Investigation of Motor Development Levels of 04-06 Age Group Girls and Boys According to Bruininks-Oseretsky Test*

RESEARCH ARTICLE

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Gönderilme Tarihi: 10.05.2023 Kabul Tarihi: 30.11.2023 DOI: 10.37669/milliegitim.1295151

Atıf: "Kavalcı, İ., and Kalkavan, A. (2023). Investigation of motor development levels of 04-06 age group girls and boys according to Bruininks-Oseretsky Test. *Millî Eğitim, 52* (Özel Sayı), 907-924. DOI: 10.37669/milliegitim.1295151 "

Abstract

Motor skills are the physical elements that enable movement. Basic skills at an early age form the basis for activities that require much more complex motor skills specific to sports. These basic skills are called basic motor skills and include activities such as throwing, jumping, running, catching and hitting. Basic movement skills form the basis of sport-specific skills to be acquired later. In this respect, it is important to measure the basic movement skills of children and to monitor these skill levels. In this study, it was aimed to investigate the motor development levels of children aged 04-06 according to the Bruininks-Oseretsky test.The population of the study consists of children between the ages of 4-6 attending kindergartens and nursery schools in Rize in 2018-2019 academic year. The sample of the study consists of 286 healthy children, 150 boys and 136 girls, selected by random method. The short form of this conversion of the Bruininks-Oseretsky Motor Proficiency Test (BOT-2) was used as a measurement tool. Normality test was applied to the obtained data. It was observed that the data had normal distribution in some sub-groups and not normal distribution in some others. Then, t-test or Mann-Whitney-U test was applied for two independent groups in pair wise comparisons at a = 0.05 significance level, and One-Way ANOVA test or Kruskal-Wallis H test was applied in comparisons of three or more.According to the test results, there was a significant difference in the gross motor skills of children according to gender and age (U0.05; -3,538; p<0.05; X2(2), n=286, 101,754 p<0.05). There was also a significant difference in gross motor skills of children according to school type (X2 (2), n=286, 14,358 p<0.05). There were no significant differences in hand coordination and strength and agility tests according to gender (U0.05; -1,066; -1,077; p>0.05) and in hand control test according to school type (f2,283; 0.004; p>0.05). As a result, it can be said that the gross motor development levels of 4-6 year old children vary according to gender, age and school type. In line with the results, games involving physical activity such as running, jumping, climbing and playing ball should be encouraged for 4-6 year old children. Such games can provide children with a fun activity while developing fine and gross motor skills.

Keywords: *skill-based teaching, motor development, preschool, bot-2*

* This study was composed of the author's master's thesis titled *'Investigation of Motor Development Levels of 04-06 Age Group Girls and Boys According to Bruininks-Oseretsky Test'*.

04-06 Yaş Grubu Kız ve Erkek Çocukların Bruininks-Oseretsky Testine Göre Motor Gelişim Düzeylerinin Araştırılması

Öz

Harekete izin veren fiziksel bileşenler motor beceriler olarak bilinir. Temel becerilerin erken gelişimi, özellikle sporda çok daha karmaşık motor becerilerin daha sonraki gelişimi için zemin hazırlar. Genellikle temel motor beceriler olarak bilinen bu temel yetenekler, fırlatma, zıplama, koşma, yakalama ve vurma gibi eylemleri kapsar. Daha sonra edinilen spora özgü becerilerin temeli, temel hareket yeterliliğidir. Bu bağlamda çocukların temel hareket yeteneklerini ölçmek ve takip etmek çok önemlidir. Bu çalışmada 4-6 yaş arası çocukların motor gelişim düzeyleri Bruininks-Oseretsky testi kullanılarak incelenmiştir.Araştırmanın evrenini, 2018-19 eğitim-öğretim yılında Rize il merkezinde bulunan anaokulu ve kreş eğitim merkezlerinde eğitime devam eden 4-6 yaş arası çocuklar oluşturmaktadır. Araştırmanın örneklemi için 150 erkek ve 136 kız olmak üzere 286 sağlıklı çocuk rastgele seçilmiştir. Ölçüm aracı olarak Bruininks-Oseretsky Motor Yeterlilik Testi'nin (BOT-2) kısaltılmış formu kullanılmıştır. Elde edilen veriler normallik testine tabi tutuldu. Verilerin normal dağılımının bazı alt gruplarda olduğu ancak hepsinde olmadığı dikkat çekmiştir. İki bağımsız grubun ikili olarak karşılaştırılmasında α= 0,05 anlamlılık düzeyinde t-testi veya Mann-Whitney-U testi, üç veya daha fazla grup karşılaştırılmasında Tek Yönlü ANOVA testi veya Kruskal-Wallis H testi kullanıldı.Test sonuçlarına göre cinsiyete ve yaşa göre çocukların kaba motor beceri düzeylerinde anlamlı farklılık vardı (U0.05; -3,538; p<0.05; X2(2), n=286, 101,754 p<0,05). Okul türüne göre çocukların kaba motor becerilerinde de anlamlı farklılık olduğu dikkat çekmiştir (X2 (2), n=286, 14,358 p<0,05). Cinsiyete göre el koordinasyonu ve güç ve çeviklik testlerinde (U0.05; -1,066; -1,077; p>0.05), okul türüne göre el kontrolü testinde anlamlı farklılıklar olmadığı görüldü (f2,283; 0.004; p>0.05). Sonuç olarak 4-6 yaş çocukların kaba motor gelişim düzeylerinin cinsiyete, yaşa ve okul türüne göre değiştiği söylenebilir. Sonuçlar doğrultusunda, 4-6 yaş çocuklara yönelik olarak koşma, zıplama, tırmanma ve top oynama gibi fiziksel aktivite içeren oyunlar teşvik edilmelidir. Bu tür oyunlar, ince ve kaba motor becerileri geliştirirken aynı zamanda çocuklara eğlenceli bir etkinlik sunabilir.

Anahtar Kelimeler: *beceri temelli öğretim, motor gelişim, okul öncesi, bot-2*

Introduction

Motor development is a sub-discipline of motor behavior that examines age-related, sequential changes that occur across the lifespan and the processes (such as growth and development) and factors (such as heredity and environment) that influence these changes. Changes that occur in a child aged two or three over a short period

of time which are not related to practice or experience, such as throwing an object farther or running faster, are likely to be due to motor development. These motor skills do not magically appear overnight as a new motor skill. Motor skills should be taught and practiced (Drost, Brown, Wirth & Greska, 2015; Pamela, Greg & Douglas, 2018).

It has been suggested that encouraging physical activity in early childhood can help improve motor skills (Güler, 2023). Basic motor skills are crucial integral elements for mastering complex movements (Dewi, Veratti, Sukamton, Hakim, Burhaein & Lourenço, 2023). At the same time, control over objects (throwing or catching a ball), basic locomotor movements (running, jumping, leaping) and stability, i.e. balance, are necessary components for the construction of basic movements (Sutapa, Pratama, Rosly, Ali, & Karakauki, 2021). The greatest development of basic motor skills occurs in preschool, and the development of these skills is associated with a child's physical, social, and cognitive development (Lopes, Santos, Pereira, & Lopes, 2013). Physical activity and movement experiences in the preschool age enhance academic learning, help children develop early literacy (Kirk & Kirk, 2016), and give children the ability to learn spatial awareness (Gehris, Gooze, & Whitaker, 2015; Kirk & Kirk, 2016). Furthermore, playing together allows children to build peer relationships and learn to respect rules (Serpentino, 2011). Moreover, physical activity promotes the acquisition of basic and complex movement skills as well as sport learning (Gallahue, Ozmun & Goodway, 2011). These basic movement skills are crucial for more specialized skills, thus they provide a basis for future sport practices that positively influence quantitative and qualitative aspects of motor skill and motor coordination development (Cools, De Martelaer, Samaey & Andries, 2011).

Motor skills, which are the basis of all our vital activities, refer to the movement and coordination of one's muscles and body. Motor skills are divided into two groups as fine motor skills and gross motor skills (Matheis and Estabillo, 2018). Improved balance in preschool leads to new gross motor achievements. Children become better coordinated and their gait becomes rhythmic and smooth. In addition, increased control of hands and fingers leads to the development of fine motor skills (Simpson, Ruwaili, Jolley, Leonard, Geeraert and Riggs, 2019; Marin and Monier, 2013). By developing basic motor skills in the preschool period and having sufficient motor skills; the opportunity for a sustainable active life can arise (Salehian, Dehghani, Peyghan and Ghanati, 2023).

Motor skills are an important part of children's physical, cognitive and emotional development, and many national and international studies emphasize this issue. These studies aim to understand how motor skills affect children's quality of life, learning abilities and general health (Logan, Ross, Chee, Stodden and Robinson, 2018; WHO,

2019; Kalkavan ve Kavalcı, 2023). Motor skills are basic abilities involving the coordination and control of muscles and body movements. They play a crucial role in a person's physical and cognitive development (Günar, 2022). Therefore, the aim of this study is to emphasize how important motor skills are for developing children's physical abilities and increasing their coordination. While supporting children's muscular development with motor skills, it also contributes to their mental development. Indeed, it is important to provide opportunities and encourage children to learn different motor skills. Also, since each child's individual needs and interests are different, it is important to help children discover their strengths by focusing on different skill areas.

It is stated that programs involving movement are effective in the development of children's physical competence and body awareness, control, balance and coordination (Stanković, Horvatin, Vlašić, Pekas and Trajković, 2023). Considering the importance of movement education in child development, it can be said that preschool education program is one of the main activity areas (MoNE, 2013). In order to program and plan the movement education in an effective way, the motor levels of children should be well known. The BOT-2 test is a reliable test that is widely used to reveal children's motor skills (Bruninks, 2005). The motor skills that children acquire at an early age can determine the type and quality of movements they will perform later in life. For this reason, it is important to develop and support children's motor skills. In the light of this information, the main purpose of this study is to investigate the motor development levels of children aged 04-06 years according to the Bruininks-Oseretsky test.

Method

Research Model

Experimental model, one of the quantitative research methods, was used in the study. Quantitative research, which is to objectively measure the social behaviours of individuals through observation, experiment and tests, and to explain them with numerical data, is a research approach that reveals facts and events in an observable, measurable and numerically expressible way (Bedir Erişti, 2013). The model considered in this study is an experimental design involving different groups, which is one of the types of experimental research. In this design, the effect of the independent variable on different groups is examined to see whether the difference is significant (İslamoğlu and Alnıaçık, 2019).

Population-Sample

The population of the study consists of children between the ages of 4-6 attending the nursery schools and kindergartens in Rize in 2018-2019 academic year. The sample of the study consists of 286 healthy girls/boys selected randomly on a voluntary basis. Necessary permissions were obtained from individuals and institutions.

Data Collection Tools

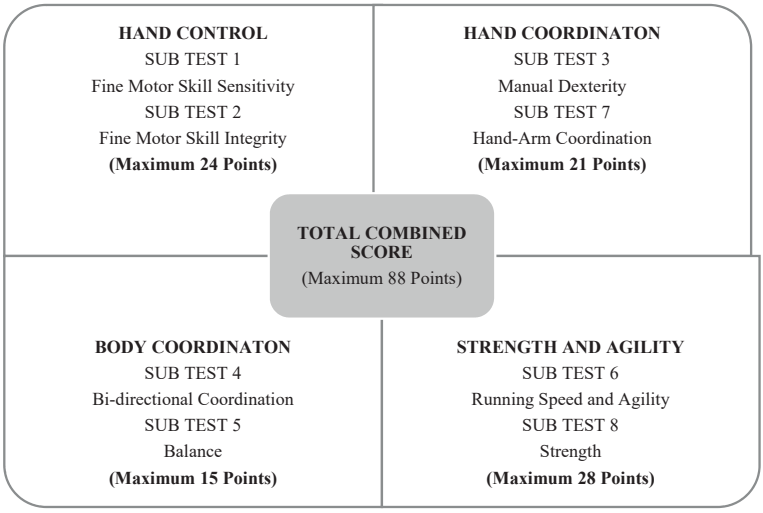
The short form of the Bruininky-Oseretsky Motor Froficiency Test (BOT-2) was used to determine the fine and gross motor skills of the children.

Bruininks-Oseretsky Motor Proficiency Test (Bot-2)

The Bruininks-Oseretsky Motor Proficiency Test (BOT-2) was developed to measure the motor functions of children between the ages 4-21. The first test developed by Bruininks-Oseretsky in 1978 consisted of 46 items in total. In the study conducted by Bruninks (2005) on 1520 students aged between 4-21 years, 14 items were removed to ensure functionality and consistency, and 21 new items were added, and the BOT-2 was formed consisting of 8 subtests and 53 items, and the reliability coefficient of it was found to be .70. Those items were; fine motor skills (7 items - e.g.; Connecting the Dots), fine motor skill integrations (8 items - e.g.; Copying a Square), manual dexterity (5 items - e.g.; Sorting Shape Cards), bi-directional coordination (7 items - e.g.; Sketch Jumping), balance (9 items - e.g.; Walking on a Line), running speed and agility (5 items - e.g.; Sideways Jumping on a Balancing Beam), hand-arm coordination (7 items - e.g., Dropping and Catching a Ball with Both Hands), strength (5 items - e.g., Sit-ups). A total motor compound score was also obtained from the total score of all items. The test was standardised by Bruininks. The administration time of the test can vary between 40 and 60 minutes for each child. The short form of the test consists of a total of 14 items. Accordingly, 8 subtests are specified as follows (Bruininks and Bruininks, 2005).

Figure 1

Bruininks-Oseretsky Test (Short Form) Sub Tests



This test is a reliable test that is widely used in the world to reveal the motor skills of children. BOT-2 is a tool used by educators, therapists and researchers to assess children's motor skills, to prepare and evaluate motor development programmes, and to detect and evaluate various motor dysfunctions and developmental delays. The test materials were designed to attract children's attention, provide uniform application, and facilitate application and evaluation (Bruininks and Bruninks 2005).

Protocol

Ethical compliance warrant was obtained from Recep Tayyip Erdoğan University Non-Interventional Clinical Research Ethics Committee (dated 05.12.2018 date and issued 2018/179). Necessary permissions from the nursery school and kindergarten administrations were also obtained to investigate the motor development levels of children. Finally, after obtaining the consent of the families and children with a consent form, the appropriate days and times for the measurements were determined.

The material to be applied and the test procedure were introduced to the children in a simple way and their motivation was ensured during the test. Firstly, the age, gender, height and weight of the children were specified. The measurements were first taken from the girls and then from the boys.

Statistical Methods

The normality test was applied to the obtained data. It was seen that the data were normally distributed in some subgroups while were not normally distributed in some others. Subsequently, t-test or Mann-Whitney-U test was used for two independent groups for pairwise comparisons at α= 0.05 significance level, One-Way ANOVA test or Kruskal-Wallis H test was used for three or more comparisons. Tukey's HSD test was applied as a second level test for significant differences.

Findings

The demographic characteristics of the children are shown in Table 1.

Table 1

Demographic Characteristics of Children

Variable	Group	n	%
Gender	Boys	150	52,4
	Girls	136	47,6
Age	Aged 4	105	36,7
	Aged 5	89	31,1
	Aged 6	92	32,2
School Type	State Kindergarten	205	71,7
	Private Kindergarten	52	18,2
	Private Nursery School	29	10,1
Kindergarten and Nursery School	Kindergarten	257	89,9
	Nursery School	29	10,1

The distribution of the participants by gender, age and school type is as follows. 52.4% of the children were boys and 47.6% were girls, 36.7% of the children were in the 4-year age group, 32.2% in the 6-year age group and 31.1% in the 5-year age group, 71.7% were in State Kindergarten, 18.2% in Private Kindergarten and 10.1% in Private Nursery School.

Findings on Test Results

T-test was applied at α=0.05 significance level in order to determine whether there was a significant difference between children's Hand Control and Total Motor Compound scores by gender.

Table 2

T-Test Results by Gender

Sub Dimension	Gender	Mean	Ss	df	t	p
Hand Control	Boys	11,02	4,13	284	-2.438	**0.050***
	Girls	12,26	4,51			
Total Motor Compound	Boys	43,15	10,01	284	-2.189	**0.050***
	Girls	45,74	10,02			

Test results showed that there was a significant difference between children's Hand Control scores (t_{284}; -2.438; $p<0.05$). Hand Control scores of the girls participants (12.26 ± 4.505) were found to be significantly higher than the scores of boys participants (11.02 ± 4.127) Similarly, it was seen that the difference between children's Total Motor Compound scores was significant (t_{284}; -2.189; $p<0.05$). Accordingly, the Total Motor Compound scores of the girls (45.74 ± 10.02) significantly higher than the score of boys (43.15 ± 10.01).

Mann-Whitney U test was applied at $\alpha=0.05$ significance level in order to determine whether there was a significant difference between children's Hand Coordination, Body Coordination and Strength and Agility scores.

Table 3

Mann-Whitney U Test Results by Gender

Sub Dimension	Gender	Mean	Ss	df	U	p
Hand Coordination	Boys	8,03	2,97	284	-1.066	0.287
	Girls	7,67	2,79			
Body Coordination	Boys	10,33	2,78	284	-4.089	**0.000***
	Girls	11,62	2,51			
Strength and Agility	Boys	13,77	3,01	284	-1.077	0.282
	Girls	14,19	2,58			

The test results showed that the difference between children's Body Coordination scores was significant ($U_{0.05}$; -4,089; $p<0.05$). Body Coordination scores of the girls participants (11.62 ± 2.51) were found to be significantly higher than the scores of boys participants (10.33 ± 2.78). No significant difference was found between the scores of Hand Coordination sub-dimension ($U_{0.05}$; -1,066; $p>0.05$). In other words,

although the Hand Coordination score of the boys (8.03 ± 2.97) were found to be higher than that of girls (7.67 ± 2.79), the difference was not statistically significant. The test results also showed that the difference between children's Strength and Agility scores was not significant ($U_{0.05}$; -1,077; p>0.05). Although the Strength and Agility scores of the girls (14.19 ± 2.58) were found to be higher than that of boys (13.77 ± 3.01) the difference was not statistically significant.

One way ANOVA test was applied at α=0.05 significance level in order to determine whether there was a significant difference between children's Hand Control and Total Motor Compound scores by age.

Table 4

One Way ANOVA Test Results by Age

Sub Dimension	Age	Mean	Ss	df	F	p
Hand Coordination	4 years	8,80	3,73	283	65.561	**0.000***
	5 years	11,74	3,33			
	6 years	14,70	3,73			
Total Motor Compound	4 years	36,59	8,29	283	126.023	**0.000***
	5 years	44,38	7,50			
	6 years	53,27	5,95			

The test results showed that the difference between children's Hand Control scores was significant ($f_{2,283}$; 65.561; p<0.05). Hand Control scores of the children aged 6 (14.70 ± 3.72) were found to be significantly higher than the scores of children aged 5 (11.74 ± 3.32) and aged 4 (8.80 ± 3.72). Similarly, the difference between children's Total Motor Compound scores was found to be significant ($f_{2,283}$; 126.023; p<0.05). Total Motor Compound scores of the children aged 6 (53.27 ± 5.95) were found to be significantly higher than the scores of children aged 5 (44.38 ± 7.50 and aged 4 (36.59 ± 8.29).

Kruskal- Wallis test was applied at α=0.05 significance level in order to determine whether there was a significant difference between children's Hand Coordination, Body Coordination and Strength and Agility scores by age.

Table 5

Kruskal- Wallis Test Results by Age

Sub Dimension	Age	Mean	Ss	df	X	p
Hand Coordination	4 years	6,15	2,29	286	83.131	**0.000***
	5 years	7,79	2,69			
	6 years	9,87	2,37			
Body Coordination	4 years	9,22	2,77	286	88.363	**0.000***
	5 years	11,08	2,17			
	6 years	12,77	1,79			
Strength and Agility	4 years	12,42	3,02	286	92.050	**0.000***
	5 years	13,78	2,42			
	6 years	15,93	1,40			

The test results showed that the difference between the children's Hand Coordination scores was significant. (X^2 (2), n=286, 83,131 p<0,05). It was seen that the Hand Coordination scores of the children aged 6 (9.87 ± 2.36) were significantly higher than the scores of the children aged 5 (7.79 ± 2.69) and aged 4 (6.15 ± 2.29). The difference between Body Coordination sub-dimension scores was also found significant. (X^2 (2), n=286, 88,363 p<0,05). The Body Coordination scores of the children aged 6 (12.77 ± 1.78) were found to be significantly higher than the scores of children aged 5 (11.08 ± 2.17) and aged 4 (9.22 ± 2.76). It was also seen that the difference between the scores of Strength and Agility sub-dimension was statistically significant (X^2 (2), n=286, 92,050 p<0,05). The Strength and Agility scores of the children aged 6 (15.93 ± 1.40) were observed to be significantly higher than the scores of the children aged 5 (13.78 ± 2.42) and aged 4 (12.42 ± 3.02).

One way ANOVA test was applied at α=0.05 significance level in order to determine whether there was a significant difference between children's Hand Control and Total Motor Compound scores by school type.

Table 6

One Way ANOVA Test Results by School Type

Sub Dimension	School Type	Mean	Ss	df	F	p
Hand Control	State Kindergarten	11,62	4,44			
	Private Kindergarten	11,60	3,93	283	0.004	0.996
	Private Nursery School	11,55	4,58			
Total Motor Compound	Private Kindergarten	45,65	9,88			
	Özel Kindergarten	40,81	9,02	283	6.063	**0.000***
	Private Nursery School	41,79	11,48			

No significant difference was found between the scores of Hand Control sub-dimension ($f_{2,283}$; 0.004; p>0.05). In other words, although the Hand Control scores of the children attending State Kindergartens (11.64 ± 4.43) were found to be higher than that of attending Private Kindergartens (11.60 ± 3.92) and Private Nursery Schools (11.55 ± 4.57), the difference was not statistically significant. The results also showed that the difference between the Total Motor Compound scores was significant ($f_{2,283}$; 6.063; p<0.05). Total Motor Compound scores of the children attending State Kindergartens (45.65 ± 9.88) were found to be significantly higher than the scores of children both attending Private Nursery Schools (41.79 ± 11.48) and Private Kindergartens (40.81 ± 9.02).

Kruskal- Wallis test was applied at α=0.05 significance level in order to determine whether there was a significant difference between children's Hand Coordination, Body Coordination and Strength and Agility scores by school type.

Table 7

Kruskal- Wallis Test Results by School Type

Sub Dimension	School Type	Mean	Ss	df	X	p
Hand Coordination	State Kindergarten	8,32	2,84			
	Private Kindergarten	6,69	2,66	286	20.267	**0.000***
	Private Nursery School	6,69	2,75			
Body Coordination	State Kindergarten	11,27	2,57			
	Private Kindergarten	9,92	2,86	286	10.706	**0.000***
	Private Nursery School	10,45	3,12			
Strength and Agility	State Kindergarten	14,44	2,44			
	Private Kindergarten	12,60	3,24	286	17.496	**0.000***
	Private Nursery School	13,10	3,49			

According to the test results, the difference between children's Hand Coordination scores was significant (X^2 (2), n=286, 20,267 p<0,05). The Hand Coordination scores of the children attending State Kindergartens (8.32 ± 2.84) were found to be significantly higher than the scores of those attending Private Nursery Schools (6.69 ± 2,75) and those attending Private Kindergartens (6.69 ± 2,66). The results also showed that the difference between the scores of Body Coordination sub-dimension was statistically significant (X^2 (2), n=286, 10,706 p<0,05). The Body Coordination scores of the children attending State Kindergartens (11.27 ± 2.57) were found to be significantly higher than the scores of those both attending Private Nursery Schools (10.45 ± 3.12) and Private Kindergartens (9.92 ± 2.86). Similarly, it was observed that the difference between the scores of Strength and Agility sub-dimension was significant (X^2 (2), n=286, 17,496 p<0,05). The Strength and Agility scores of the children attending State Kindergartens (14.44 ± 2.44) were found to be significantly higher than the scores of those attending Private Nursery Schools (13.10 ± 3.48) and those attending Private Kindergartens (12.60 ± 3.24).

Discussion, Results, and Recommendations

The acquisition of large and small muscle skills contributes to the child in various aspects. Motor skills enable the child to take steps towards independence. In addition, the state of being in action is useful for the child to express the situation in which s/he is in and to provide satisfaction in self-sufficiency. Another important aspect of this development that cannot be underestimated is that it prepares the ground for the child to participate in social activities and social integration (Heper, 2012). For this purpose, the motor skill levels of 4-6 year old children were analysed depending on gender, age and school type. Bruiniks-Oseretsky test results showed that girls participants obtained significantly higher scores than boys participants with regards to gender in Hand Control, Body Coordination and Total Motor Compound levels while no significant difference was found in Hand Coordination and Strength and Agility sub-dimensions. Boys scored better in hand coordination, where no significant difference was found, and girls scored better in strength and agility. In studies in which the short form of the BOT-2 test was applied to preschool children, it was observed that girls scored higher than boys (Bruininks, 2005; Hasan,Shaheen, Rizvi, Obradovic and Yousafzai, 2021). Also, other similar studies showed that girls were more successful than boys in fine motor skills variables (Ecevit, 2021; Jírovec, Musálek and Mess, 2019; Morley, Till, Ogilvie and Turner, 2015; Matarma, Lagström, Löyttyniemi and Koski, 2020; Bozanic, Delas Kalinski and Zuvela, 2011; Cadoret, Bigras, Lemay, Lehrer and Lemire, 2018). It has been suggested that there are four different factors that cause differences in motor performance according to gender. These four reasons

are body weight, anatomical structure, physiological structure, social and cultural factors (Timurkaan, 2003). It can be said that the results obtained from this research are due to these reasons as well. On the contrary, no significant difference was found in motor skill scores according to gender in a study conducted on randomly selected 5-7 year old children attending kindergartens (Boz 2011; Eynur, 2013). Motor becerilerin el koordinasyonu ile kuvvet ve çeviklik alt boyutlarındaki farkın önemsiz olması, grupların ortalama puanlarının birbirine yakın olmasına bağlanabilir.

The Bruiniks-Oseretsky test scores with regards to age revealed that children aged 6 obtained significantly higher scores than children aged 4 and 5 years in all sub-dimensions. Significant increases were observed in children's hand and body coordination skills as well as strength and agility skill score levels with age. In other words, as age increased, children's total motor composite values also increased. As a matter of fact, the findings obtained are in line with the results of the other studies in the field (Antunes et al., 2015; Fransen et al., 2014; Hardman, Júnior, Oliveira, & Barros, 2017; Seabra et al., 2013; Vandorpe et al., 2011; Karambe, Dhote, & Palekar, 2017; Derer & Ballı, 2018; Ecevit, 2021); it was concluded that age is an important factor in children's motor development (Tavşan 1997; Rudd, et al., 2015; Morano, et al., 2020). The increase in age and exposure to environmental stimuli augment the control and competence of the children over their motor skills (Payne and Isaacs, 2017). Haywood and Getchell (2014) defined motor development as "continuous and sequential changes in movement-related behaviours that occur in parallel with age". In the light of all these opinions, it can be said that age-related growth and maturation have an important place in the acquisition of these skills of motor development, as in different areas of development.

Bruiniks-Oseretsky test scores of children with regards to school type showed that children attending public kindergartens scored significantly higher than children attending private kindergartens and private nurseries in respects except the Hand Control sub-dimension. Although there was no significant difference in the level of hand control, it was observed that children attending public kindergartens received higher scores, as in other subscales. Similarly, Müniroğlu (1995) found that the motor performance levels of children attending public kindergartens were higher than those of children attending private kindergartens. Gülaç (2017) stated that the total motor skill scores of children studying in public schools were better than those of studying in private schools. It can be said that the results obtained in these studies overlap with the findings of the current research. It is known that it is very difficult for teachers in public kindergartens to go beyond the education and training programme determined by the national education or to act flexibly. Therefore, the motor skill levels of the

children attending state kindergartens might be expected to be at better levels. It can be argued that the insignificant difference in the hand control sub-dimension is due to the fact that teachers in each school type include similar activities that will improve hand control skills. Moreover, the results prove that studies on hand-body control and coordination, strength and quickness development are systematically implemented for 4-6 year old children in state kindergartens in Rize province.

As a conclusion, it was observed that girls participants had better motor skill levels than boyss and motor skill scores in all sub-dimensions increased with age. In addition, it was determined that the motor skill levels of children attending public kindergartens were at significantly higher levels than that of attending private nurseries and kindergartens.

Based on these results, the author's recommendations are as follows:

1. It is recommended that parents of boys, especially those with slightly lower motor skills, should take action as early as possible, while at the same time considering their relationship with the teachers at school as a crucial element for the normal and natural growth and development of children's basic motor skills.
2. It is recommended that teachers working in private kindergartens and private nursery schools, as in public schools, develop their basic motor skills sufficiently to identify and eliminate motor skill deficiencies of children. Accordingly, children should be provided with opportunities for practice, support and teaching, and at the same time, it is recommended to have them do various activities to expand their own range of motion and movement.
3. Comparisons can be made with different schools in socio-cultural and socio-economic terms by multiplying the demographic characteristics of this research.

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