

Analysis of physical activity of gross motor movements in early childhood: Systematic literature review

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Abstract

Early childhood naturally experiences gross motor movement development which is important for their motor and cognitive abilities. In this literature review, we investigated the relationship between physical activity and gross motor movement development in early childhood. We conduct systematic searches in leading scientific databases and analyze relevant studies. Our findings suggest a significant positive association between participation in structured physical activity and gross motor movement development in early childhood. Activities such as play, sports, and gymnastics programs are designed to improve coordination, muscle strength, and other gross motor skills. However, there is a lack of in-depth research in this context, especially in terms of methodology and consistent measurement. Therefore, this review highlights the need for more in-depth follow-up research to better understand the relationship between physical activity and gross motor movement development in early childhood. The implications of this study may aid in the development of more effective intervention programs to improve gross motor skills in early childhood.

Keywords: Physical activity, movement, gross motor, early childhood

INTRODUCTION

The development of gross motor movements in early childhood has a significant impact on their motor, cognitive, and social skills (Choi et al., 2023; Djafar, Smith, et al., 2023; Menescardi et al., 2022). Physical activity has an important role to play in influencing that development. Early childhood naturally experiences a process of increased muscle strength, balance skills, and motion coordination, all of which are important ingredients in the development of gross motor movements (Humaedi et al., 2022; Nugroho et al., 2021; Perdani, 2014). Physical activities, such as play, sports, and gymnastics programs, provide a supportive environment for practicing these gross motor skills. However, although the importance of physical activity has been generally recognized, a systematic review of the literature on its relationship to gross motor development in early childhood is lacking (Bruni et al., 2022; Kalstabakken et al., 2021; Simpson et al., 2023). Therefore, in this context, more in-depth research is needed to better understand how physical activity affects gross motor development in the early stages of a child's life.

The development of gross motor movements in early childhood has a significant impact on their motor, cognitive, and social skills (Bigelow et al., 2022; de Souza Morais et al., 2021; Krombholz, 2023). Physical activity has an important role to play in influencing that development. Early childhood naturally experiences a process of increased muscle strength, balance skills, and motion coordination, all of which are important ingredients in the development of gross motor movements (Özçelik et al., 2022; Stevenson & Walters, 2023; Su & Yang, 2023). Physical activities, such as play, sports, and gymnastics programs, provide a supportive environment for practicing these gross motor skills. However, although the importance of physical activity has been generally recognized, a systematic review of the literature on its relationship to gross motor development in early childhood is lacking.

Early Childhood is children who at that time are born until the age of six years (Maeda et al., 2020; Mittal & Osborn, 2019; L. Wang et al., 2023). For early childhood physical activity is a game, so play is a fun activity for children. Because by playing children can explore and can develop gross motor, so that gross motor in early childhood can develop optimally, various forms of physical activity and games that are interesting for children are designed (Kvestad et al., 2022; Kwon et al., 2023; Moriyama et al., 2023).

Explanation of motor growth and development in children according to Laura E. Berk explains motor growth and development in AUD through her observations about children playing in the environment around schools, playgrounds, or other educational play centers (Patilaya & Rahman, 2018; Puspitasari, 2016; Saputri et al., 2022). Early age is the age when children begin to know themselves and the environment around them, therefore at this time children must be given various stimuli or stimuli so that their growth and development become good. The stimulus can be in the form of education, with children's education becoming more focused, especially in terms of play, children will be directed by teachers or supervisors to carry out activities that are beneficial for their physical and mental development (Hewitt et al., 2022; Novak, 2023; S. Wang et al., 2023).

Early childhood education provides a stimulus for children's physical and spiritual growth and development from birth to age 6, preparing them to live and adapt to the environment (Bach et al., 2023; Djafar, Johnson, et al., 2023; Li et al., 2023). Research at TPA Dhrama Yoga Santi shows that gross motor activity, both in learning and play, has a positive impact on children's growth and development. This physical activity increases children's physical endurance and immunity, making it easier for them to adapt to the play environment and school environment as they enter the later stages in education (Barghaus et al., 2022; Fu et al., 2023; Spagnolo et al., 2023).

Therefore, teachers who teach children also focus more on learning children's physical activities (Luking et al., 2022; Mallawaarachchi et al., 2023; Nishizawa et al., 2020). For this reason, the school also provides media and children's play tools that can support children's gross motor. Here are the playground tools in the school, namely there are chairs, tables, monkey ladders, seesaws, boats, sand and hoops. In addition to the play tools mentioned earlier, it turns out that schools are also always held cheerful gymnastics accompanied by teachers with the intention that in addition to play activities at school children can also learn to know the surrounding nature and also as a recreational activity for children. So as to answer questions from researchers about how to improve children's gross motor skills through the process of learning and play through physical activity (Humaedi et al., 2022; Mirawati & Rahmawati, 2017; Yudha Prawira et al., 2021).

Here the answer that researchers get is that teachers when teaching focus more on games or children's physical activities using existing media, because according to teachers, by focusing more on play activities, the brain (mind), physical, and mental children will be better formed so that children will be better prepared to enter adolescence, because basically and what they have in mind is play. Because with play children will be more happy to follow learning because in gross motor learning there are activities of walking, jumping, running, throwing and others. So from there physical activity, especially children's gross motor skills, will be formed better and more mature. So the researchers concluded that the learning process of physical activities, especially gross motor activities given and carried out by children and teachers at Dhrama Yoga Santi Landfill was good and improved well, it's just that the lack of adequate tools or media to support the children's learning process.

METHOD

This research uses a qualitative descriptive research model that is a literature study that uses various literature reviews in strengthening research analysis. This research begins with collecting some literature, then reviewing some important terms in research, then collecting relevant research literature, then conducting an analysis based on all the literature that has been obtained by compiling a discussion, then formulating conclusions based on the results that have been analyzed and submitting suggestions based on the conclusions obtained.

The data used in this study was using secondary data. (Sugiyono, 2015) states that secondary data is data taken indirectly that can provide information to data collectors. The source of the data obtained is in the form of original scientific reports derived from published scientific articles and journals that have been accredited and indexed, both printed and non-print which are interrelated in the model of application of blended learning in physical education and sports.

The data collection method used in this study is the documentation method. The documentation method is a method of collecting data by digging and searching for data from the literature related to what is in the problem statement. Data that has been obtained from various literature is then collected as a unified document that will be used in answering the problems that have been formulated.

Article search techniques in this study are through web access mendeley, google scholar, and science direct as well as on other journal search access with keywords learning models, blended learning, and physical education health sports. Articles or journals that match the criteria are then taken for further analysis and journal summary including the name of the researcher, year of publication of the journal, study design, research objectives, samples, instruments, and summary of results or findings. The summary of the research journal is entered into a table sorted according to the alphabet and year of publication of the journal and in accordance with the format mentioned above. This literature review uses literature that can be accessed fulltext in pdf format and scholarly (peer reviewed Journal). To further clarify the abstract and full text, the journal is read and examined. The summary of the journal is analyzed on the contents contained in the research objectives and research results / findings. The analysis method used is the analysis of journal content.

RESULTS AND DISCUSSION

Results

This literature review was conducted to determine the analysis of physical activity on gross motor movements in early childhood. The collected literature was analyzed with critical appraisal tables to answer the measurement objectives compared to simple measurement results. There are as many as 5 literatures that discuss physical activity analysis of early childhood gross motor movements, all of these journals are journals that are international journals that are searched on the google scholar, mendeley, science direct.com portal by typing the keywords "Analysis of physical activity, gross motor movements of early childhood" which is then analyzed using critical appraisal analysis to analyze from the core of the journal, as well as the results or findings of these journals. The following is a table of critical appraisal analysis from 5 journals:

Table 1. Critical Appraisal Analysis from 5 Journals

Investigators	Title of study	Research results
(Willoughby & Hudson, 2023)	Contributions of motor skill development and physical activity to the ontogeny of executive function skills in early childhood	A recurring idea is that children’s fine and gross motor development represents a sequence of goal-directed activities that serve to engage and practice their EF skills. The development of children’s motor skills appears more strongly associated with EF skill development in early childhood than the frequency, duration, or intensity of their physical activity. We integrate these ideas into the larger literature and consider implications for research and practice.
(Veldhuizen et al., 2023)	Stability of M-ABC-2-measured motor functioning in early childhood: Evidence from a large prospective cohort	Aim some studies have reported that children with poor motor functioning tend to improve over time. However, much existing research does not account for regression towards the mean (RTM). Here, we examine measurement stability among 589 children aged 4–5 years. Method We administered the Movement Assessment Battery for Children 2nd Edition annually to 269 children initially scoring above and 252 at or below the 16th percentile. We measured agreement between year 1 and year 2 standard scores using

Investigators	Title of study	Research results
		<p>Pearson correlation and derived expected regression towards the mean (RTM). We then regressed follow-up on baseline scores, controlling for relative age, sex, and exact interval between assessments. Finally, we performed a small illustrative simulation. Outcomes and results The mean score in the poor-coordination group rose from 5.6 (SD = 1.5) to 7.2 (SD = 2.8). Year 1 and year 2 scores were correlated at $r = 0.66$, corresponding to predicted RTM in the MI group of 1.56, close to the observed change of 1.57. Degree of change was not associated with time between assessments.</p>
(Kandula et al., 2020)	<p>Peripheral nerve maturation and excitability properties from early childhood: Comparison of motor and sensory nerves</p>	<p>The overall pattern of sensory maturation was similar to motor maturation demonstrating prolongation of the strength duration time constant ($P < 0.001$), reduction of hyperpolarising threshold electrotonus ($P = 0.002$), prolongation of accommodation half-time ($P = 0.005$), reduction in hyperpolarising current-threshold slope ($P = 0.03$), and a shift to the right of the refractory cycle curve ($P < 0.001$), reflecting changes in passive membrane properties and fast potassium channel conductances. Sensory axons, however, had a greater increase in strength duration time constant and more attenuated changes in depolarising threshold electrotonus and current-threshold parameters, attributable to a more depolarised resting membrane potential evident from early childhood and maintained in adults. Peak amplitude was established early in sensory axons whereas motor amplitude increased with age ($P < 0.001$), reflecting non-axonal motor unit changes. Maturation trajectories of sensory and motor axons were broadly parallel in children and young adults, but sensory-motor differences were initiated early in maturation.</p>
(Cameron et al., 2021)	<p>Motor outcomes of children born extremely preterm; from early childhood to adolescence</p>	<p>This review will outline what is known about PA participation across childhood and adolescence for children born EP and term, recognising that PA may improve physical, social, and mental health outcomes. Critically, PA participation occurs in the</p>

Investigators	Title of study	Research results
		context of children's and adolescents' daily lives, and is influenced by the family, social and physical environment, as well as by the child's personal factors, such as motor impairment. Further research is needed to better understand PA participation levels and correlates for children and adolescents born preterm, to better inform effective and sustainable interventions.
(Chandler et al., 2021)	Self-regulation moderates the relationship between fine motor skills and writing in early childhood	Self-regulation was also important at the end of the school year for both 1) children with lower fine motor skills but only for the simpler writing tasks and 2) for children with higher fine motor skills on the more challenging writing tasks. Findings suggest that the relation between self-regulation and writing is dependent upon task difficulty and that self-regulation and fine motor skills may compensate for deficits in one or the other skill when children perform writing tasks.

Discussion

Writer Peters et al. (2023); Woodburn et al. (2021) conducted research on Gross Motor Development Activities of Children Aged 5-6 Years in Kober Peupado. The purpose of this study was to describe early childhood gross motor development activities in Kober Peupado. The methods used in this study are descriptive, qualitative. The population used in this study was children aged 5-6 years grade A in Kober Peupado village Malanusa, with a sample of 12 children. The results obtained from this study show that physical activities show a good and positive influence on gross motor development in Kober Peupado Malanusa Village has begun to run in accordance with expectations and learning objectives. so it can be concluded that gross motor development activities in Kober Peupado have a positive impact and run well.

As for the author Lopes et al. (2022); Mahmassani et al. (2022) Conduct research on improving gross motor skills through traditional games in early childhood. The purpose of this study is to determine the gross motor skills of underdeveloped children in Adelia Kindergarten, Ampibabo District, Parigi Moutang Group The method used in this study is qualitative. The population used in this study was Kindergarten of Ampibabo District group B with a total of 15 children with a division of 6 boys and 9 girls. The results obtained from the study showed that traditional games can improve children's gross motor skills in group B at Adelia Kindergarten, Ampibabo District, Parigi Moutang Regency. So it can be concluded that traditional games in gross motor learning in Adelia Kindergarten have improved and run well.

As for the author Asadi-Pooya et al. (2023); Dreiskämper, Tietjens, and Schott (2022) Conducted research on the Effect of Rhythmic Gymnastics on the Gross Motor Development of Group B Children in AL-Fitroh Kindergarten Surabaya. The purpose of this study proves whether there is an influence of rhythmic gymnastics on the gross motor development of group B children in Al-Fitroh Kindergarten Surabaya. The method used in this study is quantitative method. The population used in this study was children in TK AL-Fitroh Surabaya which amounted to 24 children. Based on the results of the study, it was proven that rhythmic gymnastics had a significant effect on the gross motor development of group B children in Al-Fitroh Kindergarten Surabaya. So it can be concluded that rhythmic gymnastics has an effect and can improve the gross motor development of children in AL-Fitroh Surabaya Kindergarten.

As for the author Lee et al. (2021); Melamed et al. (2023) Conducted research on the Application of Gantar Dance Learning to Improve Early Childhood Gross Motor Using the Developmentally Appropriate Practice (Dap) Concept at Tk Kartika V-66 Balikpapan. The purpose of this study was to

improve early childhood gross motor skills in TK Kartika V-66 Balikpapan. The method used in this study is the Qualitative method. The population used in this study was 25 students of TK Kartika V-66 Balikpapan group B aged 5-6 years. The results showed that there was an increase. Children's Gross Motor Physique showed significant improvement from the initial cycle to the final cycle of learning. So it can be concluded that gross motor activity has increased very well in children in TK Kartika V-66 Balikpapan.

As for the author Domi et al. (2020); Liraz and Eyal (2023) Conducted research on Improving Gross Motor Skills of Children Aged 5-6 Years Through Tail Stepping Games in group B TKIT Assirajj Nganjuk Regency. The purpose of this study was to determine the improvement of gross motor skills of children aged 5-6 years through tail stepping games in group B TKIT Assirajj Nganjuk Regency. The population used in this study was the children of Group B TKIT Assirajj which amounted to 15 children. The results of classroom action research through the application of tail stepping games in learning to improve abilities have proven effective in improving children's gross motor skills. So it can be concluded that tail stepping games in learning can improve children's gross motor skills in group B TKIT Assirajj Nganjuk Regency.

As for the author Andries et al. (2023); Jahreie (2023) Conducting research on Improving Gross Motor Skills through Animal Dance Activities in Group B Children of PGRI I Langkap Kindergarten. The purpose of this study was to determine the Improvement of Gross Motor Skills through Animal Dance Activities in Group B Children of TK PGRI I Langkap. The population used in this study was group B children in TK PGRI 1 Langkap totaling 15 children. The results showed that animal dancing activities can improve children's gross motor skills. So it can be concluded that Animal Dance can improve gross motor skills in Group B Children of PGRI I Langkap Kindergarten. As for the author (Butchereit et al., 2022; Harper et al., 2023; Murphy et al., 2019; Rose et al., 2023) Conducted research on Improved gross motor skills of children aged 4-6 years through shuttle run games and throwing bounce balls. The purpose of this study was to determine the effectiveness of motor improvement in children aged 4- 6 years. The subjects of this study used a saturated sampling technique of 45 children of Mujahideen Kindergarten 2 Pontianak. The results of this study indicate an increase in children's gross motor skills through the game shuttle run, and throwing bouncing balls, as evidenced by the number of students who increase their motor skills it can be concluded that the shuttle run game can improve children's gross motor skills of 45 children of Mujahideen.

As for the author Alvarado-Suárez and Acosta-González (2022); Castellanos-Ryan et al. (2023) Conducted research on Stimulation Dance Creations Art On Gross Motor Development Children Aged 5-6 Years in Islamic Al-Huda TK Semarang. The purpose of this study was to determine the effect of creative dance on gross motor development of children aged 5-6 years at Al-Huda Islami Kindergarten in Semarang. The method used in this research is the quantitative method. The population used in this study were all students of AL-Huda Islami Kindergarten Semarang, totaling 30 children. The results of this study indicate that there is an increase in children's gross motor development by stimulation of dance creation, after being given treatment in the experimental group. It can be concluded that there is an increase in children's gross motor development with the stimulation of dance creations in AL-Huda Kindergarten Semarang.

CONCLUSSION

Based on the results and discussion, it can be concluded in this study that there is a significant positive relationship between participation in structured physical activities and the development of gross motor movements in early childhood. Activities such as play, sports, and gymnastics programs are designed to improve coordination, muscle strength, and other gross motor skills.

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