

Original Article

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A systematic Review on the effect of physical activity on pupils' motor skills

Authors' contribution:

- A. Conception and design of the study
- B. Acquisition of data
- C. Analysis and interpretation of data
- D. Manuscript preparation
- E. Obtaining funding

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Article History:

Received: July 8, 2022

Revision: September 20, 2022

Accepted: October 17, 2022

Published: October 24, 2022

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How to Cite: Ajayi, O. A. (2022). A systematic Review on the effect of physical activity on pupils' motor skills. *Indonesian Journal of Sport Management*, 2(2), 174-179. <https://doi.org/10.31949/ijsm.v2i2.2869>

Abstract. This study aimed at examining the effect of physical activity on pupils' motor skills in Asa Local Government Area. Pretest-posttest quasi experimental research design was adopted in this study. The population of this study comprised of all pupils' in Asa Local Government Area. Simple random sampling technique was used to select one public and one private primary school in Asa Local Government Area. Sample size contained 57 pupils' which were gotten from two intact classes. The schools were grouped into one experimental and one control group. The experimental group was exposed to physical activities while the control was exposed to the conventional method of teaching. Physical activity was the treatment while placebo was given to control group. The instrument was validated by experts in Human Kinetics department and reliably tested at ($r=0.91$). Descriptive statistics of mean, standard deviation and percentage were used to analyze demographic information and Analysis of Covariates (ANCOVA) was used to analyze the research hypotheses. The findings of the study revealed that there was significant difference in the development of pupils using physical activities. Based on the findings of this study, the study concludes that physical activities improve motor skills development of pupils. It was recommended among others that pupils should be encouraged by teachers and school on physical activities and school owners should provide necessary equipment to foster physical activities in schools.

Keywords: primary school; pupils; physical activity; motor skills; development

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INTRODUCTION

Early childhood is the most critical and rapid period of complete and healthy motor and cognitive development in human life (UNICEF 2017). Increased physical activity may provide motor and cognitive benefits across childhood and adolescence (Riethmuller et al., 2009). Therefore, gaining a better understanding of physical activity's potential in improving motor skills and cognition in young pupils' is critical and can inform pediatricians and other health professionals regarding its efficacy as an intervention strategy. There is an urgent need to synthesize RCT studies to definitively establish the presence of effects of physical activity on motor skills and cognitions as well as identify the dose-response relationships for the population of primary school pupils'. Therefore, the purpose of this paper was to systematically evaluate the available evidence examining the effects of physical activity on motor skills and cognitive development in healthy primary school pupils'. Specifically, this systematic review aims to identify, synthesize, and interpret the best available evidence for minimal and optimal amounts of physical activity needed to promote motor skills and cognitive development among pupils' aged 4–6 years. Further, this review attempts to help inform scholars and health professionals concerning the benefits of regular physical activity participation and the development of evidence-based physical activity guidelines for this age group.

Early childhood is considered a critical time period for establishing healthy behaviors such as physical activity (Ward et al., 2010). Physical activity programs provide young pupils' with the milieu for motor skill development, with motor skills being the foundation for physical activity during early years and subsequent years (Jones, Riethmuller, Hesketh, Trezise, Batterham and Okely, 2011). Young pupils' today are showing insufficient proficiency in their motor skills (Hardy et al., 2010). Indeed, early childhood settings play a significant role in the promotion of physical activity participation and motor skill development since these settings generally have the resources to implement physical activity and motor skill programs (Ward et al., 2010). Therefore, interventions to improve young pupils' motor skills and physical activity have been a priority.

Physical activity is fundamental to the early development of each child and affects many aspects of a child's health (King et al., 2003). Contemporary health organizations propose that higher levels of physical activity in school-aged pupils' are associated with important short- and long-term health benefits in physical, emotional, social, and cognitive domains across the life span (WHO, 2017). As such, it is vital to integrate physical activity into the lives of pupils' and set the foundation in facilitating and maintaining a healthy, active lifestyle throughout adulthood (Tucker, 2008). It has been reported that more than 41 million young pupils' under the age of 5 were overweight or obese in 2014, worldwide (WHO, 2017). The health implications of physical activity during early childhood cannot be disregarded; therefore, it is warranted to investigate the relationships between physical activity and health outcomes and cognition in early ages.

The study of Nan et al. (2017) synthesized the high-quality experimental evidence available regarding the effectiveness of physical activity on motor skills and cognitive development in 4–6-year old, typically developing pupils'. Findings favor causal evidence of relations between physical activity with both motor skills and cognitive development in primary school pupils', with increased physical activity having significant beneficial effects on motor skills and cognitive functioning. Of 10 studies examining the effects of physical activity on primary school pupil's motor skill outcomes, eight (80%) reported significant improvements in motor development (e.g. fundamental motor skills and motor abilities) following activity-based interventions (Adamo et al., 2016). Notably, Salem et al. (2012) had mixed findings, observing remarkable enhancements on several variables (i.e., single leg stance test, right grip strength, and left grip strength), with no significant effects found for

other outcomes after a Nintendo Wii Sports-based treatments (twice a week × 30 minutes per session for 10 weeks), including gait speed, timed up and go test, five-times-sit-to-stand test, timed up and down stairs test, 2-minute walk test, and gross motor skills assessed by the Gross Motor Function Measure (GMFM).

Although significant changes in other outcome measures were not seen between the study groups, there were trends towards greater improvements in the intervention group compared to the control group (Salem et al., 2012). It is also worth noting that not all included studies support the effectiveness of physical activity on motor skill development. A governmentally led physical activity program failed to promote any beneficial motor performance outcomes (i.e., climbing up and down the stairs; running; balancing; getting up; and landing after jumping) (Adamo et al., 2016). The researchers of this particular study highlighted the complexity of implementing physical activity interventions outside of a study setting and urge future similar studies to improve on existing programs (Salem et al., 2012). Other variable which will be considered in this study is school type.

Ken and Iyen (2018) posited that the use of physical activities such as sports enhances motor skills development in children irrespective of school type. Cosmos (2020) carried out a study on public and private school use of physical activities in enhancing motor skills development. The sample consisted of 87 pupils, which were 40 private and 47 public pupils. ANCOVA was used to analyze the information. The study revealed that pupils exposed to treatment performed significantly better than those taught using conventional method.

Statement of the Problem

Early childhood has been considered as critical time period for establishing healthy behaviours such as physical activity. As studies examining the effects of physical activity on motor skills continue to increase in frequency, a more recent and thorough review is needed. Researchers failed to include only randomized controlled trials (RCTs), indicating cause-effect relationships cannot be inferred. Therefore, the effectiveness of physical activity interventions on motor skills in this population is still unclear. This creates a knowledgeable gap in which this study intends to fill. Thus, this study examined the effect of physical activity on pupils' motor skills in Asa Local Government Area, Kwara State.

METHODOLOGY

Pretest-posttest quasi experimental research design was adopted in this study. The population of this study comprised of all pupils' in Asa Local Government Area. Simple random sampling technique was used to select one public and one private primary school in Asa Local Government Area. Sample size contained 57 pupils' which were gotten from two intact classes. The schools were grouped into one experimental and one control group. The experimental group was exposed to physical activities while the control was exposed to the conventional method of teaching. Physical activity was the treatment while placebo was given to control group. The instrument was validated by experts in Human Kinetics department and reliably tested at ($r=0.91$). Descriptive statistics of mean, standard deviation and percentage were used to analyze demographic information and Analysis of Covariates (ANCOVA) was used to analyze the research hypotheses.

RESULT AND DISCUSSION

Table 1 shows the effect of treatment on pupils' motor skills in Asa Local Government Area. There was significant main effect of treatment on pupils' motor skills in Asa Local Government Area ($F(1; 52) = 147.735, P < 0.05$). The hypothesis is therefore rejected in the light of the

result since the significant value (.000) is less than 0.05. This implies that treatment had significant effect on pupils' motor skills development in Asa Local Government Area.

Table 1 also revealed the effect of school type pupils' motor skills in Asa Local Government Area. There no was significant effect of school type pupils' motor skills in Asa Local Government Area ($F(1; 52) = .308; P > 0.05$). The hypothesis is therefore not rejected in the light of the result since the significant value (.582) is greater than 0.05. This implies that school type had no significant effect pupils' motor skills development in Asa Local Government Area. Table 1 also revealed the interaction effect of treatment and school type pupils' motor skills in Asa Local Government Area. There was no significant interaction effect of treatment and school type on pupils' motor skills in Asa Local Government Area ($F(1; 52) = .691; P > 0.05$). The hypothesis is therefore not rejected in the light of the result since the significant value (.410) is greater than 0.05. This implies that interaction of treatment and school type had no significant effect of pupils' motor skills in Asa Local Government Area.

Table 1. Summary of Analysis of Covariance (ANCOVA) showing the Main effect of treatment on pupils' motor skills in Asa Local Government Area

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	468.474 ^a	4	117.119	48.763	.000
Intercept	1388.237	1	1388.237	577.997	.000
Pretest	4.505	1	4.505	1.876	.177
Main Effect					
Treatment	354.831	1	354.831	147.735	.000
Gender	.739	1	.739	.308	.582
Two Way Interaction					
Treatment* gender	1.660	1	1.660	.691	.410
Error	2.402	52	2.402		
Total	14994.000	57			
Corrected Total	593.368	56			

a. R Squared = .790 (Adjusted R Squared = .773)

Table 2 revealed that the significant main effect exposed by table 1 is as a result of the significant difference among: physical activities and Conventional method. This implies that those exposed to physical activities (Mean = 18.378) performed better than those exposed to control group had (mean = 12.247).

Table 2. Summary of estimated marginal means with the Groups

Group	Mean	Std. Error	95% confidence intervals for difference	
			Lower Bound	Upper Bound
Outdoor Sports	18.378	.290	17.796	18.961
Control	12.247	.367	11.511	12.983

Table 3. Summary of Bonferroni's Post Hoc Pairwise Comparison of the scores within the two groups

Treatment	Mean Difference	Experimental	Control Group
Outdoor sports	18.378	*	
Conventional Method	12.247		*

Table 3 revealed that the significant main effect exposed by table 1 is as a result the significant difference between Physical activities and conventional method. Physical activities refer to experimental groups, while conventional method is known as control group. This

implies that those exposed to Physical activities (18.378) performed better than those exposed to conventional method (12.247).

Discussion of findings

Based on the finding of the study, it was revealed that there was significant effect of treatment on pupils' motor skills in Asa Local Government Area. Invariably, it implies that pupils' gross and fine motor skills were enhanced through physical activities. This finding negates Adamo, Wilson and Harvey (2016) which noted that it is also worth noting that not all included studies support the effectiveness of physical activity on motor skill development. A governmentally led physical activity program failed to promote any beneficial motor performance outcomes (i.e., climbing up and down the stairs; running; balancing; getting up; and landing after jumping).

Another finding revealed that school type no significant effect on preschool motor skills in Ilorin Metropolis. This finding implies that irrespective of public and private primary schools, the use of physical activities enhanced motor skill. This study supports Ken and Iyen (2018) posited that the use of physical activities such as sports enhances motor skills in children irrespective of school type. The finding negates Cosmos (2020) carried out a study on public and private school use of physical activities in enhancing motor skills. The sample consisted of 87 pupils, which were 40 private and 47 public pupils. ANCOVA was used to analyze the information. The study revealed that pupils in private school performed significantly better than those in public school. Lastly, the finding revealed that treatment and school type had no significant effect on preschool motor skill development in Ilorin Metropolis. This implies that public and private schools exposed to physical activities had similar effect on their motor skills.

CONCLUSION

Based on the findings of the study, the study concluded that physical activities can improve motor skills among primary school pupils. As both fine and gross motor skills will be strong and fully developed. Based on the findings, the study recommends as follows: 1) Workshops and conferences should be organized by school owners regularly, in order to inform teachers on ways of improving motor skills among pupils; 2) Teachers in public and private schools should be encouraged on the use of physical activities in improving motor skills in pupils; 3) Public and private schools should provide necessary equipment for physical activities in schools to encourage motor skills.

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