DOI: 10.4025/jphyseduc.v29i1.2903

Original Article

MOTOR PERFORMANCE IN BASIC SKILLS OF CHILDREN PARTICIPANTS AND NONPARTICIPANTS OF ORIENTED SPORT PRACTICE

DESEMPENHO MOTOR EM HABILIDADES BÁSICAS DE CRIANÇAS PARTICIPANTES E NÃO PARTICIPANTES DE PRÁTICA ESPORTIVA ORIENTADA

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ABSTRACT
The present study aimed to analyze the motor performance in basic skills of children participants and nonparticipants of oriented sport practice. The sample consisted of 40 children of both sexes aged between 8 and 10 years, students from a private school in Belo Horizonte. The groups were set into children that participated in some additional oriented sport practice (PEA) and children who did not participate in any oriented practice of sport besides physical education classes (GC). Performance in basic skills was assessed by the Test of Gross Motor Development (TGMD-2). The used measures were gross motor quotient, raw score of locomotor and object control subtests, and descriptive ratings. An anamnesis was applied to parents with questions about children's routine, kinds of places they go in their free time; time they play; time using electronic games; family socioeconomic level; and if the child participated or not in some oriented sport practice. A superiority of PEA group upon GC in all TGMD-2 measures was observed. In general, results show that the involvement of children with oriented sport practice can contribute to the motor development process.
Keywords: Sport. Motor Development. Practice.

RESUMO
O presente estudo objetivou analisar o desempenho motor em habilidades básicas de crianças participantes e não participantes de prática esportiva orientada. A amostra foi constituída por 40 crianças de ambos os sexos com idade entre 8 e 10 anos, estudantes de uma escola privada de Belo Horizonte. Os grupos foram divididos em crianças participantes de alguma prática esportiva orientada adicional (PEA) e crianças que não participavam de nenhuma prática esportiva orientada além de aulas de educação física (GC). O desempenho em habilidades básicas foi avaliado por meio do *Test of Gross Motor Development* (TGMD-2). As medidas usadas foram o quociente motor amplo, escore bruto das habilidades locomotoras e manipulativas e análise qualitativa. Uma anamnese foi aplicada junto aos pais contendo perguntas sobre a rotina das crianças, tipos de lugares que costumavam frequentar no tempo livre; tempo aproximado que faziam uso de brincadeiras, tempo aproximado que costumavam fazer uso de aparelhos e jogos eletrônicos em dias úteis, classe socioeconômica da família e se participavam ou não de alguma prática esportiva orientada. Observou-se superioridade do grupo PEA sobre o grupo GC em todas as medidas do TGMD-2. O conjunto dos resultados permite concluir que o envolvimento de crianças com prática esportiva orientada pode contribuir com o processo de desenvolvimento motor.
Palavras-chave: Esporte. Desenvolvimento Motor. Prática.

Introduction

The motor development is understood as changes in the motor behavior along the life span and the underlying processes on which these changes are based. Such changes are continuous and provided by the interaction among constraints over the body, the environment and the task[2,3].

A relevant period of this process is the childhood, because a high number of changes happen, related to fundamental skills acquisition[4,5]. However, a developmental delay in these

skills has been observed, both in the locomotor skills category[6,7] and the object control skills[8,9]. The lack of opportunities for structured and systematized practice, aiming to provide assorted motor experiences, can be one of the reasons why children do not show the typical motor performance for their age in fundamental motor skills[10-13]. Consequently, the motor development in basic skills observed in children, according to their age, has been below expectations[10,11,14].

Opportunities for oriented and systematized practice, besides Physical Education classes at school, can contribute to the acquisition and refinement of motor skills along the motor development process. Fundamental skills such as run, jump, kick, throw, catching, among others are included in this repertoire[15-19]. The oriented sports practice is one of the systematized motor activity possibilities. Different from the spontaneous sports practice, common among Brazilian children, the oriented sports practice is usually conducted by a Physical Education professional, who should provide a range of motor tasks related to sport modality, yet suitable for the child's development level[15,20,21]. Overall, the participation in a systematized and structured sport practice has been a proper context for the acquisition of basic motor skills[17-19,22,23].

Although the oriented activities should be structured to ensure the motor development is reached, considering each children's needs and motor abilities[16], the offer of these activities do not always achieve the majority of the population. Thus, the oriented sport practice can contribute to the acquisition of fundamental skills, what allows us to speculate about its contribution for the motor skills acquisition process. The present study has investigated the basic skills performance in children who take part in oriented sport practice as well as in those who do not.

Methods

Participants

40 children of both sex participated in this study and the ages were between 8 and 10 years of age (23 girls and 17 boys) all of them studying in a private school in the metropolitan region of Belo Horizonte, both practicing and not practicing specialized oriented sport activity. Data were collected in the last trimester of the school year. The following inclusion criteria were used: 1) children who were inserted only in the school Physical Education should not have participated in any oriented sport practice in the last six months before the study; 2) children involved in oriented sport practice should have been practicing the activity regularly for the last six months before the study. This way, the sample was defined for convenience, once the children who took part in the study had to be from the school which matched the pre-established inclusion criteria. The study was approved by the University Research with Human Beings Ethics Committee (Parecer 1.083.385).

Instruments

An adapted anamnesis[25] was applied to the parents where there were questions about the children's routine, kinds of places they used to go to in their free time; approximate time they used to play, approximate time they used to use electronic devices and games on weekdays and whether they were taking part or had already done any organized sport practice. The anamnesis has also assessed other features related to the children's context, such as socioeconomic level of the family (ABEP)[26].

To assess the motor performance, the *Test of Gross Motor Development – 2* (TGMD-2) was used. This test assesses the motor performance in basic skills in children between 3 and 10 years of age, being a reliable instrument to be used with Brazilian children[12]. The test

assesses the motor performance analysing the movements used to move the body from one place to another (locomotion) and to throw or manipulate objects (objects control), mainly balls[13]. The TGMD-2 evaluates twelve fundamental motor skills: six in the Locomotor subtest (run, gallop, hop, leap, horizontal jump and slide) and other six in the Objects Control test (striking a stationary ball, stationary dribble, catch, kick, overhand throw and underhand roll).

Each skill in the locomotor and object control subtests has from three to five behavior components, which are presented as performance criteria[13]. If the performance observed presents the expected criteria, a point is credited to it. At the end the points of two trials are added, encompassing all the motor skills, which indicate the execution level of the skills in the corresponding subtest called "raw score". With the raw score as a reference, the standard score in each subtest is extracted from the normative tables of the test. This measure is based on the motor performance expected according to the sex and age of the child, which can vary from 3 years to 10 years and eleven months of age. There is also a possibility to obtain the motor quotient considering the sum of the standard scores obtained by each child in the respective subtests and comparing them to the normative.

In the present study, measures such as raw score in the locomotor subtest, raw score in the objects control subtest, motor quotient, and descriptive ratings were used, which, through the normative table, classifies the motor quotient as Very Poor (lower than 70), Poor (from 70 to 79), Below Average (from 80 to 89), Average (from 90 to 110), Above Average (from 111 to 120), Superior (from 121 to 130) and Very Superior (higher than 130).

Design

The research was composed by two groups. The first group was composed by children who took part in Physical Education classes and also practice another sport activity (SAG) and the control group was composed by children who did not participate in any systematized sport practice apart from Physical Education classes (CG). These groups were defined from adapted anamnesis sent to the children's parents before collecting data, questioning about their participation in oriented sport practice. Concerning SAG group, the parents had to answer how long the children have been practicing the sport activity without interruption, whereas in the CG group they answered whether the children had already practiced any specialized sport activity or not. If they had, they had to answer how long they had stopped practicing it. To be included in SAG group, the members should have been practicing oriented sport activity for the previous six months without interruption. This criterion is similar to the one used by Nazário e Vieira[17]. To take part in the control group, children should not have participated in oriented sport practice for a period of six months before data collection. Furthermore, the groups were paired by age (the average for group SAG was 9.04 ± 0.74 years of age and for group CG was de 9.0 ± 0.66 years of age). We also tried to strike a balance between the number of boys and girls in each group, having in with SAG (13 girls and 7 boys) and in CG (10 girls and 10 boys). The children in SAG group have practiced oriented sport modalities, such as futsal (indoor soccer), swimming, artistic gymnastics or taekwondo, for at least 6 months without interruption and used to have from two to four hours of weekly practice, besides one hour and forty minutes of Physical Education classes every week. The children in the control group (CG) had only one hour and forty of Physical Education classes every week. All the children lived in Belo Horizonte, went to the same private school in the metropolitan region of Belo Horizonte, being all of them exposed to Physical Education practice with similar lesson plans and, children who belonged to SAG, also practiced oriented sport modality in sports school besides, obviously, practicing Physical Education at school.

Procedures

Initially, all the children in the sample were recruited through a mapping done by the researcher and the school Physical Education coordination. This mapping was done considering the higher control of possible intervening variables, such as children from different groups, Physical Education classes given by more than one teacher, lesson plan, etc. As for the motor test, the protocol drawn up in the manual was followed. The test application lasted approximately 30 minutes. The sequence of skills assessment was started by the subtest of locomotor motor skills, and afterwards, the subtest for objects control was applied, following the order presented in the test manual. Each skill was tested three times, being the first trial as a familiarization and the other ones as assessment. The skills performed by the children were filmed by two cameras of 60 Hz fixed in lateral and front positions.

After the test was done, the recordings were evaluated using a worksheet. In each of the subtests the twenty-four criteria were analysed. This procedure was done for each of the two trials and, after that, the score obtained in both trials were added to get to a raw score of the skill in each item. The analysis of the recordings was done separately by two experienced assessors, with index of agreement between the observers of at least 85%, which corresponds to a value considered satisfactory[27].

Statistical Analysis

After having the data tabulated, the statistical analysis was done using the *software Statistical* version 10.0. Data did not present normality according to *Shapiro-Wilks* test. After that, non-parametric statistical analysis was adopted via "U" de *Mann-Whitney* test, with risk error alpha $p<0.05$, comparing motor performance of the groups using locomotor raw score measures, control of objects raw scores and motor quotient.

For the analysis of descriptive assessment of motor performance, socioeconomic level, time for playing, places to spend free time, time of use of TV/DVD and time of use of computers/videogames distribution of frequency was done. In this analysis, the Chi-square test was used to verify the anamnesis data association with the groups. When the number was smaller than five cases in any category of assessment, the Fisher exact test was used to adjust the error risk α. The effect size in the Chi-square tests was determined by Cramer's (V).

Results

In relation to the participation of children in sports practice, through the anamnesis filled out by the parents, we could verify which children took part in oriented sports practice besides the Physical Education classes (n=20) and which ones did not participate in any oriented sport practice, what is to say they only participated in Physical Education practice (n=20).

Table 1. Mean (± standard deviation) age, body mass , height e body mass index (BMI) of the groups

Group	Sex	Age (years)	Mass (Kg)	Height (m)	Descriptive Classification BMI (Mode)
CG (n=20)	10 fem./10 male.	9.00 ± 0.66	35.4 ± 6.19	1.38 ± 0.10	Normal
SAG (n=20)	13 fem./07 male.	9.04 ± 0.74	30.8 ± 8.37	1.34 ± 0.18	Normal

Source: The authors

Figure 1 indicates the motor performance of the groups in the subtest of locomotor skills. The results have detected superiority of group SAG over CG group in the subtest of

locomotor skills [Z(N=40)=2.04, p=0.040].

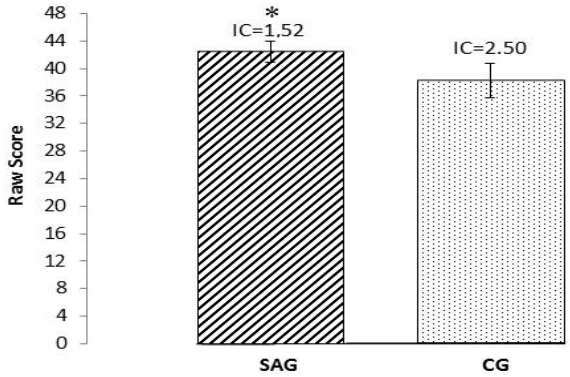

Figure 1. Mean and confidence interval (CI) of the motor performance in the Locomotor subtest
Source: The authors

Figure 2 represents the raw score in the subtest of objects control. The *Mann-Whitney* analysis has detected superiority of the SAG group over the CG group [Z(N=40)=2.09, p=0.035].

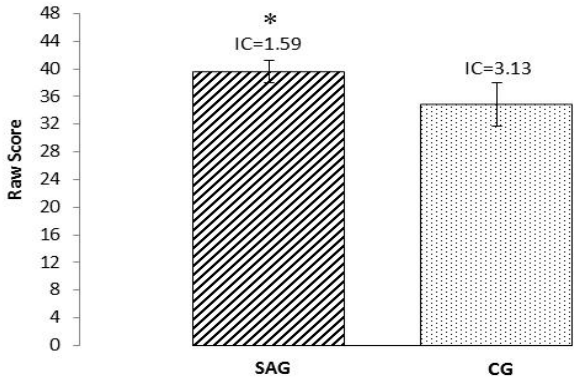

Figure 2. Mean and confidence interval (CI) of the motor development in the subtest of Objects Control
Source: The authors

Figure 3 represents the measure of motor quotient in which the *Mann-Whitney* test has also detected the superiority of group SAG over the CG group [Z(N=40)=2.32, p=0.019].

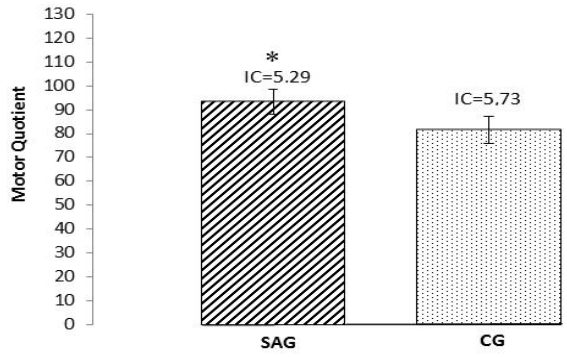

Figure 3. Mean and confidence interval (CI) of Broad Motor Quotient
Source: The authors

Figure 4 represents the distribution of frequency in each group according to the descriptive assessment of the motor performance. The Chi-square test has detected an association of the motor development with the practice context of each group (X^2=8.778 p=0.042 V=0.46). The children in the control group have shown a "poor" predominant motor performance (mode) for their age, indicating motor delay. The children inserted in the sport practice context have obtained "an average" predominant motor performance (mode) according to the test, indicating motor proficiency expected for their age. The asterisk in the chart indicates in which categories there has been association.

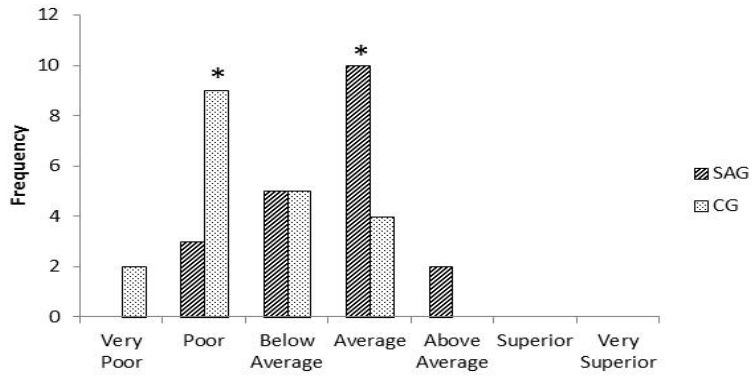

Figure 4. Frequency distribution analysis in the descriptive assessment of motor development
Source: The authors

Table 2 presents the frequency distribution of the socioeconomic level of the children in each group. The Chi-square test has not shown any significant association of the socioeconomic level of the children's families with the context of practice in each group (X^2=4.636 p=0.316 V=0.32).

Table 2. Frequency distribution of the subjects in each group related to the family socioeconomic

Group	Class E	Class D	Class C2	Class C1	Class B2	Class B1	Class A
CG (*n*)	-	-	01	06	01	05	07
f (%)	-	-	05	30	05	25	35
SAG (*n*)	-	-	01	02	01	03	13
f (%)	-	-	05	10	05	15	65

Source: The authors

Table 3 presents the frequency distribution of subjects in each group related to the places they used to go in their spare time. The Chi-square test has not shown any association of the places children used to go in their spare time with the context of practice in each group (X^2=3.950 p=0.125 V=0.31).

Table 3. Frequency distribution of subjects in each group related to the places they used to go to in their spare time

Group	At home	On the street	On the Square	Playground	Sports Facilities
CG (*n*)	16	01	-	-	03
f (%)	80	05	-	-	15
SAG (*n*)	10	02	-	-	08
f (%)	50	10	-	-	40

Source: The authors

Table 4 presents the frequency distribution of the subjects in each group related to the average weekly time they used to play on weekdays. The Chi-square test has not shown any association of the average weekly time children used to play on weekdays with the context of practice in each group (X^2=1.812 p=0.770 V=0.21).

Table 4. Frequency distribution of the subjects in each group related to the weekly workload they used to play on weekdays

Group	Less than 1 hour	From 1 to 2 hours	From 2 to 4 hours	From 4 to 6 hours	More than 6 hours
CG (*n*)	05	11	04	-	-
f (%)	25	55	20	-	-
SAG (*n*)	07	08	04	01	-
f (%)	35	40	20	05	-

Source: The authors

Table 5 presents the frequency distribution of the subjects in each group related to the average weekly time they used to watch TV/DVD on weekdays. The Chi-square test has not shown any association of the average weekly time children used to watch TV/DVD with the context of practice in each group (X^2=0.816 p=0.796 V=0.13).

Table 5. Frequency distribution of the subjects in each group related to the weekly workload they used to watch TV/DVD on weekdays

Group	Less than 1 hour	From 1 to 2 hours	From 2 to 4 hours	From 4 to 6 hours	More than 6 hours
CG (*n*)	03	14	03	-	-
f (%)	15	70	15	-	-
SAG (*n*)	05	13	02	-	-
f (%)	25	65	10	-	-

Source: The authors

Table 6 presents the frequency distribution of the subjects in each group related to the average weekly time they used to use computers and video games on weekdays. The Chi-square test has not shown any association of the average weekly time children used to use computers and video games with the context of practice in each group (X^2=0.297 p=1.000 V=0.00).

Table 6. Frequency distribution of the subjects in each group related to the weekly workload they used to use computers and video games on weekdays

Group	Less than 1 hour	From 1 to 2 hours	From 2 to 4 hours	From 4 to 6 hours	More than 6 hours
CG (*n*)	14	05	01	-	-
f (%)	70	25	05	-	-
SAG (*n*)	14	05	01	-	-
f (%)	70	25	05	-	-

Source: The authors

Discussion

The aim of this study was to analyze the motor performance in basic skills of children who participate and do not participate in oriented sport practice. The results have shown a superiority of group SAG over the CG group concerning motor performance of fundamental motor skills of locomotion and objects control, besides the measures of motor quotient and descriptive analysis, according to normative table of the test. In relation to the analysis of the children's everyday life, the results have not shown any significant difference between the groups, addressing the weekly workload on weekdays they use electronic devices and games, places children used to go on their spare time and weekly workload on weekdays they used to play. Moreover, the results of the socioeconomic analysis of the children's families have not shown any significant differences between the groups.

The results have initially suggested a possible influence of oriented sport practice, although neither the specificity of these sports practice nor the content developed in Physical Education classes and in the sports classes have been investigated, or else we have not done a longitudinal study. Considering there was an intra-group variation concerning the kind of sport practice (SAG children practiced futsal, swimming, artistic gymnastics or taekwondo), the common factor in the SAG group was how long the oriented sport activity had been practiced. As the other factors analyzed were similar between the groups, it seems reasonable to suggest that the bigger weekly workload of oriented sport practice during childhood provides superior motor performance in basic skills.

The obtained results support the observation of superior motor performance in basic skills in children involved with systematic sport practice or additional practice besides Physical Education classes at school according to what had been observed in previous studies[15,17,19-23]. In the present study lower motor performance of locomotor basic skills was observed, as well as lower objects control skills in children who were not involved in any oriented sport practice aside from Physical Education classes.

In the case of this study, the best motor performance does not come from a specific design of intervention, but from a cross- sectional analysis of the everyday life of a child who had already been practicing sports. If on one hand there was loss of control of intervening variables with the used design, on the other hand, the results reflect the children's habits natural conditions. Therefore, the offer of oriented sport practice in childhood can contribute to develop fundamental motor skills[16,21]. Children inserted in a sports context, with structured and oriented practice, had, in the present study, a bigger weekly workload of practice, once there was no significant difference concerning the items assessed through the anamnesis answered by the people responsible for them. Such difference in motor stimulation time could have contributed for the superior motor performance of the children in the SAG group.

When analysing the performance of children who do not participate in any oriented sport practice, we can observe lower motor performance in locomotor and objects control skills related to the expected according to the age. Such result suggests that the participation in only Physical Education classes at school as oriented practice can be insufficient to reach the expected motor performance in basic skills[15,17,21,23]. The results, however, do not allow to infer whether the poor performance of these children is related to the duration of Physical Education classes, to the quality of these classes, or both. Moreover, the fact of not having significant differences between the groups concerning the analysis of some variables in children's everyday lives, gives us room to argue, cautiously, that the plays and activities done without professional orientation did not influence the motor performance in basic skills.

Understanding the environment can influence directly the development of the basic skills reflects the view that the motor development is not merely a biological process, as the

practice context characteristics interfere, even indirectly, in the child's motor development[28,29]. The results of the present study support the importance of the environmental context, in this case, the oriented sport practice in the children's context. The fact of having children involved with sport during childhood can be a factor that contributes to the acquisition and refinement of basic motor skills[15,17-21,23]. In other words, as children explore opportunities provided by the environment, motor skills are refined in a way that increases the competence, and, consequently, they have greater capacity to adapt to the context demands[16,30-32]. In this case, opportunities to have oriented sport practice, that is, systematized practice out of the Physical Education classes, can expand the amount of environmental stimulus in a way to contribute with the process of acquisition and diversification of basic skills[15,33].

Anyway, it is important to reinforce that the results of the present study suggest that additional oriented practice opportunities, in this case sport practice, can contribute to develop motor performance in basic skills. Such result was detected in both locomotor and objects control skills. The result of this study is more overwhelming than other studies, which found significant differences only concerning basic skills that involved objects control[34,35].

However, even though this study presents limitations related to the use of cross-sectional design, the results, as well as in previous studies, lead us to infer that the context of Physical Education classes might not have been enough to make children present a proficient motor performance of the locomotor[15] and objects control[17] basic skills. A possible explanation, as observed in other studies[15,21,23,33] is the fact that the Physical Education classes did not have a weekly practice workload considered enough for the development of basic skills. In other words, the duration of the practice could not present a sufficient amount of stimulus to guarantee the motor performance expected in children in the end of their childhood. The results of the present study allow us to infer that the oriented practice, mainly the major involvement with sports in childhood, can contribute with the process of children's motor development. Besides the experimental design used, another limitation of the present study was the fact that the Physical Education classes and sports practice done by the children were not deeply controlled, not even followed, being described only in a generally way.

Anyway, even facing some limitations, it was possible to suggest that the oriented sport practice during childhood seems to contribute for the children's motor development. Children who used to take part in sports programs had more opportunities of practicing and have shown normal development in relation to their pears who did not have the same practice dimension. Therefore, these additional practice conditions could have contributed for the children to present superior motor performance in basic skills when compared to children who did not have such opportunities beyond Physical Education classes. Future studies can be done to analyze not only the possible influence of opportunities of oriented sport practice, but also to analyze if there is any influence caused by the kind of practice and the modality of the sport practice, besides checking if there is any effect related to the amount of hours practicing oriented sport activities in the children's motor performance in basic skills.

Conclusions

In summary, we can conclude that the context of oriented sport practice has shown a way to influence, positively, the children's motor development of basic skills. Therefore, besides the Physical Education classes, the oriented sport practice has shown that it can enlarge the practice opportunities, contributing overall to the process of acquisition and refinement of the basic motor skills.

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Received on Jan, 13, 2016.
Reviewed on Apr, 04, 2017.
Accepted on Jun, 20, 2017.

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