



## PHYSICAL EDUCATION AND ITS ROLE IN SCHOOLS

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**Abstract:** Physical education (PE) plays a crucial role in supporting children's physical, cognitive, and socio-emotional development. This empirical study investigates the effects of a structured 12-week physical education intervention on physical fitness, working memory, attention, and social skills among middle-school students.

A quasi-experimental design with 120 participants aged 11–14 compared an intervention group receiving four weekly PE sessions with a control group following the standard curriculum. Physical fitness tests, cognitive assessments, and teacher observation checklists were used for data collection.

Results indicated significant improvements in cardiovascular endurance (+18%), muscular strength (+12%), flexibility (+10%), working memory (+9%), and attention (+7%) in the intervention group. Qualitative findings demonstrated notable increase in cooperation, leadership, and conflict resolution.

These results align with established evidence that structured physical activity enhances children's health and learning capacities. The study recommends greater curricular time for PE, targeted teacher training, and enhanced resource allocation to maximize developmental outcomes.

**Keywords:** physical education (PE), physical activity, cognitive performance, educational system, curricula

### INTRODUCTION

Physical education (PE) is widely regarded as a fundamental component of educational systems due to its contributions to students' developmental outcomes (Bailey et al., 2013; Sallis et al., 2012). Research consistently highlights that structured physical activity enhances cardiovascular health, muscular strength, motor competence, and overall well-being (Strong et al., 2005; Tremblay et al., 2016). Schools represent an ideal setting for promoting physical activity since children spend a significant portion of their daily lives in the school environment (Pate et al., 2006).

Beyond physical outcomes, a growing body of literature has demonstrated the cognitive benefits of physical activity. Regular participation in PE is linked to improvements in attention, working memory,

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executive functioning, and academic achievement (Donnelly et al., 2016; Hillman et al., 2009). These cognitive benefits are attributed to increased cerebral blood flow, neurotrophic factor stimulation, and enhanced brain plasticity (Ratey, 2008).

Social and emotional development is also strongly supported through physical education, particularly when activities are team-based. Cooperation, communication, leadership, empathy, and conflict management are consistently developed through PE environments (Bailey, 2017; Howells & Coppinger, 2021). Despite these well-established benefits, many schools limit time allocated to PE due to academic pressure, infrastructural barriers, and insufficient teacher specialization (Kirk, 2010; UNESCO, 2021).

This study seeks to address the gap in empirical, school-based interventions by examining how an enhanced physical education program affects physical, cognitive, and social outcomes in middle-school students.

**The aim of this study** was to evaluate the impact of an enhanced school-based physical education program on physical fitness, cognitive functioning, and social skill development among middle-school students.

## METHODOLOGY

A quasi-experimental, pretest–posttest design was used to evaluate the impact of a 12-week PE intervention.

The study sample consisted of 120 students aged 11–14 years divided in two groups: *Intervention group*: 60 students, *Control group*: 60 students. Participants were randomly assigned by class section.

The intervention group completed four 45-minute PE sessions per week for 12 weeks. Activities included: aerobic exercises, team sports (basketball, football, volleyball), coordination and agility drills, strength training using bodyweight, flexibility routines.

The control group followed the standard curriculum of two weekly PE sessions.

*Instruments used in the research:*

Physical Fitness Measures: cardiovascular endurance: 20 m shuttle run test, muscular strength: handgrip dynamometer, push-up test, flexibility: sit-and-reach test.

Cognitive Measures: working memory: Digit Span Test, attention: Stroop Color-Word Test.

Social Skills: teacher observation checklist evaluating: cooperation, communication, leadership, conflict resolution, participation.

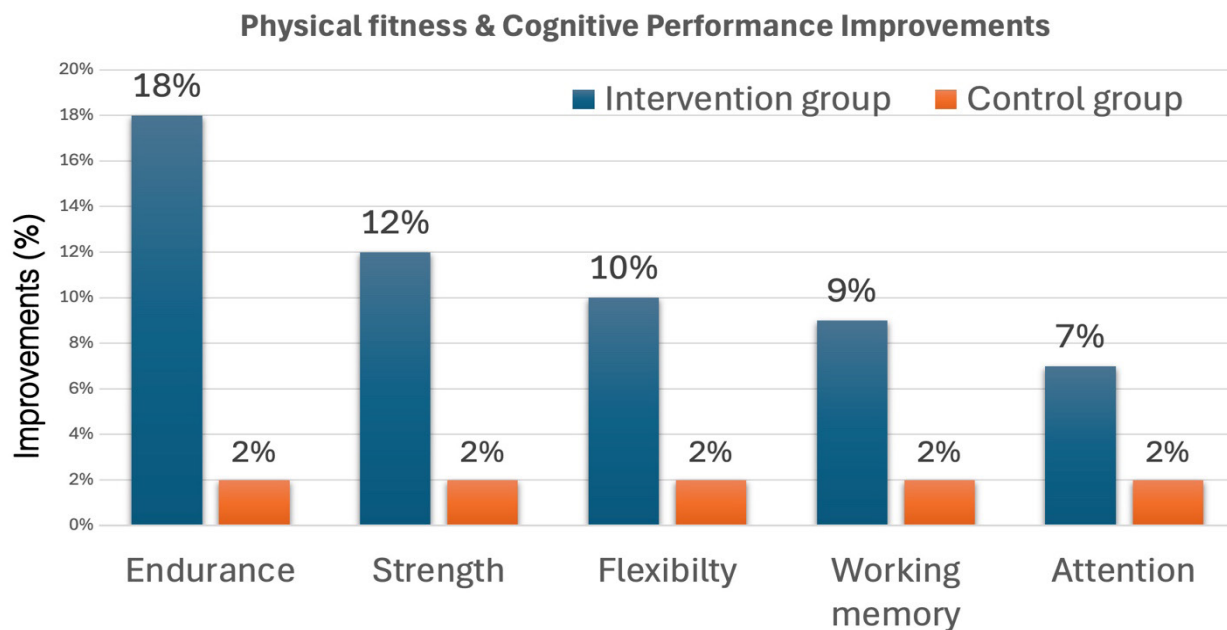
Data were analyzed using paired and independent t-tests. Qualitative data were coded using thematic content analysis.

## RESULTS

In terms of physical fitness intervention group shows statistically significant improvement: Endurance increases with +18%, Strength with +12%, and Flexibility: +10%. Control group changes remained minimal improvement - 2% (figure 1).

The intervention group demonstrated significant improvements in cognitive performance, with working memory increasing by 9% and attention by 7%, whereas improvements in the control group did not exceed 2% (figure 1).

Teachers reported significant improvements in social skill development among students in the intervention group, including stronger cooperation during group activities, reduced peer conflicts, enhanced communication and leadership abilities, and increased motivation and classroom engagement. In contrast, no meaningful changes were observed in the control group.



*Figure 1. Physical fitness & Cognitive Performance Improvements*

## DISCUSSION

The findings confirm earlier research indicating that physical activity enhances students' physical health (Strong et al., 2005; Tremblay et al., 2016). The increase in cardiovascular endurance and strength aligns with established evidence that moderate-to-vigorous physical activity conducted regularly produces measurable improvements in youth fitness (Pate et al., 2006).

Cognitive improvement results support previous findings that physical activity stimulates brain regions responsible for executive function (Hillman et al., 2009; Donnelly et al., 2016). The observed gains in working memory and attention are consistent with studies showing that aerobic exercise elevates neurotrophic factor levels, enhancing synaptic plasticity (Ratey, 2008).

Social skill improvement further supports prior research indicating that PE offers unique opportunities for interpersonal development (Bailey, 2017; Howells & Coppinger, 2021). Increased cooperation and leadership within the intervention group suggest that team-based physical activity promotes emotionally supportive peer interactions.

Given these multidimensional benefits, the study reinforces global calls from WHO and UNESCO for increased PE prioritization in schools (UNESCO, 2021; World Health Organization, 2020).

## CONCLUSION

The findings of this study provide compelling evidence that enhancing the structure, frequency, and quality of physical education programs can lead to significant improvements in students' physical fitness, cognitive functioning, and social development. The 12-week intervention demonstrated that when students are given regular opportunities for structured physical activity, measurable gains occur not only in endurance, strength, and flexibility but also in mental processes such as working memory and attention. These results reinforce the well-established relationship between physical activity and cognitive performance, suggesting that schools can play an essential role in supporting students' academic growth through comprehensive PE curricula.

Moreover, the social benefits observed in the intervention group underscore the importance of PE as a vehicle for interpersonal development. Students exhibited increased levels of cooperation, communication, leadership, and conflict resolution skills that are essential not only for successful school engagement but also for long-term personal and professional functioning. These outcomes highlight the broader educational value of physical education as a discipline that contributes to holistic child

development, aligning with global frameworks that emphasize social-emotional learning and inclusive education.

The study also exposes systemic challenges, such as limited curricular time, insufficient facilities, and inconsistent teacher preparation. Addressing these barriers requires coordinated action from policy-makers, school administrators, and teacher education programs. Investing in physical education should not be viewed as a diversion from academic priorities but rather as a strategic initiative that enhances students' overall well-being, cognitive functioning, and school performance. Increased funding, professional development, and the integration of innovative pedagogical methods are critical steps toward strengthening PE delivery.

Ultimately, this study advocates for the elevation of physical education to a central position within the school curriculum. Given its demonstrated impact across multiple developmental domains, PE should be recognized as an essential contributor to students' present and future health. Expanding and improving PE is not merely an educational enhancement it is a public health strategy, a cognitive development tool, and a foundation for positive socialization. By prioritizing and modernizing physical education, schools can cultivate healthier, more resilient, and more academically capable generations.

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