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## Research Article

# Relationship between Fine Motor Skill and the Use of Gadget in Pre-school Age Children

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### Abstract

**Aims:** To analyze the relationship between fine motor skill and the use of gadget in pre school age children.

**Methods:** This study used a cross-sectional design. Sampling technique using quota sampling and the sample in this study amounted to 82 pre school age children in Purwanegara, Banyumas on March-April 2022. The adopted questionnaire used to be measured use of *gadgets* application and abilities acceptable fine motor be measured using Denver II. Data analyzed univariate and bivariate using *Gamma Test*.

**Results:** The univariate analysis showed that there were eight respondents (9.8%) *with gadgets* application in the category low, 13 respondents (15.9%) moderate, and 61 respondents (74.4%) high. Denver II results showed fine motor as much as one respondent (1.2%) in category *advance*, 24 respondents (29.3%) *caution*, 56 respondents (68.3%) *delayed*, and one respondent (1.2%) normal. The Gamma test showed a relationship between fine motor skill and the use of gadget in pre school age children with a p-value = 0,005 (p value<0.05).

**Conclusion:** There is a significant relationship between fine motor Skill and the use of gadget. Based on these results, periodic developmental screening and nursing interventions are needed to address fine motoric disorders in preschool-aged children who use gadgets, and it is expected that parents will limit the use of gadgets.

### Keywords:

Children; denver; fine motor skill; *gadget*; pre-school age

## INTRODUCTION

Preschool age or children aged 3-5 years are significant in determining success in growth and development. Every child has a different speed of growth and development, depending on the influencing factors (1). This age is a concise stage that cannot be repeated, so it is often called the golden age (2). According to the World Health Organization (WHO), in 2013, it was found that 8.1% of children under five had

developmental disorders, while based on data from the Ministry of Health (DepKes) of the Republic of Indonesia in 2014, 16% of children under five in Indonesia had developmental disorders. Therefore, at this time, it is necessary to optimize development so that it can make a more mature person (3).

Currently, parents often use gadgets as a shortcut to calm their children, so they are not fussy andso parents can complete their

daily activities without any interference from their children. When the government recommends limiting traveling and holding learning at home for children in the age group of Early Childhood Education (PAUD) and Kindergarten (TK), parents faced a problem about how to make children not feel bored. It makes them finally choose gadgets as the solution of the problem. Gadgets will make it easier for children to focus on playing games or watching YouTube so that they think gadgets can be friends. Parents feel that children can be supervised easily if they play with gadgets. However, without realizing it, parents have missed their role, which gadgets have replaced to accompany their playing needs (4). The use of these gadgets has an impact on their psychological and motor development. Some negative impacts of using gadgets include decreased concentration, lazy writing and reading, decreased socializing, and addiction, which can cause health problems and affect children's behavior (5). Children can experience disturbances in motor development, especially in fine motor skill. The presence of impaired fine motor skill, among others, is the position of the hand still gripping when ordered to open, the arms tend to be at the side of the body, and active hand movement in one hand. In addition, they have difficulty reaching and grasping objects, inability to direct both hands towards the midsection, inability to grasp objects with both hands difficulty releasing objects being held at age of 1.5 years, have difficulty writing and drawing, and rarely looking up. When reaching for or grasping an object, the hand is also a fine motor skill disorder (6).

Gadgets have positive and negative roles for their users. Gadgets play an important role in the development of a child's brain. For children who are addicted to gadgets, their brain development will be disrupted. This is caused by an excess of the hormone dopamine. The hormone dopamine is a chemical compound in the brain whose role

is to convey stimulation throughout the body. This hormone can affect various human activities, from the ability to remember to move the limbs. Excessive release of the hormone dopamine in the brain has been shown to increase a person's risk of experiencing schizophrenia and abnormalities in the hormone dopamine in the brain which are often associated with difficulty focusing and hyperactivity (ADHD) (7). The production of the hormone dopamine will increase when children play with gadgets. Dopamine production increases because there is happiness because of the activity (8). Meanwhile, Excessive it can interfere with the maturity of developmental functions, such as emotional control, self-control, responsibility, decision-making, and other moral values that can cause attention deficit disorder and hyperactivity (9). Based on this, the purpose of this study was to determine the relationship between use of gadget and fine motor skills in preschool-aged children.

## METHODS

The research design used was a cross-sectional study to determine the relationship between gadget use and fine motor skills in pre school age children. The population of this study was children aged 3-5 years in Purwanegara Village. The solving formula calculated the sample in this study. Sampling using quota sampling technique with a sample of 82 children. The inclusion criteria of respondents were children aged 3-5 years and not children with disabilities. Exclusion criteria in this study were uncooperative children. The use of gadget variable is defined as the time the respondent uses the gadget in one day and measured by Nurmasari (2016) questionnaire in previous studies that have tested the validity and reliability (10). This questionnaire is divided into several sub-chapters, there are types of gadgets, intensity of gadget use, types of applications, and parental

supervision. *Variable fine motor skills* are related to physical skills involving fine muscle coordinators and eye and hand coordination and measured by Denver II. Sources of data used in this study were primary data, namely data obtained through interviews and filling out questionnaires by respondents, including parental education, parental occupation, use of gadgets, and children's fine motor skills, and secondary data, namely data obtained from posyandu cadres, in the Purwanegara Village area. Data analysis using univariate analysis on each variable to obtain the frequency distribution results and bivariate analysis using the Gamma

correlation test. This study has received ethical approval from the Ethics Committee Faculty of Health Sciences, Universitas Jenderal Soedirman with the Number 678/EC/KEPK/III/2022.

## RESULTS

The respondent's age has a median value of almost 46.5 months. Most respondents were women, with 43 (52.4%) children. The respondent's weight has a median value of 15.1 kg. Most of the parent's education was the senior high school, with 34 (41.5%), and the parent employer primarily worked with 42 (51.2%).

**Table 1.**  
**Demographics of respondents (n=82)**

Variable	Frequency (f)	Percentage (%)
Age child (month), median(min-max)	46.57(36-60)	
Gender		
Man	39	47.6
Woman	43	52.4
Body weight (kg), median(min-max)	15.1(11-23)	
Parent Education		
Elementary	7	8.5
Junior high school	25	30.5
Senior high school	34	41.5
Diploma	2	2.4
Bachelor	14	17.1
Parent employer		
Working	42	51.2
Housewife	40	48.8

Based on Table 2, it is known that 8 (9.8%) children use gadgets with low intensity, 13 children (15.9%) with moderate intensity, and 61 (74.4%) children with high intensity. The types of gadgets that are often used are smartphones with 69 (86.2%) children, mobile phones for as many as 12 (14.6%) children, tablets with as many as 3 (3.6%) children, and one child (1.2%) using a laptop. The most widely used applications are games with 31 (37.8%) children, learning to read 12 (12%) children, puzzles with as many as 7 (8.5%) children, guessing pictures with as many as 10 (12.5%) children, videos as many as 3 (3.7%) children, and other applications namely youtube as many as 62 (75.6%) children. The initial age of children's gadget use has a median value of 29.05 months, with a minimum value of 12 months and a maximum of 48 months.

**Table 2. Gadgets application on respondents (n=82)**

Variable	Frequency (f)	Percentage (%)
Intensity gadgets application		
Low	8	9.8
Moderate	13	15.9
High	61	74.4
Type of gadgets		
Mobile	12	14.6
Smartphone	69	86.2
Tablet	3	3.6
Laptops	1	1.2
Blackberry	0	0
video games	0	0
Kinds of Application		
Games	31	37.8
Study read	12	14.6
Study write	0	0
Puzzles	7	8.5
Guess picture	10	12.5
Videos	3	3.7
Others (youtube)	62	75.6
Age early ( month )	29.05(12-48)	

Based on Table 3, fine motor skills in preschool age children, it can be said that many have problems with the results obtained that there are 56 (68.3%) children are in the delayed category, 24 (29.3 %) in the caution, and 1 child (1.2%) in the advanced and normal categories.

**Table 3. Fine motor skill respondents (n=82)**

Variable	Frequency (f)	Percentage (%)
<i>Advance</i>	1	1.2
<i>Normal</i>	1	1.2
<i>Caution</i>	24	29.3
<i>Delayed</i>	56	68.3
<i>No Opportunity</i>	0	0

Table 4 shows the results of the Gamma correlation test conducted to determine the relationship between the use of gadgets and fine motor skills in children aged 3-5 years, showing a value of  $p = 0.005$  ( $p < 0.05$ ), which means that  $H_0$  is rejected and  $H_a$  is accepted, so it can be concluded that there is a significant relationship between the use of gadgets and fine motor skills in children aged 3-5 years in Purwanegara Village. The result of the correlation coefficient is 0.597, which means the strength of the relationship between the use of gadgets and fine motor Skill is at a moderate/enough level.

**Table 4. Bivariate analysis (n=82)**

Gadgets Application	motor Fine					Coefficient correlation (r)	P Value
	Advance	Normal	Caution	Delayed	NO		
Low	0	0	6	2	0	0.597	0.005
Currently	0	1	5	7	0		
High	1	1	24	56	0		

## DISCUSSION

The results of this study indicate that the median age of children is 46.5 months which is the age of preschool children. Preschool-age children have their uniqueness where children will have a pattern of growth and development in physical, socio-economic, creative, cognitive, and language communication aspects. Preschool age will experience the potential for proper and remarkable growth and development, but the development of each child is different and cannot be equated between individuals (11). The results showed that most respondents were female (52.4%). Girls will be more accessible when given developmental stimulation than boys because girls are easier to manage than boys (12).

The children's weight in this study had a median value of 29.05 kg. Excess weight can interfere with children following the rules of the game. Children with excess weight often feel awkward and sluggish, so they will be too careful and aware of themselves when playing with their friends (13,14). Parents' last education and employment status are also characteristics of respondents in this study. Parents' most recent level of education is at the high school level with a percentage of 41.5%. Parents play a vital role in the progress of their family. Parents are the most important educators for their children. Parents with a higher education level will have broader insights into managing family and child development (15). High school-level education is considered sufficient knowledge about child growth and development. Parents with a high school education will be more open when receiving information about things that affect their child's development, both how to raise children well, good children's education, and so on (16). Most of the respondent's parents were employed as workers, as many as 42 people (51.2%). Working parents can take up quite a lot of time in family life. Parents who do not work will have more time to accompany their

children to meet their needs (10). The results of this study indicate that most of the respondents use gadgets with a high category of use, as many as 61 respondents (74.4%). The results of this study are in line with Nurmasari's (2016) research entitled *The Relationship of the Intensity of Gadget Use to Developmental Delays in Speech and Language Aspects in Toddlers in Tambakrejo Village, Surabaya*, which states that there is a significant relationship between the intensity of gadget use and delays in speech and language aspects in toddlers. in Tambakrejo Village, Surabaya. The results also show that as many as 69 respondents use a smartphone-type gadget with an oftenused application, YouTube. According to researchers, parents need to supervise the use of gadgets in children aged 3-5 years. Parents can limit the duration and reduce the frequency of using gadgets by diverting children to play with other game tools so that children do not become addicted to gadgets.

The results of this study indicate that most of the respondents experienced fine motor skill in the delayed category, as many as 56 children (68.3%) and 24 children (29.3%) in the caution category, and one child in normal category.

In pre-school-age children, the tasks on fine motor skills according to DENVER II are to form towers of 6 and 8 cubes, imitate vertical lines, shake thumbs, imitate (O), draw people 3 and 6 parts, imitate (+), choose lines that longer, and imitates a square shape (17). In the results of the study, the majority of respondents who used gadgets were lazy for physical activities, often rebelled if there were distractions when playing with gadgets, and even children forgot to eat because they were busy playing. This condition can cause the muscles of the hands and feet to stiffen, and limit extremity movements so that you have difficulty holding or holding a pencil. Respondents who have high-intensity use of gadgets may experience impaired concentration, so they cannot focus on the instructions or instructions given. In

addition, respondents who forget the need to eat can result in children lacking the nutrients needed during the growth and development process.

Delays in fine motor skills can occur due to several factors. According to Choo, et.al (2019) that the causes of developmental delays are prenatal, perinatal, postnatal, and other (social and unknown) factors (17). Actually, fine motor skills have been functioning since birth and will develop gradually, but this development can be influenced by several factors such as heredity (Pura & Asnawati 2019), good neuromuscular coordination, accurate visual function, and good nonverbal intellectual abilities. The surrounding environment (parents) also has a big influence on the development of fine motor intelligence. This can increase or decrease the level of intelligence in the early days of life (18). The results of this study are supported by Pratika's research (2019) entitled *The Relationship of Intensity of Gadget Use with Developmental Disorders in Toddlers Age 3-5 Years*, which states that there is a relationship between the intensity of gadget use and developmental disorders in toddlers aged 3-5 years at the Kendari City Dzaki Clinic in 2019 (2). The consequence that must be faced by parents is to provide time to stimulate children's growth and development and strictly limit the use of gadgets. In addition, adequate additional nutrition is needed to support the child's growth and development process.

The results of statistical tests using the Gamma correlation test showed that the value of  $p = 0.005$  ( $p < 0.05$ ) means a significant relationship between the use of gadgets and fine motor skills in children aged 3-5 years. The correlation coefficient value is 0.597, which shows the positive direction of the relationship at a moderate or enough level.

Previous research revealed the same thing, evaluations of children using gadgets during the Covid 19 period found that children's

fine motor skills were reduced. On the results of fine motor skills in the hands, it was found that the nerve muscles of the hands had not been trained so the muscles of the fingers were limp and less strong, making it difficult for children to open glue caps, markers, difficulty opening toy containers and playing with scissors. Children become lazier to do activities and more are done by parents (18). Supported by Lin (2019) in a study of differences in groups using tablets (touch screens) and non-tablets in pre-school-aged children. The results stated that there were differences in fine motor skills and the non-tablet group had better fine motor skills, higher scores on spatial relationships, shape firmness, basic visual figures, fine motor precision, fine motor integration, and manual dexterity compared to the tablet group (19). In games on tablets, children cannot explore more games than in traditional games. In the non-tablet group, children can practice activities related to assembling blocks, holding pencils, and using scissors and paper.

In contrast to Souto, et.al. (2020) study, the use of tablets (touch screens) in preschool-aged children is associated with advanced fine motor skills. Children who are frequently exposed to tablets have better fine motor skills compared to children who are rarely exposed to tablets. In this study, the use of tablets in children was accompanied by parents (passive) and had a time limit, so children had more learning experiences compared to children who rarely used tablets (19).

Research conducted by Imron (2017) on the relationship between gadget use and the social and emotional development of preschool children. His research results show a relationship between gadget use and social development and emotional preschool children with  $p = 0.001 < (0.05)$  (1). The sophistication of the gadget makes it easier for children to access various games with just one click. This makes it easy for parents to give gadgets to their children because they can play while

learning; parents also often use gadgets as entertainment tools when children are angry and are being left behind to complete other activities of their parents (20). The production of the dopamine hormone will increase when children play with gadgets. Dopamine production increases because there is happiness because of the activity [8]. Meanwhile, excessive it can interfere with the maturity of developmental functions, such as emotional control, self-control, responsibility, decision-making, and other moral values that can cause attention deficit disorder and hyperactivity [9].

Based on data from WHO (2014), it is estimated that 5-10% of children experience general developmental disorders, including motor, language, socio-emotional, and cognitive development with 1-3% being children under five years of age (21). All aspects of development affect each other from one aspect to another, so all aspects of development must be considered equally important (22).

Providing adequate stimulation strategies to children is a way to improve movement, speech-language, socialization, and independence skills in children so that they take place optimally (23). One way to provide the proper stimulation is to limit the use of gadgets in children and replace them with other games. However, gadgets do not always have a negative impact. Gadgets can also provide supportive stimulation, including the YouTube application. In addition, it should also be emphasized that YouTube is only limited to developing a child's thoughts, ideas, and creativity, not the only stimulation given to children (24).

## CONCLUSION

The results showed a relationship between use of gadgets application and fine motor skills in preschool age children. The recommendation for community nurses is to carry out developmental screening and intervention in preschool-aged children on

a scheduled basis and provide referrals if necessary. Early identification of developmental delays and appropriate management can positively alter the child's developmental trajectory. Health Education is needed for parents to understand how to stimulate the development child and limit gadgets use or with assistance. Future research suggests re-examining the relationship between gadget use and fine motor skills in children aged 3-5 years by using a larger sample and other variables as a substitute.

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