

## Object Control Abilities of Kindergarten Students: Impact of Eye-Hand Coordination, Nutritional Status, Gender



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**ABSTRACT:** This study aims to reveal the effect of exogenous variables directly, causally and simultaneously on endogenous variables. This research method is a quantitative method using an ex-post facto research design. The population in this study were 30 students at Padang Utara Kindergarten aged 5-6 years. Consists of 15 male students and 15 female students. Sampling was done by purposive sampling technique. The data analysis technique used was path analysis. Research results The results showed that 1) There was a direct effect of eye-hand coordination on the object control abilities of North Padang Kindergarten students. 2) There is a direct effect of nutritional status on the ability of object control students at North Padang Kindergarten. 3) There is no direct effect of gender on the ability of the control object of North Padang Kindergarten. 4) There is no indirect effect of eye-hand coordination on the ability of control objects through gender at North Padang Kindergarten. 5) There is no indirect effect of nutritional status on the ability of control objects through gender at North Padang Kindergarten. 6) There is a simultaneous effect of eye-hand coordination, nutritional status and gender on the object control ability of students at North Padang Kindergarten.

**KEYWORDS:** hand eye coordination, nutritional status, gender and control object ability

### I. INTRODUCTION

Previous research has revealed that object control abilities in kindergarten-aged children have an important role in cognitive and motor development. (Bardid et al., 2015; De Meester et al., 2020; Laukkanen et al., 2020). However, there are still aspects that are not fully understood, especially in terms of the relationship between eye-hand coordination, nutritional status, and gender to these abilities (Luz et al., 2017; Venetsanou & Kambas, 2016). Through an innovative approach, this research aims to broaden our understanding of the impact these factors have. By analyzing data from kindergarten students in specific areas, this study aims to provide new insights that can support the development of educational strategies that are more effective in improving object control skills in early childhood. (Gusril, 2008) Motor ability is the quality of a person's ability that can make it easier to perform movement skills. According to (Kiram, 2000).

Motion can be interpreted as a change in the place, position, and speed of the human body and body parts that occurs in a dimension of space, time, and can be observed objectively (Barnett et al., 2017; Blomqvist et al., 2019; Roth et al., 2010). Motor ability is the ability to look / perform a person which is influenced by factors of speed, strength, coordination and endurance thus will make it easier for someone to perform movement skills (Komaini, 2018; Aiman et al., 2016; Chung, 2018; Li et al., 2011).

Motor Development is the process of a child learning to skillfully move limbs. This motor development can provide stimulation / stimulus such as training dexterity, speed, strength, flexibility and accuracy of hand eye coordination. Developing children's motor skills is very necessary so that they can grow and develop optimally (Sit et al., 2019; J. J. Yu et al., 2021). There are three motor skills of children namely: Locomotor Skills such as running, gallop, walking, hops, leap, Non Locomotor Skills such as jumping, balance, coordination of movements, Manipulative Skills such as hand and foot movements (Noordstar et al., 2017; J. Yu et al., 2016).

Eye-hand coordination is the ability of the eyes and hands possessed by a person in performing a physical task at the same time (Wicks et al., 2015). These activities can be in the form of catching and throwing, if a child can do these activities flexibly without significant obstacles, then in general the child is considered to have good eye-hand coordination. This element of eye-

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hand coordination develops rapidly at the age of 4 to 6 years. The need for nutritional status is also very influential because rapid growth and development occur in this age group. Provision of balanced nutrition in this period is carried out to support its development optimally.

This period is irreversible, which means it cannot be corrected in the next phase of life and will affect outcomes in childhood and adulthood. Ideally, the development of the child is in line with growth. The complexity of the muscular tissue system, nervous system as well as the functioning system of body organs is in line with the process of physical maturation or growth. Malnutrition in early childhood has an impact on growth disorders that result in disruption of child development. (Sarah, 2020). Nutritional status factors, if the nutritional status of children is low, of course, they cannot move properly, the consequences are of course low motor skills of the child. Poor or poor nutrition in children can result in impaired physical growth and intelligence. If physical growth is stunted, then his physical and motor abilities will be difficult to develop.

Globally, the problem of early childhood nutrition based on height data on age is 95% said to be normal, 95-90% said mild malnutrition, 90-85% in katakana moderate malnutrition, and 85% in katakana severe malnutrition. Data based on weight to height are clarified 110-90% in normal katakana, 90-85 in mild malnourished katakana, 85-75% in moderate malnourished katakana and 75% in severe malnourished katakana. (Soetjningsih, 2015: 143-144). In addition to nutritional status, sex differences are also one of the factors that affect children's movement ability. Because there are differences in ability between men and women (Kim et al., 2022).

Boys have better motor skills than girls, both in terms of strength and accuracy of movement. Suppose in to accuracy and throwing speed is often used to investigate differences in quantitative characteristics of throwing movements. Gender differences in speed throwing have been identified from ages 6 to 13, boys performing better compared to girls of the same age. At a certain level of development, boys only improve their skills, while girls stagnate at their rate, or become worse.

Based on the researchers, see from North Padang Kindergarten the low development of basic movements in early childhood such as running, jumping, catching and going up and down stairs, the researcher wants to see if there is an effect on hand eye coordination affects the ability of North Padang kindergarten control objects, Nutritional Status affects the ability of North Padang kindergarten control objects, Gender affects the ability of kindergarten control objects North Padang. So the researcher is interested in reviewing this study with the title " Object Control Abilities of Kindergarten Students: Impact of Eye-Hand Coordination, Nutritional Status, Gender".

## II. MATERIAL AND METHODS

Research Research design is a plan and structure of investigation that is arranged in such a way that researchers will be able to get answers to their research questions. This type of research design is included in the ex-post facto. In the ex-post facto study there was no control group or pre-test activity. The cause and effect relationship between one subject and another subject is not manipulated, because ex-post facto research only reveals symptoms that exist or have occurred. The facts in this study are revealed as they are from the collected data. The population in this study was 30 North Padang kindergarten students aged 5-6 years. It consists of 15 male students and 15 female students. Sampling is carried out by purposive sampling technique. The data analysis technique used is path analysis.

## III. RESULTS AND DISCUSSION

### 1) Control Object Capabilities

Based on the frequency distribution table of control object capability data above, it can be seen that out of 30 students in North Padang Kindergarten, there is 1 student who is in the 5-6 interval class with the category "Very Less". In classifications 6-7, there are 8 students or 27% of North Padang Kindergarten with the category "Less". In interval classes 7-8 there are as many as 6 students or 20% of North Padang Kindergarten with the category "Enough". In interval classes 8-9 there were 2 students of North Padang Kindergarten with the category "Good". Furthermore, in the interval class 9-10 there were 13 students of North Padang Kindergarten with the category "Very Good". The frequency distribution of the results of the data on the ability of the North Padang TK control object can be seen in the table below.

**Table 1. Data Frequency Distribution of North Padang Kindergarten Control Objects.**

No	Interval Class	Frequency		Categories
		Absolut	Percent	
1	9,1-10	13	43%	Very Good

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2	8,1-9	2	7%	Good
3	7,1-8	6	20%	Enough
4	6,1-7	8	27%	Less
5	5,1-6	1	3%	Less Than Once

### 2) Hand Eye Coordination

Based on the frequency distribution table of eye-hand coordination data above, it can be seen that of the 30 students in North Padang Kindergarten, there are as many as 2 people or 7% of students who are in the 0-0.8 classification with the category "Less Once". In the classification of 0.9 – 1.6, there is not a single student in North Padang Kindergarten with the category "Less". In the interval class 1.7 – 2.4 there were 5 students or 17% of North Padaang Kindergarten with the category "Enough". In the interval class 2.5 – 3.2 there are as many as 6 students or 20% of North Padang Kindergarten with the category "Good". Furthermore, in interval classes 3.3 - 4 there were 17 students or 57% of North Padang Kindergarten with the category "Very Good". The frequency distribution of the results of the hand coordination data of the North Padang Kindergarten can be seen in the table below.

**Table 2. Frequency Distribution of Eye-Hand Coordination Data for North Padang Kindergarten Students**

No	Interval Class	Frequency		Categories
		Percent Absolut	Percent	
1	3,3-4	17	57%	Very Good
2	2,5-3,2	6	20%	Good
3	1,7-2,4	5	17%	Enough
4	0,9-1,6	0	0%	Less
5	0-0,8	2	7%	Less Than Once

### 3) Nutritional Status

Based on the frequency distribution table of BMI data above, it can be seen that out of 30 students in North Padang Kindergarten, there is not a single student who is in the classification of >2 elementary school with the category "Very Fat", >1 SD – 2 SD with the category "Fat" and -2 SD – 1 SD with the category "Normal". In the classification -3 elementary school - -2 elementary school there are 2 students or 6.7% in North Padang Kindergarten with the category "Kurus". In the <-3 interval class of elementary school, there were 28 students or 93.3% in North Padaang Kindergarten with the category "Very Thin". The frequency distribution of the results of the nutritional status data of North Padang Kindergarten can be seen in the table below

**Table 3. Frequency Distribution of Nutritional Status Data of North Padang Kindergarten Students**

No	Interval Class	Frequency		categories
		Percent Absolut	Percent	
1	<-3 SD	28	93,3%	Very Skinny
2	-3 SD - 2 SD	2	6,7%	Thin
3	-2 SD - 1 SD	0	0%	Usual
4	>1 SD - 2 SD	0	0%	Fat
5	>2 SD	0	0%	Very Fat

### 4). Gender

Based on the table above, it can be seen that the number of male students is the same as the number of female students in North Padang Kindergarten. The number of male and female students in North Padang Kindergarten is 15 students or 50% each. The frequency distribution of the results of the North Padang Kindergarten sex data can be seen in the table below.

**Table 4. Frequency Distribution of Gender Data of North Padang Kindergarten Students**

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No	Gender	Frequency Absolut	Frequency Relative
1	Man	15	50%
2	Women	15	50%
<b>Sum</b>		30	100%

### IV. DISCUSSION

#### 1. There is a direct influence of eye-hand coordination on the ability of the control object of North Padang Kindergarten

Coordination is the ability possessed by a person to perform movements or physical activities effectively and efficiently, showing how a movement can occur. Hand-eye coordination, also known as (hand-eye coordination), is the coordinated control of eye movements with hand movements, and the processing of visual information to achieve a person's ability to coordinate the eyes and hands into a complete, thorough and continuous series of movements precisely in a controlled rhythm of motion that elicits a feedback reaction. In simple terms, coordination between eyes and hands involves coordinated vision and hand gestures to carry out tasks (Anang, 2020).

Research that has been conducted found that there is a direct influence of eye-hand coordination on the ability of control objects of North Padang Kindergarten students is 19.5%. While the rest is influenced by other factors. The meaning of the direct influence of hand eye coordination on control objects is the coordination possessed by the sense of sight with the limbs, namely the hands work together to carry out an activity such as catching, throwing, kicking, bouncing the ball, and rolling the ball. Without coordination between the eyes and hands, it will be difficult to feel the ability of the control object to be carried out perfectly.

#### 2. There is a direct influence of nutritional status on the ability of the control object of North Padang Kindergarten

Nutritional Status is an expression of one or more aspects of an individual's nutrition in a variable (Hadi, 2019). Nutritional status is the state of the body which is the end result of the balance between nutrients that enter the body and their utilization (Waura, 2016). Nutritional status is the expression of a state of equilibrium in the form of a certain variable or the embodiment of nutrition in the form of a certain variable (Supariasa, 2016). The quality of life of an individual can be seen from his health. Health problems can occur at all ages, especially more susceptible in toddlers because the toddler's immune system is still in the process of development. Health problems that often occur in the world are the occurrence of nutritional problems both thin and fat nutrition (Yohana, 2021). Nutritional status is the state of the body as a result of food consumption and use of nutrients (Soetjningsih, 2015). Alnedral, (2019), Nutritional status is the state of the body which is the end result of the balance between nutrients that enter the body. The data collection method is carried out by means of students first measured TB and BB. To find the Body Mass Index by BB in kilograms divided by TB in meters squared. Then the results are matched with the reference Body Mass Index According to Age (BMI / U).

The results of research that researchers have conducted show that there is a direct influence of nutritional status on the ability of control objects of North Padang Kindergarten students. Nutritional status affects the ability of control objects of North Padang Kindergarten students is 21.9%. While the rest is influenced by other factors. The meaning of the direct influence of nutritional status on the ability of the control object, with good nutritional status, the ability of the control object of kindergarten students will also be good, so that kindergarten students can carry out activities without excessive fatigue to get various movement experiences.

#### 3. There is no direct influence of gender on the ability of the control objects of North Padang Kindergarten

In the calculation results of the path analysis, the direct influence of Gender (X3) on the Ability of the Control Object (Y) was found that  $H_0$  was rejected. This means that there is no direct influence of Gender on the Ability of Control Objects. In children who were not given movement training, between men and women had differences in basic movement skills. Boys have better basic movement skills when compared to girls. This situation is closely related to the selection of toys and play activities they do, such as running, jumping, throwing, hitting, catching and kicking. Without them realizing it, it turns out that this activity has trained their bodies in basic movement skills at an early level. Girls tend to do play activities that stay in one position only. While boys have a tendency to do physical activity with more movement intensity.

This has also been explained in several research results, previous research revealed that sex differences in children affect basic movement abilities (Judith & Walter, 2015). Boys do have better basic motion skills than girls, especially in object control skills

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(Barnett et al., 2017; Judith & Walter, 2015). That the relationship between age and gender can be interpreted as high age, the basic movement skills (object control) of children will be better. With this opinion explained that the sex of children aged 5-6 years has not determined whether or not the ability of object control, but to get a good object control determined age and experience of motion.

### **4. There was no indirect effect of eye-hand coordination on the ability of objects of control through sex in North Padang kindergarten**

Based on research conducted regarding the indirect influence of Hand Eye Coordination on the Ability of Control Objects Through Gender, it was found that  $H_a$  was rejected. That is, there is no direct influence between the Hand Eye Coordination and the Ability of Control Objects Through Gender. Delays are more often caused by a lack of opportunities to learn motor skills, excessive parental protection, or lack of motivation to learn them. Another factor is the lack of knowledge, experience and insight of ECCE teachers in teaching basic movement skills to children (Famelia, 2018). So far, ECCE teachers have only focused on teaching reading, writing, and ignoring motion-related learning. In fact, by teaching movement skills to children can stimulate their cognitive abilities (Johor, et al., 2020).

### **5. There was no indirect effect of nutritional status on the ability of control objects through sex in North Padang kindergarten**

Based on research conducted regarding the indirect influence of Nutritional Status on the Ability of Control Objects Through Gender, it was found that  $H_a$  was rejected. That is, there is no direct influence between Nutritional Status and the Ability of Control Objects Through Sex. Nutritional Status Ability is the expression of one or more aspects of an individual's nutrition in a variable (Hadi, 2019). Nutritional status is the state of the body which is the end result of the balance between nutrients that enter the body and their utilization (Waura, 2016). Nutritional status is the state of the body which is the end result of the balance between nutrients that enter the body and utilis Nutritional status is an expression of the state of balance in the form of certain variables or the embodiment of nutrients in the form of certain variables (Supariasa, 2016). The quality of life of an individual can be seen from his health. Health problems can occur at all ages, especially more susceptible in toddlers because the toddler's immune system is still in the process of development. Health problems that often occur in the world are the occurrence of nutritional problems both thin and fat nutrition (Yohana, 2021). Nutritional status is the state of the body as a result of food consumption and use of nutrients (Soetjningsih, 2015).

### **6. There is a simultaneous influence of eye-hand coordination, nutritional status and gender on the ability of the control objects of North Padang Kindergarten**

Object Control involves more hands and feet, but other parts of our body can also be used in these basic locomotion skills. Object manipulation is far superior to eye-foot and hand-eye coordination The forms of manipulative ability consist of: 1) Pushing motion (throwing, hitting, kicking). 2) The movement of receiving (grasping) objects is an important ability that can be taught using a ball made of rubber pads. 3) The movement of bouncing the ball or dribbling. According to (Setyo, 2019) Basic manipulative movements are motion manipulation movements using tools, which involve eye coordination, foot coordination, and hand coordination, or other body parts such as throwing, catching, kicking and so on.

The results showed that there was a direct influence of eye-hand coordination, nutritional status and sex together on the ability of control objects. This can be seen from the calculated value obtained that eye-hand coordination, nutritional status and gender to the ability of the control object amounted to 24.01% while the rest of the ability of the control object was influenced by other factors. The meaning of the influence of hand eye coordination, nutritional status and gender affects the ability of object control of kindergarten students.

## **V. CONCLUSION**

Based on data analysis and discussion in the previous chapter, the conclusions in this study are as follows: 1) There is no significant influence by learning motivation on students' physical fitness. 2) There is no significant effect by nutritional status on students' physical fitness. 3) There is no significant influence by learning motivation on student learning outcomes. 4) There is no significant effect by nutritional status on student learning outcomes. 5) There is no significant effect by physical fitness on student learning outcomes. 6) There is no indirect influence of learning motivation on learning outcomes through students' physical fitness. 7) There is no indirect influence of nutritional status on learning outcomes through students' physical fitness.

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