



The Association Physical Activity (3-5 Years) to Gross And Fine Motor Ability of Preschool Children's

Sofio Oulvan¹ Dona Sandy Yudasmara^{2*}  Zihan Novita Sari³ ME Winano⁴ Nurrul Riyad Fadhli⁵ Imam Hariadi⁶

^{1,2,3,4} Department of Physical Education, Faculty of Sport Science, Universitas Negeri Malang

^{5,6} Department of Sport Coaching Education, Faculty of Sport Science, Universitas Negeri Malang

dona.sandy.fik@um.ac.id

Abstract. The purpose of this study is to identify physical activity, gross motor, fine motor, and the link between physical activity and gross motor and fine motor in preschool children (3-5 years). The survey method, quantitative approach, and correlational approach are all used in this study. The sample for this study consisted of 28 students from Group A at the TKN Pembina School in the Batu District. The Global Physical Activity Questionnaire (GPAQ) and the Gross Motor Development Second Edition Test (TGMD-2) were the tools employed in this study. In order to determine the lowest, maximum, and mean values using IBM SPSS, descriptive statistics are employed as a data analysis technique. To measure physical activity and motor skills, the fine motor test is analyzed using the Spearman correlation test and bivariate correlation. The findings of this study show that preschoolers at TKN Pembina in the Batu District achieved test results that were in compliance with the WHO guidelines for moderate to vigorous physical activity. According to the examination of the data, there is a substantial correlation between physical activity and gross motor skills, with a significance value. $0.004 < 0.05$. While this is going on, the Spearman correlation test reveals that there is no correlation between physical activity and fine motor abilities in preschoolers at TKN Pembina, Batu District, as evidenced by the Significance value of $-0.283 > 0.05$.

Keywords: physical activity, preschool children, gross motor, fine motor

1 Introduction

Children of preschool age experience tremendous growth and development. According to age, the process of growth and development is broken down into different stages. Children in preschool are those between the ages of 3-5 (1). Preschool is the time during which all areas of development, from stimulation to all aspects of development, have a significant influence in the development of the next aspect. This time period is also known as the "golden age" or (golden age). 80% of children in preschool have reached a certain level of cognitive development. (2). The first four years' developments were just as significant as the subsequent 14 years' developments (3). Additionally, in order to enhance growth, stimulation is provided to all elements of a child's development when they are at their most vulnerable (4). The World Health Organization (WHO) reports that, worldwide, between 5 and 25% of children under the age of three experience moderate brain abnormalities, such as growth and development issues. In 2008, there were 19,971,366 persons residing in Indonesia's various regions; of them,

© The Author(s) 2023

T. D. Tama et al. (eds.), *Proceedings of the 5th International Scientific Meeting on Public Health and Sports (ISMOPHS 2023)*, Advances in Health Sciences Research 70, <https://doi.org/10.2991/978-94-6463-320-7>

https://doi.org/10.2991/978-94-6463-320-7_12

up to 27% had developmental abnormalities, and between 4% and 5% had speech and language issues. It is believed that 5-10% of children under the age of five exhibit general delays, according to the Association of Indonesian Pediatricians' (IDAI) Commitment to Improving the Health of Indonesian Children, which was published by the Pediatric Society (5).

Basic early childhood movement skills locomotor motions were obtained based on the outcomes of earlier studies employing assessments given to kindergarten students aged 4-6 years. The results revealed that 14 children, or 17-20 with a percentage of 28.00 percent, achieved very high scores. The majority of the kids score above average in their academics. These results show that children have very good locomotor skills. Based on the tests that were administered, it was discovered that 22 children with a score of 44.00% were on a high score—exactly 15–16—for the development of children's manipulative skills. The majority of kindergarten students in Surakarta City have grades above the national average. These outcomes show how adept the child is at controlling things. It was discovered that 25 kids, or 50.00%, had very high scores for gross motor skills, while some other kids had high or more typical scores. These findings show that children's gross motor abilities are generally quite good (6).

The child's motor motions can be used to gauge the child's physical condition and rate of growth. Gross motor abilities are the capacity to direct movement in response to varied internal and external pressures and to move different body parts involving substantial muscle activity on command (7). Children's motions, such as walking, running, jumping, hitting, kicking, and so forth, stimulate the growth of their muscles. The child's motor development will advance if they get the chance to play with motions of their limbs that are controlled by brain organs (8). The development of gross motor abilities is crucial during the preschool and early school years. Large muscles expressly restrict the ability to perform simple movements (6). However, the prevalence of developmental issues in children with gross motor delays ranges from 12 to 16% in the United States, 24% in Thailand, 22% in Armenia, and 13 to 18% in Indonesia (9). There are still many children who experience motor development disorders as many as 3 million people and the prevalence is still high at 27.5%. In contrast, around 16% of Indonesia's population is said to suffer from developmental disorders such as intelligence disorders, hearing loss, and motor disorders due to brain development disorders (10). There was an 8.83% delay in gross motor development between the ages of 3 and 5 years (49%) according to earlier studies (11). Children who don't get enough stimulation from their parents, carers, or toys may develop motor deficits. Additionally, kids rarely have the chance to speak, play socially and verbally, or explore their body when they are babies (12). Preschoolers also need to work on their fine motor abilities.

Fine motor abilities are the capacity to precisely coordinate a number of small muscles (13). Fine motor abilities are the capacity of youngsters to operate with their small muscles, such as writing, squeezing, gripping, sketching, sticking, constructing blocks, and inserting marbles (8). The capacity to control or manage the use of eye and hand motions in a proficient, accurate, and adaptable manner has also been described as having well-coordinated talents (6). WHO (2010) estimates that between 5% and 25% of preschoolers experience problems of fine motor development, which include delays in fine motor development, according to the Ministry of Health of the Republic of Indonesia in 2012. According to estimates, 3-5% of preschool-aged children have motor problems, and up to 60% of these cases are observed to arise spontaneously in children

under the age of five. According to information from the Indonesian Ministry of Health, 16% of children in the nation have developmental issues, such as hearing loss, poor intelligence, delays in language development, and problems with their fine and gross motor skills. Data from the East Java Provincial Hospital show that 133 kids have issues with their fine and gross motor skills (14).

According to WHO recommendations, children ages 3-5 should engage in at least 180 minutes of vigorous physical activity every week (15). According to earlier studies, 88% of the time children are in child care, there are few opportunities for active play, and more than 70% of the time there is little movement. This is based on data that the majority of preschool children do not achieve the required level of daily physical exercise (16). Considerations for the role of parents and teachers in knowing the level of physical condition and motor abilities of children must take into account the rising cases of growth and development delays in the preschool years as well as the significance of physical activity and early childhood motor skills. The data gathered from this research can be utilized as evaluation material for parents, teachers, and other connected institutions. In this case, the research will examine the association between physical activity and gross and fine motor skills in preschool children (3-5 years). as a supportive resource to assess children's development, growth, and abilities.

2 Method

The design of this study uses a survey method with a quantitative approach. The sample in this study was Group A students, totaling 28 children who were at the TKN Pembina School, Batu District. This research has received approval from teachers and parents. Furthermore, data collection in this study has fulfilled the ethical test issued by the Health Research Commission of the Malang Ministry of Health Polytechnic with Registration No.: 618/KEPK-POLKESMA/2022. In this research using the Global Physical Activity Questionnaire (GPAQ), Test Gross Motor Development Second Edition (TGMD-2), cutting and pasting according to a pattern. The technique used for data analysis is descriptive statistics to find out the minimum, maximum, and mean values using IBM SPSS by looking for descriptive statistics. To analyze the fine motor test using the Spearman correlation test and bivariate correlation is used to determine physical activity and motor skills.

3 Results

According to the table and figure below, the results of this study used the GPAQ (Global Physical Activity Questionnaire) test as an instrument to measure physical activity in TKN Pembina TKN children in Batu District.

Table 1. Results of Minimum Maximum Mean Value of Physical Activity

| Descriptive Statistics | | | | | |
|-------------------------------|----|------|------|---------|----------|
| | N | Min | Max | Mean | SD |
| Physical Activity | 28 | 1700 | 9970 | 5880.68 | 2145.694 |
| Valid N (listwise) | 28 | | | | |

Based on the information in Results Table 1, scores with a reasonably wide range are generated, with a minimum and maximum value range of 1700-9970 and an average value of 2145.694. Based on these findings, it can be concluded that children in the TKN Pembina Batu District engage in high levels of physical exercise.

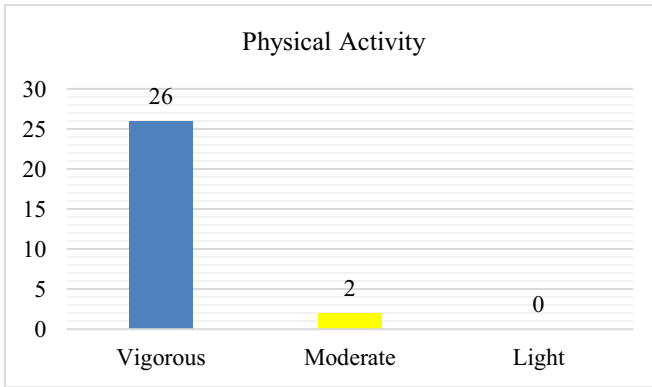


Figure 1. Percentage of Physical Activity Results

According to Figure 3.1's findings, 26 TKN Pembina TKN preschoolers in the Batu District met the requirements for high physical activity, whereas just two kids met the requirements for moderate physical activity. All kids fall into the category of being very active. In the meantime, the results of the locomotor subtest, which consists of 6 tests, and the object control subtest, which consists of 6 tests, were used to determine the TGMD-2 (Gross Motor Development-2 Test) test as a gross motor instrument for pre-school aged 3-5 years at TKN Pembina, Batu District. The table and % of category diagrams in the following provide information about the TGMD-2 test results.

Table 2. Results of the Minimum Maximum Mean Gross Motor Value

| Descriptive Statistics | | | | | |
|-------------------------------|----|-----|-----|--------|--------|
| | N | Min | Max | Mean | SD |
| Gross Motor | 28 | 70 | 130 | 113.29 | 12.947 |
| Valid N (listwise) | 28 | | | | |

Table 2 shows that the results for the minimum and maximum gross motor scores are not significantly different from those for the range of 70-130. In the TKN Pembina TKN Batu District, the average score for gross motor skills meets the above-average

standard at 113.29. Diagram 2 demonstrates that there is still 1 child whose value is below average..

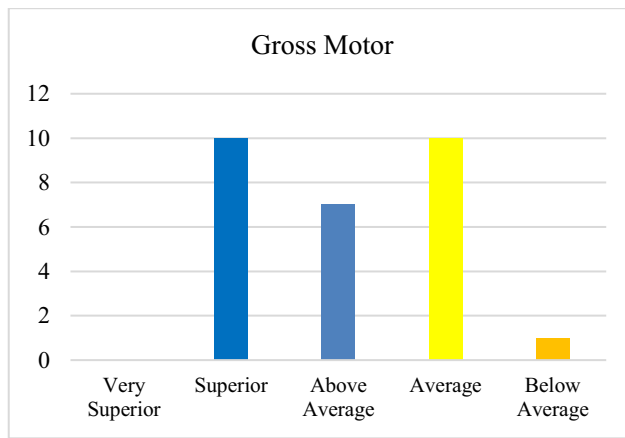


Figure 2. Gross motor percentage results

Ten children fall into the Superior category, seven into the Above Average category, ten into the Average category, and one into the Below Average category, according to Figure 3.2. It can be argued that the TKN Pembina Batu District has gross motor skill levels that are above average.

Additionally, this study used the test of cutting and pasting pictures according to patterns and in IBM SPSS analysis using the Spearman correlation test, which can be known according to the table and diagram below, to determine the results of fine motor skills in TKN Pembina TKN pre-school children in Batu sub-district.

Table 3. Results of Minimum Maximum Mean Fine Motor Values

| Descriptive Statistics | | | | | |
|-------------------------------|----|-----|-----|-------|-------|
| | N | Min | Max | Mean | SD |
| Fine Motor | 28 | 10 | 16 | 14.18 | 1.588 |
| Valid N (listwise) | 28 | | | | |

Table 3 shows that scores are attained between 10 and 16, with an average of 14.18. These findings indicate that TKN Pembina Batu District residents have very good fine motor abilities.

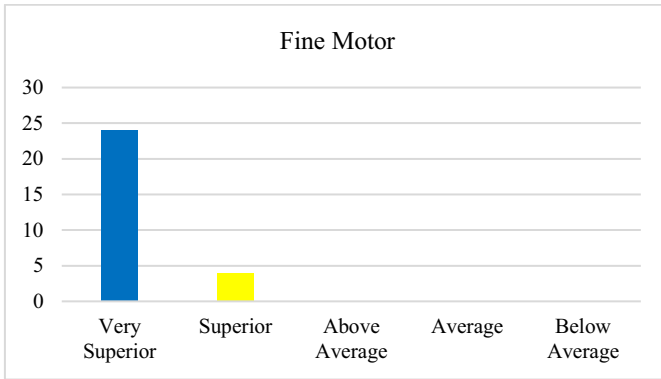


Figure 3. Fine Motor Percentage Results

Figure 3 shows that up to 24 kids go into the "very good" category and 4 kids fall into the "good" category. Therefore, it can be said that youngsters in the TKN Pembina Batu District have very strong fine motor skills.

Table 4. Correlation Results of Physical Activity on Gross Motor

| SPSS Correlation Results | | Physical Activity | Gross Motor |
|--------------------------|-------------------------|-------------------|-------------|
| Physical Activity | Coefficient correlation | 1 | .530** |
| | Sig. (2-tailed) | | .004 |
| | N | 28 | 28 |
| Gross Motor | Coefficient correlation | .530** | 1 |
| | Sig. (2-tailed) | .004 | |
| | N | 28 | 28 |

There is a substantial association, as can be shown from table 4, where the findings were obtained with a significance value of 0.004 0.05. Based on the Pearson correlation test results in the table above, it can be concluded that there is a significant correlation between the two variables, namely the impact of physical activity on gross motor skills in preschoolers at TKN Pembina, Batu District. The significance value for this correlation is 0.004 0.05.

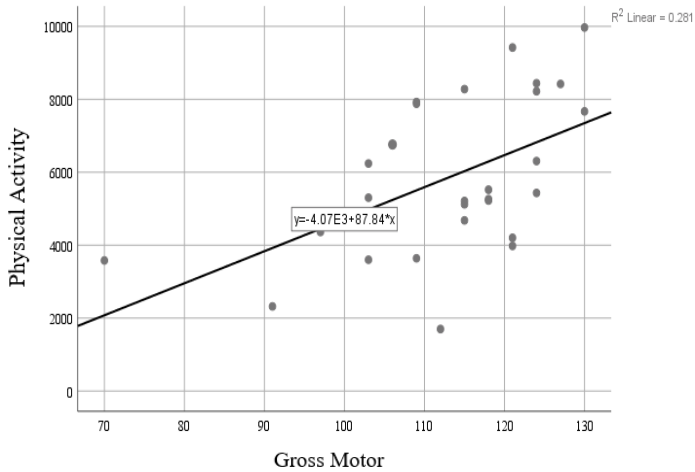


Figure 4. Graph Results of Correlation of Physical Activity with Gross Motor

According to Figure 3.4, the results of the correlation graph between physical activity and gross motor abilities above, there is a correlation between physical activity and gross motor skills if the lines on the graph are increasingly diagonal and sharp.

Table 5. Correlation Results of Physical Activity with Fine Motor

| SPSS Correlation Results | | Physical Ac- tivity | Fine Motor | |
|--------------------------|--------------|-------------------------|------------|-------|
| Spearman's rho | Physical Ac- | Coefficient correlation | 1.000 | -.210 |
| | | Sig. (2-tailed) | . | .283 |
| | | N | 28 | 28 |
| Fine Motor | | Coefficient correlation | -.210 | 1.000 |
| | | Sig. (2-tailed) | .283 | . |
| | | N | 28 | 28 |

As can be seen from table 5, there is no significant association between the results, which have a significance value of $-0.283 > 0.05$. Based on the Spearman correlation test results in the table above, it can be concluded that there is no significant correlation between the two variables, namely physical activity on fine motor skills in preschoolers at TKN Pembina, Batu District. The significance value for the test is $0.0283 > 0.05$.

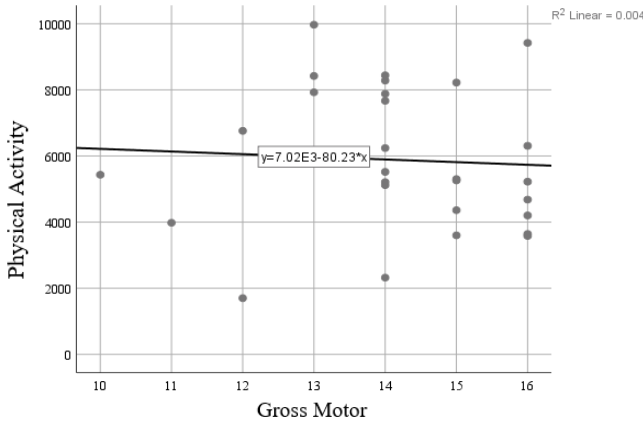


Figure 5. Graph Results of the Correlation of Physical Activity with Fine Motor

If the line on the graph is sloping, it indicates that there is no association between the two variables, namely physical activity on fine motor abilities, according to Figure 3.5, the findings of the correlation graph of physical activity and fine motor skills above.

4 Discussion

The results of this study revealed that preschoolers at TKN Pembina in the Batu City achieved scores that were in compliance with the WHO's guidelines for moderate to vigorous physical activity (17). Preschoolers (ages 3-5) should engage in physical activity for an additional hour per day (three times per week), which should include strengthening their bones and muscles, according to research conducted by the US Department of Health and Human Services. This will aid in their growth and development. To improve physical health, spend the majority of the 60 minutes engaging in moderate-to vigorous-intensity physical activity (18). Additionally, regular, increased physical exercise can support and enhance the health of muscles and bones as well as lower the risk of obesity (19).

International studies have revealed that the majority of kids and teenagers fall short of the recommended levels of physical activity. A recent analysis of children and adolescents' physical activity in 38 countries across all continents revealed that, on average, 60% of kids and teens globally do not fulfill the guidelines for physical exercise (20). Only a third or less of children and adolescents in about half of the countries say they reach the recommended levels of physical activity, and some even report lower levels as an issue with insufficient physical activity during childhood throughout Europe (21). However, according to some studies, the intensity of each physical exercise varies depending on the activity and the time of day. Weekend physical activity for control object skills is moderate to high compared to weekend physical activity for locomotor skills (22). Due to inactivity, obesity kills more people than underweight and malnutrition, yet the majority of people in the world live in large countries where underweight and obesity are less deadly (23). Having less physical activity in preschoolers will have a 7.66 times greater likelihood of being overweight or obese (24).

The results of this study differ from those of other studies due to a variety of reasons, including motor deficits among children who have difficulty engaging in physical activity. Children's ability to maintain an appropriate amount of exercise can be greatly influenced by their gross motor skills (25). The development of children's motor skills will be impacted by low levels of physical activity.

Based on previous research using the TGMD-2 instrument, which obtained results for locomotor motion and control objects in preschool children (3-5 years), included in the average category – moderate average, which had low gross motor results in preschool children who were in research in one of the developed countries (26). Similar studies have also been carried out using the TGMD-2 instrument, the results show that most children fall into the average category (27). This study is consistent with previous research which found that gross motor development of preschoolers in most subjects was average in overall skill ratings (28). The results of several studies indicate that children's gross motor skills fall into two categories: Very Good (71.44%), and Good (9.52%). Enough has a percentage of 4.76%, whereas Poor and Very Poor both have ages of 4.76% and 9.52%, respectively. According to data analysis, children's gross motor development is rated as being in very good condition (29). The necessity for PAUD educators to provide children with positive coaching from a young age so that they can develop gross motor skills should be a concern given the significance of gross motor abilities for children ages 3-5. Crank games and other conventional game techniques can be used to this end. Additionally, adjusting game media, dividing up groups of kids, and when playing can be done to improve gross motor abilities in order to use playtime as a way to enhance those skills in kids. (30). So that the game model is able to make children achieve the achieved motor development.

The development of children in Indonesia is categorized as quite low when viewed from their fine motor skills when compared to European countries Eropa (31). The Early Childhood Education study found that the majority of kids, regardless of age, still struggle with fine motor skills. Children are still unable to put together 8 blocks at the age of 36. Between the ages of 48 and 60 months, some kids are still unable to appropriately draw circles and crosses. Additionally, some infants between the ages of 60 and 72 months are still incapable of using both hands to grab a little ball (32). In addition, fine motor skills can be in the form of exercises such as cutting with scissors, shading, drawing with pencils and pastels (33). As a result, both parents and teachers have a responsibility to comprehend and focus on how children develop their fine motor abilities both at home and in the classroom. Results from earlier studies indicate that a variety of physical activities can have an impact on a person's motor skills. where there is a considerable association between play activities and students' motor skills. When compared to female students, one of the male students' motor skills that contributes most to success is the length of playing activities. However, the play activities that female students engage in exhibit a substantial link, and the influence of play on motor skills is less significant than that of male students' accomplishment (34). Other studies also state that there is a significant correlation between physical activity on gross motor skills of children aged 3-5 years (35). This study is also supported by studies that have been conducted, obtained data that there is a correlation between physical activity and fine motor skills (36). Preschoolers with low motor skills or those who are less active than preschoolers with high motor skills are less active, according to the findings of prior study.

The health of children in Indonesia depends greatly on preventing obesity and understanding the relationship between motor skills and physical activity. Parents should keep an eye on their kids' motor abilities and stress that they take part in activities that help them perform better (37).

The findings of this study are in contrast to other studies, where the data indicated a correlation between the two variables, namely physical activity and preschoolers' fine motor skills. (38). There was no significant correlation between physical activity and fine motor skills in preschoolers, according to other studies that were conducted. The Spearman correlation test results showed that there was no correlation between physical activity and fine motor skills in either the dominant or non-dominant hands (37). The findings of gamma correlation calculations, which are also corroborated by other studies, indicate that there is no meaningful relationship between physical exercise and motor skills (39). According to earlier research, instructors and other educational professionals should change how students learn or provide learning alternatives for kids who struggle with fine motor abilities so they can develop those skills while exercising them. (40). The study made no mention of the connection between a lack of fine motor skills and exercise or how it may be overcome by it. Therefore, it is advised that parents and instructors play a more active part in implementing physical education lessons for preschoolers and paying close attention to the children's motor development.

Children's participation in activities at school is particularly crucial for developing their motor abilities. Because developing motor skills can subsequently aid children's academic ability, teachers must give students tasks that focus on their motor skills for 30 to 60 percent of the school day (41). Based on the study's findings, it was evident that there was no connection between physical activity and fine motor skills, which made sense given that children should engage in high levels of physical activity. The achievement of physical activity, however, is an activity that frequently works huge muscles, ranging from activities like running, jumping, cycling, and playing ball to activities that take quite a while. Even though fine motor achievements in TKN Pembina Batu District have good fine motor skills, playing activities are more prevalent than activities that require fine motor skills in school. These activities include cutting and sticking in patterns. This is further impacted by the fact that the activities they engage in at home are inversely correlated to those that need fine motor abilities, making it possible to observe the link between physical activity and fine motor skills.

5 Conclusion

The findings of this study show that preschoolers at TKN Pembina in the Batu District achieved test results that were in compliance with the WHO guidelines for moderate to vigorous physical activity. based on research demonstrating a strong connection between physical activity and gross motor abilities. The Spearman correlation test, on the other hand, demonstrates that there is no connection between physical exercise and fine motor skills. The findings of this study, however, are in contrast to other studies, where the data indicated a connection between the two variables, namely physical activity and fine motor skills in preschoolers. Previous studies demonstrating that there is no discernible connection between physical exercise and motor skills lend support to our study. Based on the study's findings, it was determined that there was no correlation

between physical activity and fine motor abilities. This was due to the fact that children should engage in high levels of physical activity. The achievement of physical activity, however, is an activity that frequently works huge muscles, ranging from activities like running, jumping, cycling, and playing ball to activities that take quite a while. Even though fine motor achievements in TKN Pembina Batu District have good fine motor skills, playing activities are more prevalent than activities that require fine motor skills in school. These activities include cutting and sticking in patterns.

References

1. Hockenberry MJ, Wilson D. Wong's Nursing Care of Infants and Children - E-Book. Elsevier Health Sciences; 2018. 1427 p.
2. Azizah N, Darmawansyih, Fauziah H. Relationship between Nutritional Status and Development of Preschool Aged Children in the Operational Area of Puskesmas Batua Raya. 1 [Internet]. 2021 Apr 29 [cited 2022 Aug 9];3(1):23–9. Available from: <http://greenmedicaljournal.umi.ac.id/index.php/gmj/article/view/76>
3. Uce, L. (n.d.). Masa Efektif Merancang Kualitas Anak. 16.
4. Ph, L., Armitasari, D., & Susanti, Y. (2018). Pengaruh Stimulasi Motorik Halus Terhadap Tahap Perkembangan Psikososial Anak Usia Pra Sekolah. *Jurnal Pendidikan Keperawatan Indonesia*, 4. <https://doi.org/10.17509/jpki.v4i1.12340>
5. Septiani, R., Widyaningsih, S., & Iqomh, M. K. B. (2019). Tingkat Perkembangan Anak Pra Sekolah Usia 3-5 Tahun Yang Mengikuti dan Tidak Mengikuti Pendidikan Anak Usia Dini (PAUD). *Jurnal Keperawatan Jiwa*, 4(2), Article 2. <https://doi.org/10.26714/jkj.4.2.2016.114-125>
6. Hadi, H., Royana, I. F., & Setyawan, D. A. (2017). Keterampilan Gerak Dasar Anak Usia Dini Pada Taman Kanak-Kanak (TK) di Kota Surakarta. *Jurnal Ilmiah Penjas (Penelitian, Pendidikan Dan Pengajaran)*, 3(2), Article 2. <http://ejournal.utp.ac.id/index.php/JIP/article/view/588>
7. Aries Chandra SKN, Ade Susanty SK, Muhammad Ibrohim SK. Upaya Peran Keluarga Untuk Stimulasi Perkembangan Motorik Kasar Pada Anak Toddler [Internet]. Universitas Muhammadiyah Surabaya; 2022 [cited 2022 Aug 13]. Available from: <http://repository.um-surabaya.ac.id/5939/>
8. Maulana, K., & Nurunnisa, E. C. (2020). Peningkatan Kemampuan Motorik Kasar Anak Melalui Permainan Tradisional Sunda Manda. *Tarbiyat Al-Aulad: Jurnal Pendidikan Islam Anak Usia Dini*, 3(2), Article 2. <https://riset-iaid.net/index.php/TA/article/view/411>
9. Ananditha, A. C. (2017). Faktor-Faktor Yang Berhubungan Dengan Perkembangan Motorik Kasar Pada Anak Toddler. *Jurnal Keperawatan Muhammadiyah*, 2(1), Article 1. https://doi.org/10/Peer_Review_Motorik_Kasar.pdf
10. Maharani SA, Setiawan I. Hubungan Pemberian Asi Eksklusif, Jenis Kelamin dan Status Gizi terhadap Perkembangan Motorik Kasar Pada Anak Usia 3-5 tahun di Kelurahan Makam Haji. 2018;

11. Hasanah, N., & Ansori, M. N. (2014). Hubungan Tingkat Pengetahuan Ibu Dengan Perkembangan Motorik Kasar Anak Usia (3—5 TH). *Jurnal Midpro*, 6(2), Article 2. <https://doi.org/10.30736/midpro.v6i2.42>
12. Rismawan, M., Negara, K., & Kasmini, K. P. (2018). Deteksi Dini Keterlambatan Perkembangan Umum (KPU) Pada Siswa Paud di Kota Denpasar. *Jurnal Riset Kesehatan Nasional*, 2(1), Article 1. <https://doi.org/10.37294/jrkn.v2i1.100>
13. Soetjiningsih D. Tumbuh kembang anak. Jakarta: Egc. 2013;
14. Saurina N. Aplikasi Deteksi Dini Tumbuh Kembang Anak Usia Nol Hingga Enam Tahun Berbasis Android. *Jurnal Buana Informatika*. 2016;7(1).
15. World Health Organization. Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. World Health Organization; 2019.
16. Tandon PS, Saelens BE, Christakis DA. Active play opportunities at child care. *Pediatrics*. 2015;135(6):e1425–31.
17. World Health Organization. WHO guidelines on physical activity and sedentary behaviour: web annex: evidence profiles. 2020;
18. Hosker DK, Elkins RM, Potter MP. Promoting mental health and wellness in youth through physical activity, nutrition, and sleep. *Child and Adolescent Psychiatric Clinics*. 2019;28(2):171–93.
19. Kosasi L, Oenzil F, Yanis A. Hubungan Aktivitas Fisik terhadap Kadar Hemoglobin pada Mahasiswa Anggota UKM Pandekar Universitas Andalas. *Jurnal Kesehatan Andalas*. 2014;3(2).
20. Tremblay MS, Barnes JD, González SA, Katzmarzyk PT, Onywera VO, Reilly JJ, et al. Global matrix 2.0: report card grades on the physical activity of children and youth comparing 38 countries. *Journal of physical activity and health*. 2016;13(s2):S343–66.
21. Kokko S, Martin L, Geidne S, Van Hoyer A, Lane A, Meganck J, et al. Does sports club participation contribute to physical activity among children and adolescents? A comparison across six European countries. *Scandinavian journal of public health*. 2019;47(8):851–8.
22. Fowweather L, Knowles Z, Ridgers ND, O'Dwyer MV, Foulkes JD, Stratton G. Fundamental movement skills in relation to weekday and weekend physical activity in preschool children. *Journal of science and medicine in sport*. 2015;18(6):691–6.
23. Frayon S, Wattelez G, Paufigue E, Nedjar-Guerre A, Serra-Mallol C, Galy O. Overweight in the pluri-ethnic adolescent population of New Caledonia: Dietary patterns, sleep duration and screen time. *The Lancet Regional Health-Western Pacific*. 2020;2:100025.
24. Rahmah ND, Ardianira M, Dieny FF. Pola Asuh Aktivitas Fisik Terhadap Risiko Kejadian Gizi Lebih Pada Anak Prasekolah Di Kecamatan Ngesrep Dan Tembalang, Semarang. *Gizi Indonesia*. 2019;42(1):1–10.
25. Laukkanen A, Pesola A, Havu M, Sääkslahti A, Finni T. Relationship between habitual physical activity and gross motor skills is multifaceted in 5-to 8-year-old children. *Scandinavian journal of medicine & science in sports*. 2014;24(2):e102–10.

26. Kit BK, Akinbami LJ, Isfahani NS, Ulrich DA. Gross motor development in children aged 3–5 years, United States 2012. *Maternal and Child Health Journal*. 2017;21:1573–80.
27. Malika LD, Hariadi I, Fadhli NR, Roesdiyanto R. Keterampilan Motorik Kasar Anak Usia Prasekolah di TK Muslimat NU Dewi Masithoh 01 Kalipare Kabupaten Malang. *Sport Science and Health [Internet]*. 2022 Nov 30 [cited 2023 Mar 12];4(11):964–79. Available from: <http://journal3.um.ac.id/index.php/fik/article/view/2777>
28. Aye T, Oo KS, Khin MT, Kuramoto-Ahuja T, Maruyama H. Gross motor skill development of 5-year-old Kindergarten children in Myanmar. *Journal of physical therapy science*. 2017;29(10):1772–8.
29. Rachman HA, Anggita GM. The Development Pattern of Early Age Children's Motor Skills. *ACTIVE: Journal of Physical Education, Sport, Health and Recreation [Internet]*. 2018 Jun 30 [cited 2023 Mar 12];7(2):104–12. Available from: <https://journal.unnes.ac.id/sju/index.php/peshr/article/view/23652>
30. Nasirun M. Aplikasi Gerak Lokomotor Sebagai Media Untuk Meningkatkan Kemampuan Motorik Kasar Pada Kelompok B1. *Jurnal Ilmiah Potensia*. 2020;5(1):16–24.
31. Taju, C. M., Ismanto, A. Y., & Babakal, A. (2015). Hubungan Status Perkerjaan Ibu Dengan Perkembangan Motorik Halus dan Motorik Kasar Anak Usia Prasekolah di PAUD Gmim Bukit Hermon dan TK Idhata Kecamatan Malalayang Kota Manado. 3, 8.
32. Yestiari NLA, Raga G, Ujianti PR, Psi S. Penerapan Metode Pemberian Tugas Berbantuan Media Gambar Melalui Kegiatan Mencocok Untuk Meningkatkan Motorik Halus Di TK. *Jurnal Pendidikan Anak Usia Dini Undiksha*. 2014;2(1).
33. Bhatia P, Davis A, Shamas-Brandt E. Educational Gymnastics: The Effectiveness of Montessori Practical Life Activities in Developing Fine Motor Skills in Kindergartners. *Early Education and Development [Internet]*. 2015 May 19 [cited 2023 Mar 12];26(4):594–607. Available from: <https://doi.org/10.1080/10409289.2015.995454>
34. Leonardo A, Komaini A. Hubungan Aktivitas Fisik Terhadap Keterampilan Motorik. *JURNAL STAMINA [Internet]*. 2021 Mar 31 [cited 2023 Mar 10];4(3):135–44. Available from: <http://stamina.pjj.unp.ac.id/index.php/JST/article/view/764>
35. Vikana FA. Hubungan aktivitas fisik dengan tingkat keterampilan motorik kasar anak usia 3-5 tahun pada siswa Paud Al-Hasan di Kabupaten Kediri / Faula Ayu Vikana [Internet] [diploma]. Universitas Negeri Malang; 2022 [cited 2023 Mar 12]. Available from: <http://repository.um.ac.id/270307/>
36. Ansori AF. Hubungan Pola Makan dan Aktivitas Fisik dengan Perkembangan Motorik Kasar pada Anak Kelompok A di PAUD Percontohan Muslimat Hajjah Maryam Kota Batu / Ahmad Fajrul Ansori [Internet] [diploma]. Universitas Negeri Malang; 2018 [cited 2023 Mar 12]. Available from: <http://repository.um.ac.id/99409/>
37. Rahayu NI, Monica AD, Jajat J, Sultoni K. Hubungan physical activity dengan fine motor skills pada anak usia 4 tahun. *Jurnal Keolahragaan [Internet]*. 2021 Feb

- 12 [cited 2023 Mar 10];9(1):118–27. Available from: <https://journal.uny.ac.id/index.php/jolahraga/article/view/34156>
38. Wijianto, W., & Saktiyarini, K. (2022). *Relationship Of Physical Activity With Fine Motor Skill in 3-4 Years Old Children*. *Gaster*, 20(2), Article 2. <https://doi.org/10.30787/gaster.v20i2.856>
 39. Prisyana, D. I., & Nurhayati, F. (2019). Hubungan Antara Status Gizi dan Aktivitas Fisik Dengan Kemampuan Motorik Pada Siswa Kelas Atas di SDN Betiting Gresik. 07.
 40. McHale K, Cermak SA. Fine Motor Activities in Elementary School: Preliminary Findings and Provisional Implications for Children With Fine Motor Problems. *The American Journal of Occupational Therapy* [Internet]. 1992 Oct 1 [cited 2023 Mar 10];46(10):898–903. Available from: <https://doi.org/10.5014/ajot.46.10.898>
 41. Lin CK, Meng LF, Yu YW, Chen CK, Li KH. Factor analysis of the Contextual Fine Motor Questionnaire in Children. *Research in Developmental Disabilities* [Internet]. 2014 Feb 1 [cited 2023 Mar 21];35(2):512–9. Available from: <https://www.sciencedirect.com/science/article/pii/S0891422213004940>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

