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The Effect of Puzzle Educational Game Tools on Fine Motor Development in Pre-school Children at Al-Wahdah Kindergarten Bandung City

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ABSTRACT

Fine motor development is a movement that uses smooth muscles or certain parts of the body that are influenced by learning and practicing opportunities. Delayed fine motor development results in children's development being inappropriate for their age. Overcoming this, need stimulation to improve fine motor skills such as playing a puzzle. The purpose of this study was to determine the effect of Educational Games Tools puzzle on fine motor development in children. This type of research is pre-experimental research with one group pre-test post-test design. The sample of this study was children aged 5-6 years in TK Al-Wahdah totaling 45 samples. The instrument of this research used a modified sheet of KPSP fine motor. Analysis of univariate data before being treated to playing puzzles, found that there were 33 children in the appropriate category (73.3%) and 12 people in the unsuitable category (26.7%). After being given therapy playing puzzle children in the appropriate category were 45 people (100.0%). Based on the results of calculations using the Mc Nemar test, a p-value of 0.000 < (0.05) was obtained, and χ^2counted 14.08 > χ^2 table 3.841. It can be concluded that there is an effect of puzzle educational game tools on fine motor development in pre-school age children at TK Al-Wahdah Bandung City. For teachers and health centers it is recommended to be able to redevelop puzzle games by stimulating children to use puzzles that are more varied and harmless, and can pay more attention to fine motor development in children in the future.

INTRODUCTION

The pre-school age period is the age period of 3-6 years, where at this time is the most sensitive age for children, so this age is the most strategic point to carve the quality of a child in the future (Suhartanti et al., 2019). However, in 2020 there was an outbreak of the Covid-19 pandemic which became the first and main health crisis and resulted in the highest mortality rate in various parts of the world, therefore various policies emerged aimed at breaking the chain of spreading the covid-19 virus including in Indonesia. Efforts that have been made by the government are by making an appeal to keep a distance (social distancing). The existence of this appeal, learning is also carried out online or in the network, this of course makes children do more activities indoors and will affect child development (Ministry of Social Affairs, 2020).

Developmental problems are a serious problem for both developed and developing countries in the world. The World Health Organizations (WHO) reported that the prevalence of children aged 3-17 years experiencing developmental problems in the United States during 2014 - 2016 increased from 5.76% to 6.99% (ADOLESCENCE, 2008). The World Health Organizations (WHO) also reported that the prevalence of children in Indonesia under the age of 5 years in 2016 experienced developmental deviations of 7,512.6 per 100,000 population (7.51%) (Achadi, 2019).

Children in Indonesia also experience delays in general development which is still quite high at 5-10%, 3-6 out of 1,000 babies have problems with their hearing, 1 in 100 children have less intelligence and speech delays, and 2 out of 1000 babies have problems in motor development (Sugeng et all., 2019). According to national data from the Indonesian Ministry of Health (2014), 13%-18% of children under five in Indonesia experience growth and development disorders (Kemenkes, 2014). And according to UNICEF (2015), there is still a high incidence of developmental disorders, especially disorders in motor development, obtained (27.5%) or 3 million children who experience disorders. To achieve optimal development, gross and fine motor skills in children must be honed properly. Thus, children can have motor skills that are in accordance with their development (Saputri, 2021).

Motor development is the development of controlling body movements by coordinating the activities of the central nervous system, peripheral nerves, and muscles. Motor development is divided into 2, namely gross motor and fine motor development. Gross motor development involves large muscles including movements of the head, body, limbs, balance, and movement. Fine motor development involves small muscles and is influenced by the maturity of motor function, accurate visual function, and non-verbal intellectual ability (Soetjiningsih, 2013).

Delayed fine motor development can cause children's development to be inappropriate for their age, and can cause major problems for children in the future, such as becoming anxious, shy, jealous and dependent on other children. This can cause difficulties for children who will enter elementary school because they cannot socialize well as they play (Saputri, 2021).

Factors that can affect fine motor development are prenatal conditions, genetic factors, environmental conditions, postnatal health and nutrition, intellectual intelligence, inappropriate stimulation, parenting, and physical disabilities (Sutri & Zulminiati, 2020).

Overcoming this needs to be done stimulation or development in order to improve children's fine motor skills, and this needs an interesting strategy, especially in pre-school age children. At pre-school age children generally attend playgroup programs at the age of 3 years, while at the age of 4-6 years children attend kindergarten programs, and at this time it is said to be a period of play, because every time children are filled with play, and so far toys are a very important tool of play activities (Suhartanti et al., 2019).

Play is a fun thing for children, play can be done to provide information and develop children's imagination in a pleasant atmosphere (Wahyuni, 2018). Fine motor skills can be developed through play activities such as the use of educational game tools. Educational game tools (APE) are play tools specifically designed for education aimed at assisting development (Fadlillah, 2019). Educational game tools that can be used to improve children's fine motor skills, namely, related to physical skills that require small muscles and eye and hand coordination, such as playing blocks, arranging puzzles, inserting objects into holes according to their shape, folding paper, making lines, and writing letters according to their shape (Decaprio, 2013). One of the games that can be applied to pre-school children is puzzle games, because among various types of game media, puzzles are preferred by children and it is not difficult to find them (Gita & Surtikanti, 2017).

According to Yuniati's research (2018), puzzles are effective to use, besides being easy to obtain, this game is familiar to children, and is often used for preschool children. In addition, Puzzle is a form of game that can hone children's thinking skills, remember and understand concepts, thus children become more creative. This is also supported by the results of research conducted where there is an increase in the average fine motor development of children who are given puzzle type educational games, namely 3.35 to 1.88.

According to research by Fembi & Pora (2020), playing puzzles is effective because without realizing it, children will learn to actively use their fingers to arrange the right pictures. In addition, by playing puzzles, children learn about the concepts of shape, color, size, and quantity, this can train eye and hand coordination, and train the muscles of the fingers well so that it can stimulate fine motor skills. Research conducted by Fembi & Pora showed the results of a significant effect caused by puzzle games. 30 respondents were obtained based on the highest pre-test value, namely in the abnormal category of 50.0% and obtained the most fine motor development post-test value, namely in the normal category 70.0%.

According to (Maghfuroh, 2018), playing puzzles is effective because, by holding pieces of images and placing them appropriately, it can coordinate the small muscles in the hands. So that children no longer have difficulties, and the coordination of the eyes and hands of children can work well. Research

conducted by Maghfuroh shows the results, most of the development of preschool children before being given the puzzle play method is normal (59%). And almost entirely the development of preschool children after being given the method of playing puzzles is normal (88.4%). And there is an effect of the puzzle play method on the fine motor development of pre-school children at Surya Baru Kindergarten Plosowahyu Lamongan.

Puzzle is a type of game consisting of pieces of images where the way to play is by arranging the pieces of the picture until a picture is formed, the purpose of this game is to train patience, make it easier for students to understand concepts, cooperate with each other, solve problems with friends, and develop students' fine motor skills (Herawati, 2013). Based on the classification of play, puzzles are included in skill play games, this game can improve children's skills, especially gross and fine motor skills. These skills are obtained through repetition of game activities carried out (Andriana, 2013). Therefore, one of the strategies that nurses can apply in developing fine motor skills in children is by using puzzle games.

In this study, the focus is on the role of nurses as educators, namely providing education, teaching, training, direction and guidance to children and the game can be an alternative to implementing educational games in overcoming fine motor development problems. This is based on the roles and functions of nurses where nurses are care givers, disease prevention, family advocates, educators/educators, collaborators, counselors and ethical decision makers and researchers.

From the results of preliminary studies with the principal of Al-Wahdah Kindergarten, there has been no cooperation with the Batununggal Health Center for 3 years regarding the examination of children's growth and development. Growth checks are only carried out by teachers in the form of height and weight checks. Some children aged 5-6 years also still experience problems in their fine motor development. As the results of observations conducted on 15 children, it was found that 5 out of 45 children still had difficulty in forming / drawing appropriate patterns, 5 children colored pictures that were still out of line, and 5 children still cut patterns not following the line. This is due to a lack of stimulation and environment during the Covid-19 period such as no interaction with friends, limited mobile phone or laptop media for learning, signals, and working parents. Researchers chose Al-Wahdah Kindergarten because, in terms of population, it fulfills the sample for this research and as the data described above, the problem of fine motor development at Al-Wahdah Kindergarten at the age of 5-6 years is not appropriate.

Based on the explanation above, it can be concluded that the difference between the research that the author will do with previous research is from the research subject, and the research method applied. While the research similarities with previous researchers are from the educational games applied, namely using puzzle games because in the research place, puzzle media has not been applied. In addition, puzzle play therapy can be given to pre-school children by providing continuous stimulation.

Giving stimulation continuously can improve the fine motor development of pre-school children, because when stimulated the coordination of the small muscles in the hand can be trained, the child can hold the picture pieces and place them well and there is no difficulty. Increased fine motor development of children who are stimulated continuously will be accepted by the five senses which will then be conveyed to the brain. This will trigger the brain to learn, analyze, understand and respond appropriately to the stimulus (Maghfuroh, 2018).

Based on the above background, the researcher is interested in conducting a study entitled "The Effect of Puzzle Educational Game Tools on Fine Motor Development in Pre-school Age Children".

METHOD

This type of research is Pre-experimental research with a one group pre-test post-test design. In this study the population taken was pre-school children at Al- Wahdah Kindergarten aged 5-6 years totaling 45 students.

The research instrument used to measure fine motor skills uses a modified KPSP (Developmental Pre-Screening Questionnaire) sheet which consists of several question items according to age. In this study KPSP was used at the age of 60, 66, and 72 months. Data analysis used was univariate and bivariate analysis. Bivariate analysis using Mc-Nemar test.

RESULTS AND DISCUSSION

1. General Data

Table 4.1 Characteristics of Respondents by Age

No.	Age	Frequency (F)	Percentage (%)
1	60 Months	1	2,2
2	66 Months	13	28,9
3	72 Months	31	68,9
	Total	**45**	**100**

Based on table 4.1 shows that most children's age is 72 months as many as 31 people (68.9%) and a small portion is 60 months old as many as 1 person (2.2%).

Table 4.2 Characteristics of Respondents Based on Gender

No.	Gender	Frequency (F)	Percentage (%)
1	Male	17	37,8
2	Female	28	62,2
	Total	**45**	**100**

Based on table 4.2 shows that the gender of children is mostly female as many as 28 people (62.2%) and a small proportion are male as many as 17 people (37.8%).

Table 4.3 Characteristics of Respondents Based on Parents' Occupation

No.	Occupation	Frequency (F)	Percentage (%)
1	Housewife	19	42,2
2	Private	9	20,0
3	Self-employed	8	17,8
4	Civil Servant	9	20,0
	Total	**45**	**100**

Based on table 4.3 shows that most of the respondents' parents' jobs are housewives as many as 19 people (42.2%) and a small portion are self-employed as many as 8 people (17.8%).

2. Specialized Data

Table 4.4 Frequency Distribution of Fine Motor Development Before Given Puzzle Educational Game Tools

No.	Fine Motor Development	Frequency (F)	Percentage (%)
1	Appropriate	33	73,3
2	Not yet appropriate	12	26,7
	Total	**45**	**100**

Based on Table 4.4 shows that the frequency distribution of fine motor development of pre-school children aged 4-5 years at Al-Wahdah Kindergarten before being given puzzle educational game tools is mostly in the appropriate category, namely 33 people (73.3%), and the category is not appropriate, namely 12 people (26.7%).

Table 4.5 Frequency Distribution of Fine Motor Development after being given Puzzle Educational Game Tools

Based on Table 4.5 shows that the frequency distribution of fine motor development of pre-school children aged 4-5 years at Al-Wahdah Kindergarten after being given the most puzzle educational game tools is in the appropriate category, namely 45 people (100%).

No.	Fine Motor Development	Frequency (F)	Percentage (%)
1	Appropriate	45	100
2	Not yet appropriate	0	0
	Total	**45**	**100**

Table 4.6 Effect of Puzzle Educational Game Tools on Fine Motor Development

Fine Motor Development	Before		After		P Value
	F	%	F	%	
Appropriate	33	73,3	45	100,0	0,000
Not Appropriate	12	26,7	0	0	
Total	**45**	**100**	**45**	**0**	

Based on Table 4.6 shows that before being given puzzle educational game tools to 45 students, 33 students (73.3%) were found in the category of appropriate fine motor development, and 12 students (26.7%) in the category not yet appropriate. After being given a puzzle educational game tool, there was an increase in children's fine motor development in the appropriate category to 45 students (100%) and there was no decrease or in the inappropriate category.

Based on the results of statistical data calculations using the Mc Nemar test, the p-value is 0.000 < α (0.05), it can be concluded that there is an influence on the fine motor development of pre-school children aged 5-6 years at Al-Wahdah Kindergarten before and after being given a puzzle educational game tool.

Table 4.7 Mc Nemar Comparative Analysis

	Post test	
Pret test	**Not Appropriate (-)**	**Appropriate (+)**
Appropriate (+)	0 (A)	33 (B)
Not Appropriate (-)	0 (C)	12 (D)
Total	0	45

Based on Table 4.7, it can be seen that there are 12 students who have not been appropriate to be appropriate. There are no students who were previously appropriate to not appropriate. Changes occur in the gray column. Based on calculations using the McNemar Test Formula:

$$\chi^2 = \frac{(|A - D| - 1)^2}{A + D}$$

$$\chi^2 = \frac{(|0-12|-1)^2}{0+12}$$
$$\chi^2 = \frac{(-12-1)^2}{12}$$
$$\chi^2 = \frac{(-13)^2}{12}$$
$$\chi^2 = \frac{169}{12}$$
$$\chi^2 = 14{,}08$$

The results of the chi-square count are 14.08, so χ^2 count> χ^2 table, namely 14.08> 3.841 in accordance with the provisions, (H_0) is rejected and (H_1) is accepted.

1. **Children's Fine Motor Development Before Being Given Puzzle Educational Game Tools in Pre-school Children at Al-Wahdah Kindergarten Bandung City**

Based on the results of the initial test (pre-test) on the fine motor development of children aged 5-6 years at Al-Wahdah Kindergarten, the results showed that most children showed fine motor development in the appropriate category, namely 33 people (73.3%) and the category was not appropriate as many as 12 people (26.7%). According to Harliansyah (2008), fine motor development is a movement that uses fine muscles or as certain limbs that are influenced by opportunities to learn and practice (Suhartanti et al., 2019). In general, fine motor development in children aged 5-6 years based on the Regulation of the Minister of Education and Culture of the Republic of Indonesia (Permendikbud) No. 137 of 2014, namely, children can draw as desired, imitate shapes, explore using various media and activities, use correct cutlery and stationery, cut paper according to patterns, stick pieces of images appropriately, express themselves through detailed drawing movements.

Factors that can affect fine motor skills are prenatal conditions, genetic factors, environmental conditions, parenting, physical disabilities, postnatal health and nutrition, Intelligence Quotients (IQ), and proper stimulation (Sutri & Zulminiati, 2020). Delayed fine motor development will result in the child's development being inappropriate for their age, and can cause major problems for the child in the future, one of which is that the child becomes anxious, shy, jealous, and dependent on other children. This can cause difficulties for children who will enter elementary school because they cannot socialize well as they play (Saputri, 2021).

According to the researcher's assumption, children who experience inappropriate fine motor development at Al-Wahdah Kindergarten are due to a lack of stimulation and environmental factors where during the Covid-19 pandemic children's learning did not run optimally, distance restrictions and the learning system at home were also factors in this case. In addition, the lack of stimulation is due to limited online learning tools and working parents. In this study, most of the respondents' parents are housewives as many as 19 people (42.2%), where mothers can focus more on paying attention to children at home and stimulating children during learning at home. But besides that, 26 people (57.8%) of parents have jobs either working as civil servants, private employees, and entrepreneurs. The presence of parents who work, tends to provide a short time for children compared to parents who do not work, this will affect the development of children, where the opportunity for parents to provide motivation and stimulation is not maximized. This is certainly a concern for various parties to increase people's knowledge.

2. Fine Motor Development of Children After Being Given Puzzle Educational Game Tools in Pre-school Children at Al-Wahdah Kindergarten Bandung City

Based on the results of the final test (post-test) on the fine motor development of children aged 5-6 years at Al-Wahdah Kindergarten, the results show that most children show fine motor development in the appropriate category, namely 45 people (100.0%). Where 45 people consist of male children as many as 17 people (37.8%) and women as many as 28 people (62.2%). These changes occur due to stimulation or development to improve fine motor skills.

The age of respondents in this study was mostly 72 months old as many as 31 people (68.9%), and the least was 60 months old as many as 1 person (2.2%), the rest were 66 months old as many as 13 people (28.9%). At this age is the pre-school period. The pre-school period is the period in children aged 3 - 6 years, this period is a time of continued growth and development. Increased language, cognitive, and psychosocial development is important during the pre-school period, as well as physical growth.

Pre-school age is said to be a period of play, because every child's time is filled with play, and during this time toys are a very important tool of play activities (Suhartanti et al., 2019). According to Piaget (Fadlillah, 2019), play is a repetitive activity that gives pleasure and satisfaction to a person. In the research conducted by researchers, there was socialization between children in play. This is in line with the social characteristics of pre-school children according to Trianto, namely, children like to play with their peers, individual nature is still strong, quarrels often arise during play, love to get attention, and are in the stage of making the right choices.

Things that need to be considered in playing activities in this study, referring to the theory according to Adriana (2013), namely, requiring extra / additional energy, time, game tools, space to play, knowledge of how to play, playmates, and rewards. One of the games that can be applied is puzzle games, because among the types of game media, puzzles are preferred by children and it is not difficult to find them (Gita & Surtikanti, 2017). Based on the classification of play, puzzles are included in skill play games, this game can improve children's skills, especially gross and fine motor skills. These skills are obtained through repetition of game activities carried out (Andriana, 2013). Puzzles are effective to use, this is supported by research conducted by Maghfuroh (2018), where playing puzzles is effective because, by holding pieces of images and placing them appropriately, it can coordinate small muscles in the hands. So that children no longer have difficulties, and the coordination of the eyes and hands of children can work well. Meanwhile, according to Yuniati's research (2018), puzzles are effective to use. Besides being easy to obtain, this game is familiar to children, and is often used for pre-school children. In addition, puzzles are a form of game that can hone children's thinking skills, remember, and understand concepts, thus children become more creative.

According to research by Fembi & Pora (2020), playing puzzles is also effective because without realizing it, children will actively learn to use their fingers to arrange the right picture. In addition, by playing puzzles, children

learn about the concepts of shape, color, size, and quantity, this can train eye and hand coordination, and train the muscles of the fingers well so that it can stimulate children's fine motor skills. The characteristics of the puzzle, namely, must be appropriate for their age, help stimulate child development, be interesting and varied, have many uses, are safe to use, simple shapes, and are involved in children's activities (Fadlillah, 2019).

According to Fadlillah (2017), puzzles vary in shape, ranging from animal shapes, numbers, geometry, fruit, and limbs. According to Abdulloh (in Nurjanah & Anjani, 2014), there are benefits in puzzle games that can improve cognitive skills, fine motor skills, reasoning skills, memory, and concentration, increase knowledge, and social skills.

According to the researcher's assumption, the increase in fine motor development in children at Al-Wahdah Kindergarten is due to the influence of the puzzle educational tool game that is stimulated continuously. Providing continuous stimulation can improve fine motor skills in pre-school children, because when stimulated the coordination of the small muscles in the hand can be trained, the child can hold the pieces of the picture and place it well and there is no difficulty. Increased fine motor development of children who are stimulated continuously will be accepted by the five senses which will then be conveyed to the brain. This will trigger the brain to learn, analyze, understand and give the right response to the stimulus (Maghfuroh, 2018).

3. The Effect of Puzzle Educational Game Tools on Fine Motor Development in Pre-school Children at Al-Wahdah Kindergarten, Bandung City.

The level of fine motor development before being given puzzle play therapy to 45 students, obtained 33 students (73.3%) in the category of appropriate fine motor development, and 12 students (26.7%) in the category not yet appropriate. After being given puzzle play therapy, there was an increase in children's fine motor development in the appropriate category to 45 students (100%) and there was no decrease or in the inappropriate category.

This change in fine motor development is due to the stimulation of puzzle games given repeatedly by researchers 6 times to improve children's fine motor skills. Children's fine motor development is very dependent on how much stimulation is given. This is because the child's fine muscles have not yet reached maturity, with sufficient exercise, it will help children control muscle movements in achieving perfect motor conditions, characterized by stable fine movements (Sutri & Zulminiati, 2020).

Based on the results of statistical data calculations using the Mc Nemar test, the p-value is 0.000 < α (0.05), it can be concluded that there is an influence on the fine motor development of pre-school children aged 5-6 years at Al-Wahdah Kindergarten before and after being given a puzzle educational game tool. Based on calculations using the McNemar Test formula, the chi-square count is 14.08, then χ^2 count> χ^2 table, namely 14.08> 3.841 in accordance with the provisions, then (H_0) is rejected and (H_1) is accepted. Where (H_1) shows that, there is an effect of puzzle educational game tools on fine motor development in pre-school children at Al-Wahdah Kindergarten.

The results of this study are the same as the results of research conducted by Maghfuroh (2018), which shows the results, most of the development of preschool children before being given the puzzle play method is normal (59%). And almost entirely the development of preschool children after being given the method of playing puzzles is normal (88.4%). Based on the results of processing with SPSS, the Z value is -3.464. Because the test is 2-sided, the probability (asymp. sig.) is 0.001. The results of Z count away from the critical number Z ± 1.96, then (H_1) is accepted, in the sense that there is an effect of the puzzle play method on the fine motor development of pre-school children at Surya Baru Kindergarten Plosowahyu Lamongan.

According to the results of Yuniati's research (2018), there is an increase in the average fine motor development of children who are given puzzle-type educational games, from 3.55 to 1.88. And according to the results of research by Fembi & Pora (2020), of the 30 respondents showed the results (p-value 0.000 < α = 0.05), then (H_0) was rejected (H_1) was accepted. This shows that there is an effect of puzzle media educational games in improving the fine motor development of pre-school children. This is also supported by the theory put forward by Fadlillah (2017), where puzzles are a form of modern game played by arranging pieces of images together, so that they match the original image or as desired.

There are many kinds of puzzles ranging from the shape of stars, bodies, animals, and trees. This game tool can be used for children aged 2-8 years, the only difference is the level of difficulty. This is also supported by Ananda's research (2019), where playing puzzles is a game that can train children's fine motor skills, and train the muscles of the fingers by involving eye and hand coordination. In addition, puzzle games are simple games that can be disassembled, and require accuracy. Children can also recognize shapes, sizes, colors, and quantities.

According to the researcher's assumption, from some of the above studies it can be concluded that puzzles are one of the effective games to improve children's fine motor development. Where by disassembling the puzzle, without realizing the coordination between the eyes and hands of the child works, and with activities that are carried out repeatedly can hone their fine motor skills.

CONCLUSIONS

Based on the research that has been done. Researchers can conclude as follows:

1. Before being treated with puzzle educational game tools, fine motor development in pre-school children aged 5-6 years at Al-Wahdah Kindergarten was in the appropriate category, namely 33 people (73.3%) and the category was not appropriate as many as 12 people (26.7%). It can be concluded that students at Al-Wahdah Kindergarten have good fine motor development. However, it is still necessary to hold activities that can hone fine motor development.

2. After being treated with puzzle educational game tools, fine motor development in pre-school children aged 5-6 years at Al-Wahdah Kindergarten is in the appropriate category, namely 45 people (100.0%). It can be concluded that the provision of puzzle play therapy can improve fine motor development in children.

3. Based on the results of statistical data calculations using the Mc Nemar test, the p-value is 0.000 < α (0.05), while based on calculations using the McNemar Test formula, the chi-square count is 14.08, so the χ^2 count> χ^2 table is 14.08> 3.841. It can be concluded that (H_1) is accepted, where (H_1) shows that there is an effect of puzzle educational game tools on fine motor development in pre-school children at Al-Wahdah Kindergarten.

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