, there was moderate correlation between motor performance and perceived motor competence. Thus, it is evident that the role of Physical Education teachers is of paramount importance not only for children's motor development, but also to strengthen competence perception, important for development in other domains. It is worth noting that the fact that no significant correlations were found between academic performance, self-perception and motor development may be due to the small number of children participating in this study (n=31).

Therefore, further researches should be conducted to investigate these variables, taking into account their importance for children's global development and, specifically, for the assistance of children with difficulties to learn academic contents. Finally, a piece of data that stood out during the research was the fact that, although the children in this study were attending after-school classes for having academic learning difficulties, most of them had an average score on the academic performance test. This shows that, on one hand, there is a need for standardized methods that evaluate academic performance, in both research and education contexts, as recommended by the American Psychiatric Association[15]; on the other hand, it indicates that teaching strategies that do not meet some students' learning needs are possibly being adopted.

Thus, notwithstanding the partial confirmation of the study hypotheses, there should be a greater dialogue between professionals from different areas, considering that the literature has being evidencing the interdependence of the (three) human behavior domains, as well as a greater success of pedagogical interventions combining integrated actions between professionals from several areas within the education field.

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