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ASSESSMENT OF FUNDAMENTAL MOTOR SKILLS IN BOYS AND GIRLS

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Abstract
The aim of the study was to assess gross motor skills between boys and girls of preschool and primary school age. The study included a total sample of 83 respondents (49.3% boys) with an average chronological age of 6.14 ± 2.25 years. The Test of Gross Motor Development–3rd Edition (TGMD-3) was used to verify the set research goal. Research data were analyzed by the method of parametrical statistics. To determine the differences in gross motor skills between boys and girls, t-test was used for an independent sample of respondents. Based on the obtained research results, it can be concluded that there are no statistically significant differences between boys and girls on the locomotor and "Ball skills" subtest. Although no statistically significant differences were recorded, generally, boys achieve better results on the subtest "Ball skills" compared to girls. It is suggested that intervention programs be designed to improve girls' performance in ball skills.
Key words: Children, TGMD-3, Locomotor, Ball skills, Gender.

INTRODUCTION

The development of gross motor skills is a very important component of a child's psychomotor development, because thanks to the abilities of a large group of muscles, the child discovers and explores its environment and comes into direct contact with objects from the environment. During early childhood, children spend a lot of time interacting with their environment, through movement activities such as crawling, walking and jumping. This period of development is critical if the child will only master general motor skills, because, according to the most motor development experts, motor behaviour changes dramatically during the first eight years of life (Mehmedinović, 2009 according to Clark, 1994, Gallahue & Ozmun 1998, Hajwood 1993).

Motor development often involves the behavior of movements used to move the body from one place to another, as well as the behaviour of movements to capture certain objects (Ulrich, 2005). Motor development from birth to adulthood is divided into several specific phases, and for the purposes of this research, the third phase of the 3rd year of life is important, which represents the fundamental motor skills (FMS). The third phase of the Gallahue Hourglass model, which refers to the phase of FMS, includes the preschool period of the child, even early school age, and previous research has shown that this period is most sensitive to the development of motor abilities (Sabo 2002, Cvetković, Popović and Jakšić, 2007). FMS refer to basic goal-oriented movement patterns (Burton & Miller, 1998), which are considered an integral part of advanced movement skills (Clark & Metcalfe, 2002). These motor abilities are produced by large muscles in the human body (Clark, 1994) which are usually divided into locomotor skills (i.e., running and jumping) and object manipulation skills (i.e., catching and hitting a ball; Haywood & Getchell, 2009).

Acquiring FMS is a critical component of early childhood. According to the Gallahue Hourglass model, there is a Mastery barrier between Fundamental movement phase and specialized movement phase, which means that the child's lack of proficiency in FMS prevents the successful performance of specialized movements (Gallahue & Ozmun 1998). FMS, also known as faster motor skills, are basic, focused on targeted movement patterns that can be combined and applied to multiple context-specific skills (Burton & Miller, 1998; Clark, 1994).

FMS allow children to be actively involved in the environment with their peers, (Burton & Miller, 1998; Clark, 1994). Components of motor development are continuously improved and modified in child development, and have effects within the cognitive, physical, neuromuscular, and physiological areas (Malina, Bouchard, Bar-Or, 2004; Piek, Dawson, Smith, & Gasson, 2008).

When it comes to assessing children's gross motor skills in relation to gender, there are various studies that have addressed this topic. Thus e.g. Božanić and Bešlija (2010), investigated the relationship

between basic motor skills and specific karate skills in beginners aged 5 to 7. Basic motor dimensions were estimated using the test - TGMD-2. The result of the research showed that there are no statistically significant differences between boys and girls. Hardy et.al. (2009), on a sample of 425 preschool children, assessed gross motor skills between boys and girls using the Test of Gross Motor Development. The results of the study showed that the boys were better in the subtest that measured object control, while girls performed better in the locomotor skills subtest. Mohammadi et al. (2019) also showed that there was no difference in the performance of Iranian boys and girls in the locomotor subtest but boys performed better in ball skills subtest (Mohammadi et al., 2019). Since the development of FMS is not only affected by internal factors, and environmental factors also affect their development, so the aim of this study was to evaluate gross motor skills in boys and girls of preschool and primary school age.

METHODS

Participants

The research was conducted on a sample of 83 respondents, with an average chronological age of 6.14 ± 2.25 years. The total sample was divided into two subsamples of respondents. The first subsample consisted of male respondents with an average chronological age of 6.47 ± 2.42 years. The second subsample consisted of female respondents with an average chronological age of 5.82 ± 2.05 years. All participants received averbal explanation of the procedures assesement and the institutions approved research.

Measuring instruments

In order to verify the set research goal, The Test of Gross Motor Development–3rd Edition (TGMD-3) was used (Ulrich, 2019). TGMD-3 is a process-oriented test of gross motor skills of children aged from 3.0 to 10-11. The TGMD-3 has two subtests. The first subtest, Locomotor, measures the gross motor skills that require fluid coordinated movements of the body as the child moves in one direction or another. The second subtest, Ball Skills, measure the gross motor skills that demonstrate efficient throwing, striking, and catching movements. The Test of Gross Motor Development (TGMD-3) is a valid and reliable tool for assessing 6 locomotor and 7 object-control skills.

Data processing methods

Research data were processed by the method of parametric statistics. Basic statistical parameters, central tendency measures and variance measures were calculated. In order to verify the set goal of the research, a t-test was applied to an independent sample of respondents.

RESULTS AND DISCUSSION

Table 1 shows the results of the t-test in relation to the locomotor subtest. Based on the obtained results, it can be concluded that there are no statistically significant differences between boys and girls in relation to the total result of locomotor, and no significant differences were recorded on individual variables. However, although the results are not statistically significant, from the data of Table 1 it can be seen that girls, compared to boys, perform better on the variables hop, gallop, skip, and horizontal jump. The same results were obtained by Duncan et.al. (2021) as part of the TGMD-3 short version: Evidence of validity and associations with gender in Irish children.

The results of a study conducted by Zhang and Chen (2020) on a sample of 254 boys and 262 girls from 7 kindergartens in Hangzhou, show that girls perform better than boys on the variables gallop, hop, and horizontal jump, which is consistent with this study. Also, the results of the research within the master's thesis entitled "Assessment of gross motor skills in students of primary school age" show that girls, compared to boys, perform better on variables, as in this case study.

Table 1. Results of t-test (locomotor subtest)

Item	Gender	N	M	SD	SE	t	p
Run	Boys	41	7,05	1,66	0,26	,700	,486
	Girls	42	6,81	1,45	0,22		
Gallop	Boys	41	5,95	2,71	0,42	-,130	,897
	Girls	42	6,02	2,36	0,36		
Hop	Boys	41	7,39	3,20	0,50	-,271	,787
	Girls	42	7,57	2,88	0,44		
Skip	Boys	41	4,27	1,99	0,31	-1,692	,094
	Girls	42	4,90	1,39	0,22		
Horizontal Jump	Boys	41	7,34	1,22	0,19	1,438	,154
	Girls	42	6,76	2,28	0,35		
Slide	Boys	41	6,46	2,32	0,36	1,164	,248
	Girls	42	5,83	2,59	0,40		
Locomotor subtest	Boys	41	38,95	8,23	1,29	,485	,629
	Girls	42	38,00	9,56	1,47		

Note. N = Number of participants. M = Arithemtic mean. SD = Standard deviation. SE = Standard error

The results in Table 2 show that there is a statistically significant difference in the variable "One-hand stationary dribble" (t = 2.72; p = 0.008), i.e. boys at the level of statistical significance 0.01 lead the ball better in place compared to girls.

The results shown in Table 2 indicate that there is no statistically significant difference between boys and girls in the overall score for the subtest "Ball skills". Although the differences in the obtained results are not statistically significant, it can be seen from the table that boys, compared to girls, achieve better results on the subtest "Ball skills". Similar results are stated in the research by Duncan et.al. (2021) who as part of the research TGMD-3 short version: Evidence of validity and associations with gender in Irish children got to the conclusion, that boys on the "Ball skills" subtest, compared to girls, achieve better results on the variables overhand and underhand throw, kick, and one hand strike skill.

The opposite results are on the variable "Two hand strike" where Duncan et.al. (2021) found that boys are better than girls in this variable as well, which is not the case with this research. The results of a study by Webster and Ulrich (2017) entitled Evaluation of the Psychometric Properties of the Gross Motor Development Test — Third Edition show that boys perform better than girls in the "Ball skills" subtest, which was confirmed by the results of this study. Also, the results of this study are consistent with the research of Hardy et.al. (2009) who, on a sample of 425 preschool children, assessed gross motor skills between boys and girls using the Test of Gross Motor Development. The results of the research showed that boys are better compared to girls in the subtest that measured the control of the object.

Table 2. Results of t-test (Ball Skills subtest)

Item	Gender	N	M	SD	SE	t	p
Two-hand strike of a stationary ball	Boys	41	6,71	2,18	0,34	,797	,428
	Girls	42	6,36	1,81	0,28		
One-hand forehand strike of self-bounced ball	Boys	41	5,73	2,85	0,44	1,40	,165
	Girls	42	4,93	2,36	0,36		
One-hand stationary dribble	Boys	41	5,29	2,34	0,36	2,72	**,008**
	Girls	42	3,83	2,54	0,39		
Two hand catch	Boys	41	5,24	1,39	0,22	-,593	555
	Girls	42	5,40	1,06	0,16		
Kick a stationary ball	Boys	41	7,17	1,26	0,20	1,18	238
	Girls	42	6,83	1,32	0,20		
Overhand throw	Boys	41	6,22	2,39	0,37	,200	,842
	Girls	42	6,12	2,19	0,34		
Underhand throw	Boys	41	6,76	1,51	0,24	1,337	,185
	Girls	42	6,26	1,84	0,28		
Ball Skills subtest	Boys	41	43,41	9,58	1,50	1,90	,060
	Girls	42	39,64	8,39	1,29		

Note. N = Number of participants. M = Arithmetic mean. SD = Standard deviation. SE = Standard error

CONCLUSION

Based on the obtained research results, it can be concluded that there is no statistically significant difference in the assessment of gross motor skills between boys and girls of preschool and primary school age. Looking at the individual results of the subtests, it can generally be concluded that boys perform better on "Ball skills" compared to girls. It is suggested that intervention programs be designed to improve girls' performance in ball skills. As a limitation of this research, it can be considered that due to the epidemiological situation caused by the COVID-19, a only a suitable sample of respondents could be included.

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