Jurnal SPORTIF: Jurnal Penelitian Pembelajaran
Vol. 7 No. 3, December 2021, pp. 480-493
https://doi.org/10.29407/js_unpgri.v7i3.16923

Improved gross motor skills of children aged 4- 6 years through shuttle run games and throwing bounce balls

Ahmad Atiq[1], Yona Evasari[1], Yoas Yafdas[1], Frans Womsiwor[1]

[1]Physical Education Health and Recreation, Faculty of Teacher and Education Science, Tanjungpura University, Indonesia
[2]State Elementary School 36 Lubuk Jantan, Jor. Mawar II Nagari Lubuk Jantan Kec. Lintau Buo Utara, Lubuk Jantan, North Lintau Buo Subdistrict, Tanah Datar Regency, West Sumatra, Indonesia
[3]State Vocational High School 1 Numfor Biak Numfor Regency, Papua, Indonesia
[4]State High School 4 Imsumbrei Arui Supiori Islands, Papua. Indonesia

Received: 1 December 2021; Revised: 20 December 2021; Accepted: 30 December 2021

Abstract

Motor skills in children are a skill that every child must master. Having less than optimal gross motor activity makes children can interfere with activities in children. So it requires a solution to improve gross motor skills in order to develop optimally. This study aimed to find out the effectiveness of motor improvement in children aged 4-6 years. The research method used is Classroom Action Research, with data collection in this study using performance, observation, interviews, and documentation. The subjects of this study used a saturated sampling technique of 45 children of Mujahideen Kindergarten 2 Pontianak. Data analysis compares the results obtained from cycle I and cycle II with descriptive quantitative approaches. The results of this study showed an increase in children's gross motor skills through shuttle run games, and ball bounce throwing, evidenced by the number of students who increased their motor skills from 45 students from the first cycle of 16% or 16 students classified as good motor and in cycle II increased from 45 students 71% or 32 students fall into the category of good. Shuttle run and ball bounce throw are solutions to improve gross motor skills in children aged 4-6 years.

Keywords: gross motor, children, shuttle run, throw a ball bounce,

INTRODUCTION

The age of children 0-8 years is the right age for children to be given stimulation from an early age so that aspects of child development can develop optimally and children have readiness in entering the next education. Early childhood is a golden period, at the age of 4 years, the level of intelligence of children has reached 50%, age eight years 80%, and the remaining about 20% obtained after the age of 8 years. In the 2013 PAUD curriculum, there are six aspects of development-based

Correspondence author: Ahmad Atiq, Tanjungpura University, Indonesia.
Email: ahmad.atiq@fkip.untan.ac.id

ISSN : 2477-3379 (Online)
ISSN : 2548-7833 (Print)

development programs: the development of religious and moral values, cognitive, motor physical, social-emotional, language, and art.

Gross motor skills are the ability to use major muscle groups to perform regular joint movements (Abd El-Hady et al., 2018). Gross motor skills are a skill that children must master because gross motor skills are a factor in the development of life. This child's motor skills are acquired from an early age, in early childhood is a good time, it is characterized by rapid changes in growth and development, including physical, cognitive, social, and emotional. Gross motor skills have been shown to aid in skills development, physical activity, and a healthy lifestyle. Gross motor delay is often associated with a lack of instruction, experience, feedback, and opportunity. These delays can negatively impact academic performance, physical activity, and health-related fitness later in life (Jones et al., 2016).

It needs good mastery in mastery for every child, strived for proper education from an early age so that the mastery can be mastered properly. Early age is the time when the ability of bodily and psychic functions begins to develop, and this is based on the response of learning (stimulation) provided to the educational environment and surrounding areas. At an early age is the basis in developing physical (motor), emotional, intellectual, artistic, social, language, and spiritual potential (Aye et al., 2017).

In gross motor development, there is maturity in the muscles and nerves and skills to move the body. A person's motor skills vary depending on the many experiences of doing the movements mastered by a person to follow up on the extent to which these abilities can be done. Thus, the implementation of early childhood education is adjusted to the stages of development through which early childhood is passed. Fulfillment of independent activities, play activities, and skills in kindergarten education will be maximal and good if accompanied by good gross motor development. (Rink, 2006) states that Experiential learning should have the potential to improve motor performance, student activity skills. Children who have high motor skills can integrate coordination movements between

https://doi.org/10.29407/js_unpgri.v7i3.16923
7 (3) 2021 | 480-493

nerves and muscles while achieving goals (Suharjana, 2019). The central nerve acts as a regulator and basis of a person's abilities, including motor skills that require stimulation for their development. Gross motor skills involve large muscles of the body and include locomotor functions such as sitting upright, walking, kicking, running, jumping, throwing a ball, and kicking a ball.

Gross motor development in children urgently needs to be developed so that the skills can be good by adulthood. When children need to develop their movement activities, including motor movement skills, this is related to the child's development towards adulthood (Aye et al., 2017). In addition, according to (Ren & Wu, 2019) the mature age in providing movement skills to children is when the child is entered at the age of 5 years, in a study in Myanmar at the age of 5 years, children need to develop movement skills such as stabilizing locomotor motion and control ability in a motion. The age of children 4-7 years is a very appropriate age in developing their motoric skills by providing various stimuli to master these motor skills (Cook et al., 2019) The stimulus provided to improve motoric skills in children through play, research (Priyono et al., 2021) shows games have an influence on students' motor skills because with games can develop themselves optimally in aspects of physical, motor, social, emotional, and cognitive. Game models that can improve motor skills in children with a variety of simple directions, with such simple games, can develop their physical motor skills (Veldman et al., 2019).

Shuttle run and throw ball bounce games that will be done in this study is a very simple game and can be done by children. Running is a game that is easy for children to do, because this game is a mastery of the skills possessed by every child, running activities are often done by children when doing these activities can improve their physical and emotional skills (Ward et al., 2016). In childhood, which is the stage of development at the age of 10, it is a period where it forms skills or abilities in him, it can be from all activities carried out such as physical activities

and learning in open spaces (Sallis et al., 2000). Improving skills in order for children to master must be with the activities carried out by these children, such as physical activity in which there are skills such as running, walking, jumping and others (Joschtel et al., 2021; McGann et al., 2020).

The improvement of motoric skills for children is currently leading to games, and this can be seen from research (Burns et al., 2019) states the approach of play as one of the solutions to improve gross motor skills is expected to provide benefits for students as learning subjects, to provide an easy means for the process of mastering skills. In addition, research (McGann et al., 2020) reveals that play activities are considered appropriate to improve children's skills but need a good design for children to play so that their skills can be mastered. The study took two game-in-taste methods that children can easily improve their motor skills.

METHOD

This research uses quantitative research with a class action approach or called classroom action research. This study is generally conducted by teachers who cooperate with researchers or teachers themselves who play a double role in conducting individual research in the classroom, in schools, and in teaching places that aim to 'perfect' or 'improve' the learning process (Suharsimi, 2013). This research was in collaboration with teachers at TK Mujahideen 2 Pontianak. The subjects in this study were students of Mujahideen Kindergarten 2 Pontianak school year 2021-2022, with 45 students consisting of 25 men and 20 women.

This research is carried out in two cycles with four stages: action plan, implementation of actions, observation/evaluation, and reflection. The cycle scheme of action is as follows:

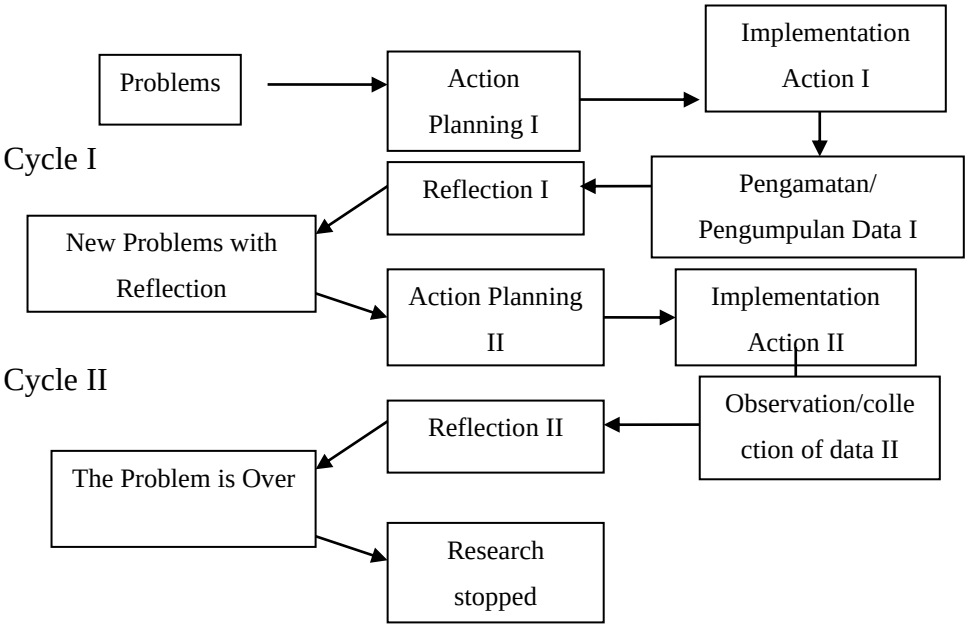

Figure 1. Implementation of Sklus in Classroom Action Research

The data obtained in this study consists of observations, examinations, and observations. Tests are used to get data from performance assessments in-game tests conducted, namely the Shuttle run test and throwing bounce balls conducted by children after being given directions regarding the game of Shuttle run and Throwing ball bounce. Show the ability in the game tests conducted by children to show gross motor skills of children of Mujahideen 2 Pontianak kindergarten. This observation was made to obtain data on gross motor skills owned by the children of TK Mujahidin 2 Pontianak. In a performance of the ability carried out by TK Mujahidin 2 Pontianak Shuttle run and Throw bounce ball using the Shuttle run test and Throw the ball bounce. The instruments and achievements in the shuttle run and throw bounce balls are as follows:

Table.1 Instruments and Parameters of Motor Skills Test Shuttle run and Throw ball bounce

Number	Component	Indicators
1	*Shuttle run/ Throw a bounce ball*	Able to run, turn around, throw, catch well while doing Shuttle run activities and throw the ball bounce.
		Able to perform body movements according to the techniques demonstrated (running, and throwing, and catching).
		Able to show the ability of shuttle run and throw bounce ball according to the rules with the best results.

The study used quantitative data analysis techniques to describe the shuttle run test results, and ball bounce throws in conjunction with students' gross motor skills. The research was conducted on Mujahideen 2 Pontianak Kindergarten students in sports learning conducted at Jeletung Dalam field. The study involved 45 children in TK mujahideen 2 Pontianak as the subject of the study. The research instruments used in this study are student worksheets, student observation sheets, teacher observation sheets, and test instruments of running and throwing, and catching skills.

RESULT

This learning is carried out during the II cycle, and each cycle is carried out in two meetings. At each cycle, gross motor skills in the form of shuttle runs and throwing bounce balls are good. For each skill, a test of performance is performed on each cycle. In the research process started by teachers as researchers to observe the learning process of lower passing in students of Mujahideen 2 Pontianak Kindergarten, in the observation it was found that there are still many students whose gross motor skills have not been mastered properly, in addition to the motivation of students to do physical education learning on the material of improving gross motor skills is still low. Furthermore, as researchers, teachers make efforts to improve gross motor skills by playing Shuttle run and throwing bounce balls.

In this study, two cycles were carried out, with two meetings in each cycle to improve gross motor skills. After the research activities are completed, the researchers will describe the findings of Classroom action research, namely efforts to improve gross motor skills with the approach of playing Shuttle run and throwing ball bounce in kindergarten students Mujahideen 2 Pontianak as follows.

Table 2. Students research results in the process of improving motion skills in cycle 1 through shuttle run games and throwing bounce balls

Indicators	Frequency	Criterion	Individual Percentage	Percentage Indicators
Able to run, turn around, throw, catch well while doing Shuttle run activities and throw the ball bounce.	20	Undevloped	44%	34%
	10	Begins to grow	22%	
	8	Growing as expected	18%	
	7	Growing very well	16%	
Able to perform body movements according to the techniques demonstrated (running, and throwing techniques, and catching).	18	Undevloped	18%	11%
	16	Begins to grow	16%	
	6	Growing as expected	6%	
	5	Growing very well	5%	
Able to show the ability of shuttle run and throw bounce ball according to the rules with the best results.	11	Undevloped	4%	77%
	9	Begins to grow	18%	
	14	Growing as expected	33%	
	11	Growing very well	44%	
Average Percentage (%)				41%

From the conclusion of the table above, it can be spelled out the indicator of children able to run, reverse direction, throw, catch well when doing the shuttle run activities, and throw ball bounce. When doing the shuttle run games and throwing ball bounce 20 children in the BB (Undeveloped) category, ten children got the CATEGORY MB (Start Developing), eight children in the category BSH (Developing As Expected), and seven children in the category BSB (Developing Very Well) so that the percentage of the indicator is 34%. Indicators of children being able to perform body movements by the techniques demonstrated (running, and throwing techniques, and catching). When doing the shuttle run games and throwing bounce balls, get 18 children in the BB (Undeveloped) category, 16 children get the CATEGORY MB (Start Developing), six children in the category BSH (Develop As Expected), and five children in the category BSB (Developing Very Well) so that the

percentage of the indicator is 11%. The child indicator can show the ability of shuttle run and throw the ball bounce according to the rules with the best results. When doing the shuttle run and throwing ball bounce games get 11 children in the BB (Undeveloped) category, nine children get the MB category (Start Developing), 14 children in the BSH category (Develop As Expected), and 11 children in the category BSB (Developing Very Well) so that the percentage of the indicator is 77%.

The average percentage in cycle I at meeting II obtained is 41%. The results of research on activities that occur during the cycle I activities show that they have not achieved maximum results considering that there are still some students getting the completion of learning at the performance of these abilities below the expected results (70%).

Table 3. Students research results in the process of improving motion skills in cycle 2 through shuttle run games and throwing bounce balls.

Indicators	Frequency	Criterion	Individual Percentage	Percentage Indicators
Able to run, turn around, throw, catch well while doing Shuttle run activities and throw the ball bounce.	-	Undevloped	0%	89%
	5	Begins to grow	11%	
	18	Growing as expected	40%	
	22	Growing very well	49%	
Able to perform body movements according to the techniques demonstrated (running, and throwing techniques, and catching).	5	Undevloped	11%	78%
	5	Begins to grow	11%	
	18	Growing as expected	40%	
	17	Growing very well	38%	
Able to show the ability of shuttle run and throw bounce ball according to the rules with the best results.	3	Undevloped	7%	93%
	-	Begins to grow	0%	
	19	Growing as expected	42%	
	23	Growing very well	51%	
Average Percentage (%)				87%

From the conclusion of the table above, it can be spelled out the indicator of children able to run, reverse direction, throw, catch well when

doing the shuttle run activities, and throw ball bounce. When doing shuttle run games and throwing bounce ball bounce 0 children in the BB category (Undeveloped), five children got the category MB (Start Developing), 18 children in the category BSH (Developing As Expected), and 22 children in the category BSB (Developing Very Well) so that the percentage of the indicator is 89%. Indicators of children being able to perform body movements by the techniques demonstrated (running, and throwing techniques, and catching). When doing shuttle run games and throwing bounce balls, get five children in the BB (Undeveloped) category, five children get the MB category (Start Developing), 18 children in the BSH category (Develop As Expected), and 17 children in the BSB category (Developing Very Well) so that the percentage of the indicator is 78%. The child indicator can show the ability of shuttle run and throw the ball bounce according to the rules with the best results. When doing shuttle run games and throwing bounce balls got three children in the BB (Undeveloped) category, 0 children got the category MB (Start Developing), 19 children in the category of BSH (Developing As Expected), and 23 children in the category BSB (Developing Very Well) so that the percentage of the indicator is 93%.

The increase that occurs in cycle II from the results of the cycle I can not be separated from the application of Shuttle run and Throwing ball bounce. Shuttle run and throwing ball bounce is an approach in the learning process that is conceptualized in the form of a game that explains gross motor skills using a game. By playing, the child's desire will be known however, the game contained elements of learning that can improve the student's ability. The game given to students aims to fulfill the mastery of students' gross motor skills in which there is an element of learning. In addition, the approach of play to improve the ability of students will further clarify and increase motivation to continue to improve their gross motor skills. By playing, the child's desire will be known however, the game contained elements of learning that can improve the student's ability. The game given to students aims to fulfill the mastery of students'

gross motor skills in which there is an element of learning. In addition, the approach of play to improve the ability of students will further clarify and increase motivation to continue to improve their gross motor skills.

DISCUSSION

After doing four meetings, both cycles 1 and 2, then in motor improvement with Shuttle run and Throwing bounce ball reflecting the wall some things need to be discussed in the field is that the increase is good in the 1st cycle meeting to 2nd cycle 2nd meeting and 2nd meeting where both Shuttle run and Throwing bounce ball for early childhood 4 to 6 years is something new and needs to be given at when developing physical movements related to the child's more basic motor skills including running and arm movements.

In line with research (Howie et al., 2017) the results of this study state that the provision of play strategies can be helpful and beneficial in developing motor skills that children have. In addition, the study results (Hsiao & Chen, 2016) showed that students who were given an attractive playing approach showed better motor skills than traditional approaches in improving children's skills. Furthermore, the game for the development of children's skills is an effective method of improving the performance of motor skills to a greater level. In this study approach through Shuttle run and Throw the ball bounce is a very interesting game played by children. Children can easily do games such as running or activity games because these activities are often done by them every day (Krneta et al., 2014).

Game activities in the world of children are activities that they do every day. This is because the world's children are still around, playing, and playing (Sugito et al., 2020). A stimulus that can improve a child's motor skills is proposed by using games related to his movement activities (Cabrera Hidalgo et al., 2018). In addition, a child skills development program that includes ball games, fun games, and targeted games can improve motor skills in children (Rafie et al., 2017). The study of the development and measurement of movement skills in children serves to conduct documentation and planning for individual intervention programs

in children (Burns et al., 2017; Draper et al., 2017; Ericsson, 2008). In children aged 4-6 years is mature age to develop the ability to move because at that age is the appropriate age to improve movement skills through various stimulants appropriate for children's activities (Hocking et al., 2014; Van Capelle et al., 2017). Children's skills can not be separated from the role of parents or teachers in interacting with these children, so it is necessary to approach or methods that are appropriate for children. The skills that children have been given to their environment or the world of learning in the school develop the abilities possessed by children with various methods provided (Dos Santos et al., 2020; Hemptinne et al., 2020; Venetsanou & Kambas, 2010).

COCLUSION

The results of the study after being carried out actions for two cycles are in cycle I by doing shuttle run games and throwing bounce balls, on indicators that children are considered able to perform gross motor skills in performing shuttle run and throwing ball bounce games and the average percentage result of the cycle I which only reaches 41% then it has not reached the success indicator of 75%. In cycle II, on indicators that are considered, children can perform gross motor skills in performing shuttle run and throwing ball bounce games. The average percentage result of cycle II is only reaching 87%, and then it has reached the indicator of success.

REFERENCE

Abd El-Hady, S. S., Abd El-Azim, F. H., & El-Talawy, H. A. E. A. M. (2018). Correlation between cognitive function, gross motor skills and health – Related quality of life in children with Down syndrome. *Egyptian Journal of Medical Human Genetics*, *19*(2). https://doi.org/10.1016/j.ejmhg.2017.07.006

Aye, T., Oo, K. S., Khin, M. T., Kuramoto-Ahuja, T., & Maruyama, H. (2017). Gross motor skill development of 5-year-old Kindergarten children in Myanmar. *Journal of Physical Therapy Science*, *29*(10). https://doi.org/10.1589/jpts.29.1772

Burns, R. D., Fu, Y., Hannon, J. C., & Brusseau, T. A. (2017). School physical activity programming and gross motor skills in children.

American Journal of Health Behavior, *41*(5). https://doi.org/10.5993/AJHB.41.5.8

Burns, R. D., Kim, Y., Byun, W., & Brusseau, T. A. (2019). Associations of school day sedentary behavior and physical activity with gross motor skills: Use of compositional data analysis. *Journal of Physical Activity and Health*, *16*(10), 811–817. https://doi.org/10.1123/jpah.2018-0549

Cabrera Hidalgo, J. C., Robles Bykbaev, Y., Arevalo Delgado, J. D., Pesantez Coyago, T., & Bykbaev, V. R. (2018, December 19). Serious game to improve fine motor skills using Leap Motion. *Congreso Argentino de Ciencias de La Informatica y Desarrollos de Investigacion, CACIDI 2018*. https://doi.org/10.1109/CACIDI.2018.8584370

Cook, C. J., Howard, S. J., Scerif, G., Twine, R., Kahn, K., Norris, S. A., & Draper, C. E. (2019). Associations of physical activity and gross motor skills with executive function in preschool children from low-income South African settings. *Developmental Science*, *22*(5). https://doi.org/10.1111/desc.12820

Dos Santos, E. M. M., Constantino, B., da Rocha, M. M., & Mastroeni, M. F. (2020). Predictors of low perceptual-motor skills in children at 4-5 years of age. *Revista Brasileira de Saude Materno Infantil*, *20*(3), 759–767. https://doi.org/10.1590/1806-93042020000300006

Draper, C. E., Tomaz, S. A., Stone, M., Hinkley, T., Jones, R. A., Louw, J., Twine, R., Kahn, K., & Norris, S. A. (2017). Developing intervention strategies to optimise body composition in early childhood in South Africa. *BioMed Research International*, *2017*. https://doi.org/10.1155/2017/5283457

Ericsson, I. (2008). To measure and improve motor skills in practice. *International Journal of Pediatric Obesity*, *3*(SUPPL.1), 21–27. https://doi.org/10.1080/17477160801896598

Hemptinne, C., Aerts, F., Pellissier, T., Ramirez Ruiz, C., Alves Cardoso, V., Vanderveken, C., & Yüksel, D. (2020). Motor skills in children with strabismus. *Journal of AAPOS*, *24*(2), 76.e1-76.e6. https://doi.org/10.1016/j.jaapos.2020.01.005

Hocking, J. A., Pearson, A., & McNeil, J. (2014). Physiotherapy to improve gross motor skills in people with intellectual disability: a systematic review protocol. *The JBI Database of Systematic Reviews and Implementation Reports*, *11*(12), 94. https://doi.org/10.11124/jbisrir-2013-1180

Howie, E. K., Campbell, A. C., Abbott, R. A., & Straker, L. M. (2017). Understanding why an active video game intervention did not improve motor skill and physical activity in children with developmental coordination disorder: A quantity or quality issue? *Research in Developmental Disabilities*, *60*, 1–12. https://doi.org/10.1016/j.ridd.2016.10.013

Hsiao, H. S., & Chen, J. C. (2016). Using a gesture interactive game-based learning approach to improve preschool children's learning performance and motor skills. *Computers and Education*, *95*, 151–162. https://doi.org/10.1016/j.compedu.2016.01.005

Jones, R. A., Okely, A. D., Hinkley, T., Batterham, M., & Burke, C. (2016). Promoting gross motor skills and physical activity in childcare: A translational randomized controlled trial. *Journal of Science and Medicine in Sport*, *19*(9). https://doi.org/10.1016/j.jsams.2015.10.006

Joschtel, B., Gomersall, S. R., Tweedy, S., Petsky, H., Chang, A. B., & Trost, S. G. (2021). Fundamental movement skill proficiency and objectively measured physical activity in children with bronchiectasis: a cross-sectional study. *BMC Pulmonary Medicine*, *21*(1). https://doi.org/10.1186/s12890-021-01637-w

Krneta, Z., Drid, P., Jaksic, D., Bala, G., Stojanovic, M., & Ostojic, S. (2014). Effects of kinesiological activity on preschool children's motor abilities. *Science & Sports*, *29*, S48. https://doi.org/10.1016/j.scispo.2014.08.096

McGann, J., Issartel, J., Hederman, L., & Conlan, O. (2020). Hop.Skip.Jump.Games: The effect of "principled" exergameplay on children's locomotor skill acquisition. *British Journal of Educational Technology*, *51*(3), 798–816. https://doi.org/10.1111/bjet.12886

Priyono, A., Sahudi, U., & Hendrayana, Y. (2021). Improvement on gross motor skills of intellectual disability students through games. *International Journal of Human Movement and Sports Sciences*, *9*(4), 20–24. https://doi.org/10.13189/saj.2021.091304

Rafie, F., Ghasemi, A., Zamani Jam, A., & Jalali, S. (2017). Effect of exercise intervention on the perceptual-motor skills in adolescents with autism. *Journal of Sports Medicine and Physical Fitness*, *57*(1–2), 53–59. https://doi.org/10.23736/S0022-4707.16.05919-3

Ren, Z., & Wu, J. (2019). The effect of virtual reality games on the gross motor skills of children with cerebral palsy: A meta-analysis of randomized controlled trials. In *International Journal of Environmental Research and Public Health* (Vol. 16, Issue 20). https://doi.org/10.3390/ijerph16203885

Rink, J. E. (2006). Teaching Physical Education For Learning. In *Research on Teaching Physical Education*.

Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports and Exercise*, *32*(5), 963–975. https://doi.org/10.1097/00005768-200005000-00014

Sugito, S., Allsabah, M. A. H., & Putra, R. P. (2020). Manajemen kepelatihan klub renang Kota Kediri tahun 2019. *Jurnal SPORTIF : Jurnal Penelitian Pembelajaran*, *6*(1). https://doi.org/10.29407/js_unpgri.v6i1.14021

Suharjana, P. S. (2019). Improving gross motor skills by kinaestheticandcontemporary-based physical activity in early childhood. *Cakrawala Pendidikan*, *38*(3). https://doi.org/10.21831/cp.v38i3.25324

Suharsimi, A. (2013). Prosedur Penelitian : Suatu Pendekatan Praktik (Edisi Revisi). In *Jakarta: Rineka Cipta*. https://doi.org/10.1017/CBO9781107415324.004

Tomaz, S. A., Jones, R. A., Hinkley, T., Twine, R., Kahn, K., Norris, S. A., & Draper, C. E. (2019). Physical activity in early childhood education and care settings in a low-income, rural South African community: An observational study. *Rural and Remote Health*, *19*(4). https://doi.org/10.22605/RRH5249

Van Capelle, A., Broderick, C. R., van Doorn, N., E.Ward, R., & Parmenter, B. J. (2017). Interventions to improve fundamental motor skills in pre-school aged children: A systematic review and meta-analysis. In *Journal of Science and Medicine in Sport* (Vol. 20, Issue 7, pp. 658–666). Elsevier Ltd. https://doi.org/10.1016/j.jsams.2016.11.008

Veldman, S. L. C., Santos, R., Jones, R. A., Sousa-Sá, E., & Okely, A. D. (2019). Associations between gross motor skills and cognitive development in toddlers. *Early Human Development*, *132*, 39–44. https://doi.org/10.1016/j.earlhumdev.2019.04.005

Venetsanou, F., & Kambas, A. (2010). Environmental Factors Affecting Preschoolers' Motor Development. *Early Childhood Education Journal*, *37*(4). https://doi.org/10.1007/s10643-009-0350-z

Ward, J. S., Duncan, J. S., Jarden, A., & Stewart, T. (2016). The impact of children's exposure to greenspace on physical activity, cognitive development, emotional wellbeing, and ability to appraise risk. *Health and Place*, *40*, 44–50. https://doi.org/10.1016/j.healthplace.2016.04.015