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Evaluation of motor coordination in early school aged children

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Abstract

Motor coordination ability development has constituted a popular field of in the last decade, as it provides important information about children's developmental level. The purpose of this study was to evaluate the level of motor coordination in early school age children. The sample consisted of 150 students (72 boys and 78 girls) of ages ranging from 69 to 99 months ($M=83.75$, $SD=7.43$), who attended the organized educational program of their school and did not participate in any exercising program. For the evaluation of motor coordination Koerperkoordinationstest fuer Kindern, KTK, was used. The test is considered to be one of the most reliable ($r=.90$) and is comprises of four individual tests that measure: a) balance capacity, b) one- leg obstacle surmounting, c) side jump and d) side locomotion and object replacement. The Two-Way Analysis of Variance did not present any statistically significant interaction of age and sex in any of the individual tests.

Keywords: *KTK, children, age, sex*

Introduction

A very important part of motor development and especially of motor skills learning is the development of coordination abilities, that constitute a requisite for the learning, stabilization, application of athletic skills and implementation so as to achieve effective access to physical abilities (Niklisch & Zimmermann 1981).

Roth and Winter (1994) maintain that coordination abilities play an important role in speed, precision and acquisition of movement dexterities and the stability of their performance in a high virtuosity level. In parallel, they play a decisive role in all levels of performance in terms of physical faculties. Although they constitute attributes determined by genetic factors, they can get improved in a high virtuosity level. In a higher level of perfection and application they are also affected by the individual's personality traits (behavior, movement, cognitive ability) (Zimmer, 1992). Finally, it is supported that they are unbreakably connected with the quality of morphology and function of our perceptual system (Noth 1994).

Hirtz (1985) proposes a model for childhood that includes five fundamental coordination abilities: kinaesthetical differentiation ability, orientation in space and time, balance, rhythmic ability and complex reaction ability.

The effort of coordination ability development in school age does not contain a lot of complex motor activities, but basic and concrete exercises that are going to be a basis for future development of more difficult and more complex programs (Gallahue, 1996, Chambers & Sugden, 2002). Kindergarten is an initial stage that helps children get familiarized with the exercise through appropriate programs, while in first and second school age they can participate in more difficult movement activity programs (Martin, Nicolaus, Ostrowski, Rost, 1999).

Systematic growth of coordination abilities is imposed in this developmental phase due to the fact that during these periods, a lot of favorable conditions exist. In childhood, before adolescence when swift growth takes place, a child's body proportions are more harmonious. Height and weight increase is minimum and in smoother course, and so children can learn and exercise under constant conditioning according to their body proportions (Gallahue & Ozmun, 1998).

Coordination ability development is completed at the age of 10-12 years due to biological maturation. After that phase any improvement is impossible without systematic training. The obvious reduction or stagnation after the age of 11-12 years is owed to a combination of factors (Urlich & Ulrich, 1985).

Motor and coordination ability development has constituted a popular field of research in the last decade. Particular interest is shown in results of relative studies results in terms of sex and age effects in the output during school age. Finally, it provides important information about children's developmental level and the planning and application of suitable movement educational programs.

The purpose of the study was to evaluate the impact of sex and age on the level of motor coordination in primary school children.

Method

Participants

The sample comprised by 150 students of A and B class of preliminary school (72 boys and 78 girls) of ages ranging from 69 to 99 months ($M. = 83.75$, $SD = 7.43$), that

attended the organized educational program of their school and did not participate in any exercising program.

Procedure

For the evaluation of motor coordination, the Battery of Body Coordination (KTK) of Kiphard and Schilling (2007) was used. The battery is considered one of the most reliable ($r=.90$) (Kiphard & Schilling, 2007) batteries of estimating the quality of neuromuscular collaboration control in typical and special population children ranging from 5-14 years of age.

The battery consists of four individual tests that measure: a) balance capacity during backward walking on three different width balance beams (3cm, 4.5cm, 6cm), b) one- leg obstacle surmounting, c) side jump and d) side locomotion and object replacement.

The experimental procedure was carried out inside suitably shaped rooms according to the directives included in the handbook of the battery.

Results

Two-Way Analysis of Variance was applied to examine sex and age impact on children's output. The results did not present any statistically important interaction of the factors above in any of the individual tests. Sex factor did not either have statistically important interaction in contrast to the age factor that affected to a statistically important extend all the individual tests: balance ($F_{1,146} = 5.36, p<.005$), one- leg obstacle surmounting ($F_{1,146} = 3.80, p<.005$), side jump ($F_{1,146} = 7.99, p<.005$), side locomotion and object replacement ($F(1,146) = 4.35, p<0.005$) and in the general index of motor development ($F_{1,146} = 4.35, p<.005$).

Discussion

Results of previous studies (Bruininks 1978, Hirtz 1985, Roth & Winter 1994, Schneider 1993, Serbezis, 1995) have proved that age constitutes one of the most important factors of motor development. In the present study is one more confirmed on the

statistical affairs that supports that age is main configuration factor in motor development test. The same results also confirm the second statistical hypothesis that concerns sex affecting coordination test scores, as the boys' output did not differ from those of girls in any of the tests. This result is in agreement to older studies (Roth & Winter 1994, Zimmer & Volkamer, 1987).

One more object of future research that concerns motor development, except for the two factors mentioned above, could be the developmental course in long term planning and the impact that certain ways of exercise might have.

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