

## MOTOR AND LEARNING DISABILITIES IN SCHOOL CHILDREN WITH LOW ACADEMIC PERFORMANCE

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### Abstract

The study aimed to identify the motor and learning difficulties in students with low academic performance. Took part in the study 19 students, with 08 boys and 11 girls, mean age of 10.3 ( $\pm$  1.20) years in a school, municipality of São José / SC-BR. The selection of participants occurred through the suggestion of teachers, pupils who had a history of poor academic performance during the semester. We used two scales: Movement Assessment Battery for Children and the School Performance Test. It was found that there was agreement between the results and initial indication of the teachers, as almost all pupils had learning difficulties, especially in reading and writing, as well as a representative number of students indicating they had motor difficulties. A significant number of children presented together with an indication of learning difficulties, problems with motor coordination. It is suggested to conduct research that will explore both the identification of developmental difficulties, and programs aimed at stimulating the economic well being, quality of life and health of children with learning and motor disabilities.

**Key words:** motor development; motor skills; learning disabilities; low academic performance.

### INTRODUCTION

Learning difficulties can be understood as obstacles or barriers encountered by students during the schooling period, related to the uptake or assimilation of the proposed content<sup>1</sup>. They can also be defined as a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing and mathematical reasoning<sup>2</sup>. The number of children with learning disabilities is high, reaching up to 30% of the population of students, being often identified in the first year of regular education<sup>3</sup>.

In addition to the processes of school learning, it is also during the period of schooling, more precisely between six and twelve years old, that occurs the maturation of the main motor skills, that besides being used in sports and leisure, are indispensable for the performance of daily life activities<sup>4</sup>. Thus, drew the attention of the academic and medical community the fact that some individuals, especially children, present extreme

difficulty to perform these daily activities<sup>5</sup>. Individuals with such difficulties proved to be very outdated in relation to the most population's motor skills<sup>5</sup>.

According to the Psychiatry American Association<sup>6</sup>, the prevalence of motor difficulties in child population ranges from 6% to 8%. Among this percentage, it is estimated that 30% to 50% also have some type of learning associated, such as dyslexia and specific language disorders<sup>7, 8,9,10</sup>. The difficulties in reading and writing are the most commonly related to problems in motor coordination<sup>11</sup>, while the difficulties on learning mathematics are more associated with perceptual-motor difficulties, such as space-time organization and laterality<sup>12</sup>.

Although these studies emphasize relationships between school learning and motor difficulties, a small number of Brazilian research has been conducted on this subject. It is believed to exist a need for further studies related to the incidence and prevalence of physical and learning

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disabilities in Brazilian children, since this phenomenon is still unknown to the general population, which means that children who have such disabilities do not receive appropriate treatment. Thus, it is understood that the improvement of motor skills, held together with the strengthening of school subjects, can provide many benefits to daily activities, which are checked at school, in sports, in playing moments, among other situations<sup>13, 11,14</sup>.

Another important aspect is related to the focus given to research involving learning difficulties in Brazil, where most research is directed to aspects such as evaluation of specific learning difficulties and neurological functions related to learning, psychological aspects, influence of the educational system, behavioral, sociocultural and socioeconomic problems<sup>15-20</sup>.

Therefore, our goal is to check the motor and learning difficulties in students with low academic performance.

## METHODS

### *Participants*

The selection of participants took place in a universe of approximately 130 students enrolled in classes of third and fourth grades of a state school, located on the outskirts of the city of São José / SC-BR. The indication for possible participation of students with learning difficulties occurred through the teachers' recommendations. Participated in this research 19 students, being eight boys and eleven girls. The average age of participants was 10.3 years ( $\pm 1.20$ ).

### *Procedures for selection of participants and data collection*

Prior to its execution, this research was submitted and approved by the Ethics and Human Research at the University of Santa Catarina - UDESC (reference number 35/2007).

The school investigated belongs to the public education system of Santa Catarina state, in the city of São José / SC. After having meetings with the headship, it was established contact with teachers of 3rd and 4th grades (from morning and evening periods), so that they could indicate the students who presented, in the classroom, characteristics of learning disabilities, in accordance with a history of poor academic performance. An interesting aspect is that both classes of 3rd and the 4th grades had the same teachers in the morning and in the evening, therefore in both groups the indication of students with possible learning disabilities supposedly followed the same criteria. 22 students were recommended for evaluation. Among these, 19 students returned on the agreed date (a rate of approximately 13% of mortality of the sample).

The tests were conducted at the school by only one evaluator, using the same criteria for all

participants. The place was quiet and isolated, in order to prevent any possible interference from outside.

### *Data collection instruments*

#### *School Achievement Test<sup>21</sup>*

The Teste de Desempenho Escolar (TDE) indicates, in a comprehensive manner, which areas of school learning are preserved or impaired in the examined subject. Children are subjected to three types of assessments: a) writing (writing their own name and words presented singly, in the form of dictation), b) arithmetic (oral solution of problems and written solution of arithmetic calculations) c) reading (recognition of words isolated from the context).

The test is unique and applicable to all grades, there being a different standard of comparison according to the school year. There are three ratings for academic performance: superior, middle, inferior, with the lowest classification being indicative of a learning disability, whether specific (reading, writing or arithmetic) or general, in case of a lower result in total TDE. This result is achieved by adding the scores for each sub-test, in accordance with the procedure for each age.

#### *Movement Assessment Battery for Children<sup>22</sup>*

The MABC has four sets of tasks, each one of them appropriated to a specific age range: the first age range is used for testing with children between four and six years; the second age range is used to children of seven and eight years; the third age range is used for children aged nine and ten years; and finally, the fourth age range is used for children of 11 and 12 years. In this research were used the third and fourth age ranges. In all age ranges, the first three tasks assess manual dexterity, the fourth and the fifth tasks assess skills with the ball and the remaining three tasks assess balance.

For each task performed is assigned a value from 0 (zero) to 5 (five) points, being 0 (zero) for the best possible performance. After the tests application, the results were summed within each set of tasks, so that would be possible to get the total results of each motor skills separately. Then these last three values were also added to the skills, to get the Total MABC. The Total MABC values were compared to the percentile table present in the test protocol. Based on this procedure there are three possible classifications: definite motor problems (values below the 5th percentile), borderline motor problem (values between the 5th and 15th percentile) and normal or typical motor skills (values above the 15<sup>th</sup> percentile).

### *Statistical treatment*

After the data collection, these data were tabulated in the Statistical Package for Social Sciences - SPSS version 17.0. To check the normality of the data it was used the Shapiro-Wilk test, not being verified parametricity in any of the variables. For data analysis, it was used

descriptive statistics (means, frequencies, minimum, maximum and standard deviation) and inferential statistics (Fisher's exact, Mann-Whitney's U and Kruskal-Wallis). It was assumed a significance level of 0.05.

**RESULTS**

Except for the arithmetic test, the participants had an academic performance below the average for their level of education, in both genders, according to the parameters of the TDE. Boys had higher mean and median measures on reading, writing and the overall result of TDE, whereas girls had a better result in arithmetic (Table 1), however this difference was not statistically confirmed.

Out of the 19 students nominated by teachers, only one showed no sign of any type of learning disability, while others were marked with difficulties in at least one academic skill (more frequently in reading and writing). No association was found between learning difficulties and gender (Table 2).

Regarding the indicator of physical impairments, it was found that five of the participants had borderline or definite motor problems. As can be seen in table 3, although a greater number of boys have presented motor difficulties, there was no association between this variable and gender (p = 0.071).

There were no statistically significant differences when comparing the motor performance of children with and without indicative of general learning difficulties. Table 4 presents the descriptive data regarding these variables.

Table 1: Descriptive data related to TDE.

Tests	Male			Female			P
	M	M <sub>d</sub>	±	M	M <sub>d</sub>	±	
Writing test	20,12	21	8,25	18,63	20	8,29	0,679
Arithmetic test	14,25	14	3,80	15,81	16	4,02	0,391
Reading test	59,75	61	10,25	58,72	62	9,77	0,741
TDE Total	92,87	94	23,76	93,18	97	18,77	0,931

Tabela 2: Frequency of children with and without learning difficulties indicative separated by sex

Sex	Wraigt disabilities		Arithmetic disabilities		Reading disabilities		Geral disabilities	
	Yes	No	Yes	No	Yes	No	Yes	No
Male	0	8	1	7	0	8	0	8
Female	0	11	2	9	1	10	0	11
Total	0	19	3	16	1	18	0	19
p*0,336	0,506	0,664	0,336					

\* p for the Fisher exact test.

Table 3: Frequency of students in each classification of MABC, separated by sex

Sex	Classification of Motor Performance		
	Normal Motor Skills	Borderline Motor problem	Definit Motor problem
Male	4	1	3
Female	10	0	1
Total	14	1	4

**Table 4:** Descriptive data related to motor skills of children with and without indicators of learning difficulties

Learning Disabilities Indicatives	Motor Abilities											
	Manual Dexterity			Ball Skills			Balance			Total MABC		
	M	M <sub>d</sub>	±	M	M <sub>d</sub>	±	M	M <sub>d</sub>	±	M	M <sub>d</sub>	±
Yes	3,3	2,0	3,9	1,3		2,3	3,	0,7	4,8	7,8	3,7	10,0
	6	0	6	6	0,0	7	0	5	6	6	5	1
No			1,6	2,7		2,6	3,		5,0	8,5	4,0	7,6
	2,5	2,5			2,5			0,5				
p*		0,963	6	0		8	7		5		0	
					0,141			1,00			0,676	

\* p for the Mann-Whitney U test

## DISCUSSION

This study aims to identify physical and learning impairments in students with low academic performance. Despite of scientific and technical limitations presented by the teachers on the issue of learning and motor difficulties, it was found that the kids really had a poor academic achievement, related to the Portuguese language, in the TDE. In other researches with Brazilian children that used the TDE, were found similar results. Dias et al.<sup>23</sup> found a worse writing performance in students from third and fourth grades, and Dias et al.<sup>24</sup> found lower results in reading among a larger number of participants. However, these differ from the research of Capellini et al.<sup>25</sup>, with students from second to fourth grades, because they presented a poorer performance in arithmetic and a better reading performance.

As for the performance of the different genders, there was no difference between the performance of boys and girls on tests of reading, writing, arithmetic and in total TDE. These results oppose to those exposed by Capellini et al.<sup>25</sup>, whose best averages were from girls, that also presented significantly better performance in writing and in the overall test. The data from this research also differ from what is happening on the national scenery, where can be seen a better performance by girls in reading and writing, while boys have shown superior results in arithmetic. Such behavior has caught the attention regarding the academic performance of Brazilian girls; while they are getting closer to the boys' performance in mathematics, can be noticed their increased advantage in the Portuguese language, behavior already seen both nationally and in the southern<sup>26</sup>.

In regard to gender and learning difficulties, although there is a greater indication of girls by the teachers, there was no association between the gender and learning difficulties. With similar results, but with a sample of more than 400 children of both genders, Silva and Beltrame<sup>27</sup> found no

association between general learning disability, indicated by lower performance in the TDE, and gender. Both studies contradict the literature, which points to a higher prevalence of learning disabilities among boys<sup>24, 28,29,23,30</sup>. The global statistical table shows that about 15% to 30% of school-aged children have learning difficulties, reaching four to five boys for every girl<sup>31</sup>. Bartholomeu et al.<sup>32</sup> however, by investigating the writing skills in elementary school students, found a better school performance of boys over girls.

There was no association between the gender and motor difficulties, confirming the research of Cairney et al.<sup>33</sup>. In this regard, the literature contains various data. It whose found a higher number of children with physical impairments, with a proportion of two boys for every girl<sup>34, 35</sup>. Or yet higher values, ranging from four to seven boys for every girl<sup>14</sup>. Going against these studies, França<sup>36</sup> found a ratio of about two girls for every boy. It is believed that is impossible to associate motor difficulties to a particular gender, since the choice of different instruments and normality parameters, types of research, populations investigated, among other factors, may be responsible for such asymmetry between the different researches .

Most of the children were classified as having normal motor skills. These data agree with the view of Rosa Neto et al.<sup>37</sup> in which the authors found that 73% of a sample of students with indicative of learning difficulties enrolled in first to fourth grade of elementary school, had normal development, according with the Development Motor Scale (DMS). Kourtessis et al.<sup>38</sup> on the other hand, analyzing the prevalence of Developmental Coordination Disorder (DCD - international nomenclature assigned to the motor coordination problems) in a group of children with learning disabilities, found 64.8% of DCD. The results presented by O 'Hare and Khalid<sup>9</sup> also associated DCD with learning difficulties as they found that 87% of children with DCD had also reading difficulties, and 70% of them had writing difficulties. Moreira et al.<sup>39</sup>, studying the motor proficiency of

children with learning difficulties in elementary school, identified superiority in the motor development level of typical students. According to the authors, children with no difficulties under the components of global motor run faster, keep their balance on one foot and dynamic terms longer, coordinate their extremities melodic and kinesthetically faster and jump over both feet more<sup>39</sup>.

It was found in this research that five of the students have borderline or defined motor problems. According to the literature<sup>7</sup>, 30% to 50% of the children with motor difficulties also show difficulties in school learning.

This research found no statistically significant differences among students with and without indicators of learning difficulties in performing motor tasks. The results meet those found by Kourtessis et al.<sup>38</sup>, in which the students without learning

disabilities performed better on tasks of MABC. In addition, the study by Smits-Engelsman et al.<sup>11</sup> showed that children with specific difficulties in writing develop less strategies to perform fine motor tasks, and need more outer aid, or feedback, from parents and teachers.

Thus, the students pointed out by teachers as presenting low academic performance had indeed indicative of learning difficulties, particularly in reading and writing. Learning difficulties and motor problems were classified as borderline or defined. It is suggested to conduct researches that explore both the diagnosis of developmental problems with a larger number of subjects, and the implementation of programs of stimulation or intervention since the early stages. Such initiatives tend to favor, on medium and long term, the well-being, quality of life and health of children with learning and motor difficulties.

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