
SPORTS TRAINING AND ITS IMPACT ON EXECUTIVE FUNCTIONS AMONG SCHOOL-AGED CHILDREN

***Jojibabu Abbadasari**

SA-Physical Education, A.R.D.G.K Municipal Corporation High School, Eluru, W.G (Dist),
A.P.

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***Corresponding Author: Jojibabu Abbadasari**

SA-Physical Education, A.R.D.G.K Municipal Corporation High School, Eluru, W.G
(Dist), A.P.

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ABSTRACT

The present study aimed to investigate the impact of sports training on executive functions among school-aged children in West Godavari District, Andhra Pradesh. Executive functions are higher-order cognitive processes that include working memory, inhibitory control, cognitive flexibility, planning, decision-making, and problem-solving abilities. These functions play a crucial role in children's academic achievement, social behavior, emotional regulation, and overall development. Growing evidence suggests that regular participation in sports and physical activities contributes not only to physical fitness but also to cognitive and psychological well-being.

For this study, a sample of 120 school-aged children aged 10 to 15 years was selected from various government and private schools in West Godavari District. The participants were divided into two groups: a sports training group comprising children who had participated in organized sports training programs for at least 6 months, and a non-sports group comprising children with minimal involvement in structured physical activities. Standardized tests and assessment tools were administered to evaluate executive function components, including working memory, attention control, cognitive flexibility, and inhibitory control.

The study employed a comparative research design to examine differences in executive function performance between the two groups. Descriptive statistics such as mean and standard deviation, along with inferential statistics including the independent sample t-test, were used to analyze the collected data. The findings revealed significant differences in executive function scores between children engaged in regular sports training and those not involved in structured sports activities. Children participating in sports training demonstrated

superior performance in working memory, sustained attention, response inhibition, and cognitive flexibility. The results indicated that regular sports participation positively influences neural processes associated with executive functioning and cognitive development. Furthermore, the study highlighted that sports requiring strategic thinking, coordination, quick decision-making, and teamwork provide an enriched environment that stimulates cognitive growth. Participation in sports activities was also found to enhance self-discipline, concentration, emotional control, and adaptability, which are essential components of executive functioning. These findings support the growing body of literature emphasizing the role of physical activity in promoting cognitive health among children.

The study concludes that sports training serves as an effective tool for enhancing executive functions among school-aged children. Schools, parents, and policymakers should encourage regular participation in structured sports programs as part of holistic child development initiatives. Integrating sports training into educational settings may contribute significantly to improving both cognitive performance and academic outcomes. Future research may explore longitudinal effects of sports training on executive functions and examine the influence of different types of sports on specific cognitive abilities among children.

KEYWORDS: Sports Training, Executive Functions, Working Memory, Cognitive Flexibility, Inhibitory Control, School-Aged Children, Cognitive Development, Physical Activity, West Godavari District, Andhra Pradesh.

INTRODUCTION

In recent years, increasing attention has been given to the role of sports and physical activity in promoting not only physical health but also cognitive development among children. School-aged children are in a critical stage of growth and development during which cognitive abilities, behavioral regulation, and learning capacities are rapidly evolving. Among the various cognitive processes, executive functions have emerged as essential skills that influence academic success, social interactions, emotional regulation, and overall well-being. Executive functions refer to a set of higher-order mental processes that include working memory, inhibitory control, cognitive flexibility, planning, organization, problem-solving, and decision-making.

Sports training has long been recognized as an effective means of improving physical fitness, motor skills, and overall health. However, contemporary research suggests that participation in organized sports may also contribute significantly to cognitive development. Sports

activities require children to process information quickly, make decisions under pressure, adapt to changing situations, maintain attention, and control impulsive responses. These demands stimulate various regions of the brain associated with executive functioning, thereby enhancing cognitive performance.

Regular engagement in sports training provides children with opportunities to develop discipline, concentration, teamwork, strategic thinking, and self-control. Team sports and individual sports alike require participants to follow rules, anticipate opponents' actions, remember instructions, and adjust strategies according to the demands of the game. Such experiences help strengthen neural pathways that support executive functions. Furthermore, physical activity increases blood flow to the brain, promotes neuroplasticity, and enhances the release of neurotransmitters that are beneficial for cognitive functioning.

In the Indian educational context, particularly in Andhra Pradesh, schools are increasingly recognizing the importance of integrating sports and physical education into the curriculum. Despite this growing awareness, academic achievement often receives greater emphasis than physical activity, leading to reduced participation in organized sports among many school children. Understanding the cognitive benefits of sports training may encourage educators, parents, and policymakers to promote sports participation as an integral component of child development.

West Godavari District of Andhra Pradesh has witnessed considerable growth in school sports programs and youth participation in various games and athletic activities. However, limited research has been conducted to examine the relationship between sports training and executive functions among school-aged children in this region. Investigating this relationship is important for understanding how sports participation contributes to children's cognitive development and educational outcomes.

Therefore, the present study aims to examine the impact of sports training on executive functions among school-aged children in West Godavari District, Andhra Pradesh. The findings of the study are expected to provide valuable insights into the cognitive benefits of sports participation and contribute to the development of effective educational and sports policies that support the holistic development of children.

Statement of the Problem:

Therefore, the problem of the present study is stated as follows: **"To investigate the impact of sports training on executive functions among school-aged children in West Godavari District, Andhra Pradesh State."**

Objectives of the Study:

1. To assess the level of executive functions among school-aged children participating in regular sports training in West Godavari District, Andhra Pradesh.
2. To assess the level of executive functions among school-aged children not participating in organized sports training.
3. To compare the executive function abilities of children involved in sports training and those not involved in structured sports activities.
4. To examine the impact of sports training on selected components of executive functions, namely:
 - Working Memory
 - Inhibitory Control
 - Cognitive Flexibility
 - Attention and Concentration
 - Decision-Making Ability
1. To determine whether regular sports participation contributes significantly to the enhancement of executive functions among school-aged children.
2. To provide recommendations for schools, parents, and policymakers regarding the role of sports training in promoting cognitive development among children.

Limitations of the Study

The study was subject to the following limitations:

1. The study was confined to school-aged children studying in selected schools of West Godavari District, Andhra Pradesh.
2. The sample size was limited to the children selected for the study and may not represent all school-aged children in Andhra Pradesh.
3. The study focused only on selected executive function variables such as working memory, inhibitory control, cognitive flexibility, attention, and decision-making.
4. Factors such as socioeconomic status, nutritional habits, family environment, intelligence level, and academic performance were not controlled.
5. The duration and quality of sports training received by participants may have varied across schools and training centers.
6. The findings of the study are limited to the period during which the data were collected.

Delimitations of the Study

The study was delimited as follows:

1. The study was restricted to West Godavari District of Andhra Pradesh State.
2. Only school-aged children between 10 and 15 years of age were selected as subjects.
3. The study included a total sample of 120 children.
4. The participants were divided into two groups:
 - Sports Training Group
 - Non-Sports Training Group
5. The investigation was confined to the assessment of selected executive functions, namely working memory, inhibitory control, cognitive flexibility, attention, and decision-making.
6. The study focused exclusively on the impact of organized sports training and did not consider other forms of physical activity or recreational play.
7. The data were collected during the academic year 2025–2026.

METHODOLOGY

The methodology adopted for the present study was designed to examine the impact of sports training on executive functions among school-aged children in West Godavari District, Andhra Pradesh. The study employed a descriptive and comparative research design to assess and compare the executive functioning abilities of children who participated in regular sports training and those who did not engage in organized sports activities. A total of 120 school-aged children between the ages of 10 and 15 years were selected as subjects for the study. The participants were drawn from selected government and private schools in West Godavari District, Andhra Pradesh. The subjects were selected using a purposive random sampling technique to ensure adequate representation of children involved in sports training as well as those not participating in structured sports programs.

The selected subjects were divided into two groups, consisting of 60 participants each:

- **Sports Training Group (STG):** Children who had been regularly participating in organized sports training programs for a minimum period of six months.
- **Non-Sports Training Group (NSTG):** Children who were not involved in any structured sports training or organized physical activity programs.

Prior permission was obtained from the respective school authorities before conducting the study. The purpose and significance of the study were explained to the participants and their

parents. The selected executive function assessments were administered individually and in small groups under standardized testing conditions. Necessary instructions were provided before conducting each test to ensure proper understanding and cooperation from the participants. The data collection process was completed during the academic year 2025–2026. Care was taken to maintain uniform testing conditions for all participants throughout the study.

Table 1: Comparison of Executive Function Variables between Sports Training Group and Non-Sports Training Group.

Executive Function Variable	Sports Training Group Mean $\pm$ SD	Non-Sports Training Group Mean $\pm$ SD	t-value	Significance
Working Memory (Score)	32.45 $\pm$ 4.21	28.16 $\pm$ 4.85	5.18	Significant
Inhibitory Control (Score)	30.78 $\pm$ 3.96	26.92 $\pm$ 4.42	5.03	Significant
Cognitive Flexibility (Score)	29.64 $\pm$ 4.15	25.87 $\pm$ 4.69	4.68	Significant
Attention & Concentration (Score)	34.26 $\pm$ 4.37	29.48 $\pm$ 4.83	5.69	Significant
Decision-Making Ability (Score)	31.82 $\pm$ 4.08	27.34 $\pm$ 4.57	5.66	Significant

Value of t at 0.05 level of significance (df = 118) = 1.98.

The results presented in Table 1 reveal that the Sports Training Group obtained higher mean scores than the Non-Sports Training Group in all selected executive function variables. The calculated t-values for Working Memory (5.18), Inhibitory Control (5.03), Cognitive Flexibility (4.68), Attention and Concentration (5.69), and Decision-Making Ability (5.66) were greater than the required table value of 1.98 at the 0.05 level of significance.

Therefore, significant differences were found between the Sports Training Group and the Non-Sports Training Group in all selected executive function variables. The findings indicate that regular participation in sports training positively influences executive functioning among school-aged children. The hypothesis stating that sports training would significantly improve executive functions among school-aged children was accepted.

DISCUSSION

The purpose of the present study was to investigate the impact of sports training on executive functions among school-aged children in West Godavari District, Andhra Pradesh. Executive functions, including working memory, inhibitory control, cognitive flexibility, attention, and

decision-making, are fundamental cognitive processes that contribute to academic achievement, behavioral regulation, and overall child development.

The findings of the study revealed significant differences between the Sports Training Group and the Non-Sports Training Group in all selected executive function variables. Children who participated regularly in organized sports training demonstrated higher mean scores in working memory, inhibitory control, cognitive flexibility, attention and concentration, and decision-making ability when compared to children who were not involved in structured sports activities.

The improvement in working memory observed among the Sports Training Group may be attributed to the cognitive demands of sports participation. During sports activities, children are required to remember rules, strategies, movement patterns, and instructions while simultaneously responding to changing game situations. Such repeated cognitive engagement enhances the brain's capacity to store and manipulate information effectively.

Similarly, the superior performance in inhibitory control among sports-trained children indicates that regular participation in sports helps develop self-discipline and impulse regulation. Many sports require players to control inappropriate responses, follow rules, and make calculated decisions under pressure. These experiences contribute to the strengthening of inhibitory processes that are essential for executive functioning.

The findings also showed that children involved in sports training exhibited greater cognitive flexibility than their non-sporting counterparts. Cognitive flexibility refers to the ability to adapt thinking and behavior according to changing circumstances. Sports environments frequently present unpredictable situations that require athletes to modify strategies, switch attention, and respond quickly to new challenges. Such experiences may contribute significantly to the development of flexible thinking patterns.

Attention and concentration scores were found to be significantly higher among children participating in sports training. This result may be due to the sustained focus required during practice sessions and competitive events. Sports activities encourage children to remain alert, monitor their surroundings, and maintain concentration for extended periods, thereby enhancing attentional control.

The results further revealed a significant improvement in decision-making ability among the Sports Training Group. Participation in sports often involves rapid analysis of situations, evaluation of alternatives, and selection of appropriate actions. These repeated experiences help children develop effective decision-making skills that can be transferred to academic and everyday life situations.

The overall findings of the present investigation support the growing body of research suggesting that regular sports participation contributes positively to cognitive development. Physical activity has been shown to improve brain function by increasing cerebral blood flow, enhancing neural connectivity, and stimulating the release of neurotrophic factors that support learning and memory processes.

Therefore, the results of the study clearly indicate that sports training plays a significant role in enhancing executive functions among school-aged children. The findings emphasize the importance of integrating organized sports programs within school education systems to promote not only physical fitness but also cognitive and academic development. Regular participation in sports can serve as an effective strategy for fostering holistic growth and improving the overall well-being of children.

CONCLUSION

The present study was undertaken to examine the impact of sports training on executive functions among school-aged children in West Godavari District, Andhra Pradesh. Based on the analysis and interpretation of the collected data, it can be concluded that regular participation in sports training has a significant positive influence on the development of executive functions in children. The findings revealed that children who participated in organized sports training demonstrated superior performance in working memory, inhibitory control, cognitive flexibility, attention and concentration, and decision-making ability when compared to children who did not engage in structured sports activities. The statistical analysis indicated significant differences between the Sports Training Group and the Non-Sports Training Group across all selected executive function variables. The results suggest that sports training provides an enriched environment that promotes cognitive growth through continuous engagement in activities requiring concentration, strategic thinking, self-regulation, adaptability, and rapid decision-making. Participation in sports not only contributes to physical fitness but also enhances important mental processes that support academic achievement, behavioral control, and social development. Therefore, it is concluded that sports training serves as an effective means of improving executive functions among school-aged children. Schools, parents, physical education teachers, and policymakers should encourage regular participation in structured sports programs as part of a comprehensive approach to child development. The integration of sports and physical activity within educational settings can contribute significantly to the cognitive, emotional, social, and physical well-being of children. In conclusion, sports training plays a vital role in fostering

the holistic development of school-aged children and should be considered an essential component of educational and developmental programs aimed at enhancing both cognitive functioning and overall quality of life.