

## The effects of the SPARK program on physical activity engagement in 11-year-old children

### Los efectos del programa SPARK sobre la participación en la actividad física en niños de 11 años

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**Abstract.** The SPARK (Sports Play Active and Recreation for Kids) program is a holistic health initiative with the primary goal of enhancing moderate to vigorous physical activity (PA) in children, focusing on improving physical fitness, fostering sports skills, and contributing to academic achievements. The main purpose of this study was to see the effectiveness of the SPARK program on interest in physical activity among 11-year-old children. This SPARK program contains four physical and four skill fitness activities that will be applied for eight (8) weeks in four selected primary schools in Perak. This study is a quasi-experimental pre and post-control group design. 240 children consisting of boys and girls were selected as a study sample. The selection of participants is based on the 'intact sampling' method, in a situation where all students in fifth grade (5) classes are retained as study subjects, consisting of 120 students in the treatment group and 120 students in the control group. Two-way ANCOVA analysis shows a significant difference in mean post-score for interest in physical activity between the treatment groups for male and female students by controlling the pre-score after undergoing the SPARK Program. The SPARK program provided positive and significant changes to the children who received the program intervention compared to those who attended Physical Education classes as usual. The implications of the study show that the use of the SPARK program attracts children to participate in physical activities and can subsequently increase the level of physical fitness performance among children.

**Keywords:** SPARK, Physical Activity, children

**Resumen.** El programa SPARK (Sports Play Active and Recreation for Kids) es una iniciativa de salud holística con el objetivo principal de mejorar la actividad física (AF) de moderada a vigorosa en los niños, centrándose en mejorar la condición física, fomentar las habilidades deportivas y contribuir a los logros académicos. El objetivo principal de este estudio fue ver la efectividad del programa SPARK sobre el interés por la actividad física entre niños de 11 años. Este programa SPARK contiene cuatro actividades físicas y cuatro de habilidades que se aplicarán durante ocho (8) semanas en cuatro escuelas primarias seleccionadas en Perak. Este estudio es un diseño de grupo cuasi-experimental pre y post-control. Se seleccionó como muestra de estudio a 240 niños, entre niños y niñas. La selección de los participantes se basa en el método de "muestreo intacto", en una situación en la que todos los estudiantes de las clases de quinto grado (5) se retienen como sujetos de estudio, que consta de 120 estudiantes en el grupo de tratamiento y 120 estudiantes en el grupo de control. El análisis ANCOVA de dos vías muestra una diferencia significativa en la puntuación media posterior al interés en la actividad física entre los grupos de tratamiento para estudiantes masculinos y femeninos al controlar la puntuación previa después de someterse al programa SPARK. El programa SPARK proporcionó cambios positivos y significativos a los niños que recibieron la intervención del programa en comparación con aquellos que asistieron a clases de Educación Física como de costumbre. Las implicaciones del estudio muestran que el uso del programa SPARK atrae a los niños a participar en actividades físicas y posteriormente puede aumentar el nivel de rendimiento físico de los niños.

**Palabras clave:** SPARK, Actividad Física, niños

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## Introduction

Physical activity plays a crucial role in enhancing health, physical fitness, and overall well-being. To maximize the positive impact on physical fitness and health, it is essential to actively and effectively encourage optimal participation in physical activities for each child. Various psychosocial factors influence children's engagement in physical activity (Leh et al., 2020). The study review done by Mercê, Cordeiro, Romão, Branco, and Catela (2023) found that the development of Developmental Coordination Disorder (DCD) which affects about 5 to 6% of school-aged children has a higher risk of developing cardio-metabolic disease due to less active in physical activities. Participating in regular physical activity yields a myriad of advantages for individuals, with a particular emphasis on enhancing bone and skeletal health, promoting motor skill development, and fostering the psychosocial and

cognitive growth of children. Beyond these physical and cognitive benefits, engagement in physical activities plays a pivotal role in nurturing social relationships among children. Parents, teachers, schools, and communities are a support system in creating a motivated environment for young children to engage in and maintain physical activity as they step into adulthood (Mercê, Cordeiro, Romão, Branco, & Catela, 2023). The social interactions that transpire during physical activities involving parents, siblings, and peers serve as crucial opportunities for the development of thinking skills, problem-solving abilities, and decision-making processes through active mental and emotional engagement. This holistic approach highlights the interconnected nature of physical activity, encompassing both physiological and socio-emotional dimensions in the overall well-being of individuals, especially in the context of childhood development (Defever & Jones, 2021; Gavin et al., 2016). Engaging in regular physical activity across diverse

forms and contexts emerges as a powerful mitigator against a range of health issues, with particular emphasis on combatting the prevalence of obesity. Schools, given their conducive environment and the inherent opportunities for social interaction, stand as ideal platforms for promoting physical activity among children through play activities. Within the school setting, various channels such as physical education classes, recess activities, breaks, and both before and after-school programs provide valuable avenues for children to actively participate in physical activities. Long periods of sitting in the classroom are one of the sedentary behaviors and this leads to negative effects on children. A strategy should be implemented to address the issue of sedentary behavior and physical fitness among primary school students. Physical activity breaks were found to boost numerous fitness characteristics, including leg power, arm power, agility, and speed (Yudanto, Hermawan, Nopembri, Jiménez, & Gani, 2024). Adding to their research findings, they also stated that due to the positive impact on physical fitness dimensions, physical activity breaks can be implemented in primary schools. Physical activity breaks can be a solution to the problem of low student fitness and a sedentary lifestyle. Recognizing the school's role as a hub for holistic development, these structured opportunities contribute significantly to fostering a culture of regular physical activity, thereby positively impacting children's overall health and well-being (Fenech et al., 2021).

The prolonged and chronic use of electronic devices, including computer games and extended television watching, emerges as a significant factor contributing to the decline in physical activity. Simultaneously, this behavior has been linked to a reduced commitment to school assignments and a diminished appreciation for family wealth and status. These combined factors play a crucial role in the escalating rates of obesity among children. It underscores the multifaceted impact of excessive screen time on not only physical health but also academic engagement and familial connections. Addressing these interrelated aspects is vital to tackling the rising prevalence of obesity in the younger population (Lau et al., 2019).

Research findings highlight a concerning trend among Asian children, indicating that a significant portion fails to meet the recommended levels of physical activity, potentially carrying long-term implications. This insufficiency extends even to preschool children, and the contributing factors are diverse, encompassing personal, family, social, economic, and environmental influences. The imperative to encourage every child's participation in physical activities becomes apparent, given their pivotal role in holistic development spanning spiritual, physical, and intellectual domains (Sharif Ishak et al., 2020). Effectively combating childhood obesity involves the promotion of optimal physical activity alongside the cultivation of healthy eating habits within a supportive community environment. The synergy between a balanced diet and regular physical activity is paramount in positively influencing body shape. The consensus recommends a minimum of 60 minutes of daily

physical activity for children and teenagers to enhance overall health and cardiovascular fitness. Despite societal recognition of the importance of physical activity, addressing the issue remains a formidable challenge among school students, as evidenced by research findings (Mohammadi et al., 2019). The complexity of these dynamics underscores the need for targeted interventions and holistic strategies to elevate the prevalence of physical activity among children in the Asian context. The investigation revealed a notable inclination among children towards social health concerns, particularly personal appearance, as opposed to a focus on the essential components of a healthy lifestyle, which traditionally revolve around physiological and physical well-being (Biddle et al., 2019).

Additionally, the socioeconomic status of families emerged as a critical factor influencing children's engagement in physical activities, predisposing them towards sedentary behaviors, and impacting their dietary habits. Notably, residing in a low socioeconomic status proved to have adverse effects on children's health, manifesting in compromised access to quality nutrition, medical care, and limited opportunities for involvement in physical activities. These findings underscore the intricate interplay between social perceptions, economic factors, and health outcomes in the context of childhood well-being (Wyszyńska et al., 2020). In ensuring the smooth implementation and garnering interest in various school programs and physical activities, a systematic monitoring approach and the development of creative and engaging programs are essential. Emphasized the importance of well-organized programs supported by skilled teaching staff to positively influence children's participation in physical activities and promote a healthy lifestyle. The curriculum for Physical Education and Health subjects should be meticulously designed to align with the current educational landscape, meeting the needs and intellectual development of children. This alignment is crucial for enhancing children's involvement in physical activities, and fostering social interaction, motivation, and creative thinking (Norsyam et al., 2022). To address these considerations, an effective and systematic program is required to capture children's interest in physical activities and encourage their participation in fitness programs. A previous study found that the SPARK program had a statistically significant positive impact on both genders equally in promoting physical activity (McKenzie et al., 2016) and student reading achievement but did not affect regular school day attendance (Jones, 2018). In Malaysia, traditional games have been integrated into physical education sessions to enhance physical activity among primary school children (Adnan et al., 2020). Since Malaysians typically reach puberty just before turning twelve years old (Zainuddin et al., 2018), it is vital to encourage participation in physical activities at this age to develop motor skills competence, which can reduce the decline in sports and physical activity participation during adulthood (Gallahue et al., 2016). The current study aims to investigate the effectiveness of the

SPARK (Sport, Play, and Active Recreation for Kids) program on 11-year-old children, specifically focusing on interest in physical activity.

## Materials and Methods

The population for this study was recruited from several primary schools in Perak, and parental consent was obtained after providing verbal briefings about the study protocol and its potential advantages. Ethical approval was secured from the Education Planning and Research Department (EPRD), the Ministry of Education Malaysia, the State Education Department, and school authorities. The main purpose of this study was to see the effectiveness of the SPARK program on interest in physical activity among 11-year-old children. This SPARK program contains four physical and four skill fitness activities that will be applied for eight (8) weeks in all four selected primary schools in Perak. This study is a quasi-experimental pre and post-control group design. 240 children consisting of boys and girls were selected as a study sample. The selection of participants is based on the 'intact sampling' method, in a situation where all students in fifth grade (5) classes are retained as study subjects, consisting of 120 students in the treatment group and 120 students in the control group.

### *Equipment and Procedures to measure the performance of motor skills*

#### *SPARK Program*

In this study, researchers used the SPARK program as teaching and learning material for the treatment group. It aims to see the effectiveness of the SPARK program on changes in interest in physical activity among 11-year-old children. The SPARK program was initiated in 1989 with a large seven-year grant to San Diego State University from the National Institutes of Health (NIH) specifically to develop and evaluate a Physical Education program related to the health of school students. In the early stages of the SPARK program, it was founded on the needs of school students based on the amount of time required for physical activity in the classroom, a behavioral self-management curriculum to encourage physical activity outside of school, and teacher training in teaching for the subject of Physical Education. The curriculum measure has two parts, which are activities that have a focus on fitness and health and a focus on motor skills/sports.

The SPARK program is not only used during the Physical Education subject but it can also be used after school hours to promote the generalization of physical activity and physical fitness among students. The SPARK program lasts 70 minutes and has two parts: fitness-related physical activity (35 minutes) and skill fitness activity (35 minutes). Fitness-related physical activities include aerobic dancing, walking, and jumping which consist of fun games such as long pole games, ketinting games, and circuit training. The increase in physical activity was modified for the level of load, duration, and complexity of the activity based on the

age of the child. However, the main focus of this study is to increase physical activity and cardiovascular endurance. As for skill fitness activities including football, Rondas, dodgeball, and Frisbee, these sports and games have the potential to promote cardiovascular fitness and generalization to children. This SPARK program contains four physical fitness activities and four skill fitness activities that will be applied for eight (8) weeks in all primary schools that have been selected.

The SPARK program is one of the programs that has self-management. It is designed to teach children behavior change skills believed to be important in the generalization and maintenance of regular physical activity and includes receiving instruction and practice in self-monitoring, goal setting, contracted behavior, stimulus control, self-reinforcement, self-direction, scheduling, and resolving decision making or problem-solving. However, the concepts and methods for self-management have been integrated with this SPARK program.

#### *Children's Attraction to Physical Activity (CAPA)*

The Children's Attraction to Physical Activity (CAPA) questionnaire instrument was constructed to assess children's interest in physical fitness activities. The questionnaire instrument has been translated and modified by the researcher into Bahasa Malaysia, that is, by using "back-to-back translation" that focuses on five ideas, namely the acceptance of peers in games and sports, the importance of exercise, interest towards sports, and games, likes to do exercise activities, and likes to do tough physical fitness activities. These multidimensional ideas are built to measure cognitive and emotional dimensions to assess children's interest in physical fitness activities (Sanuddin, & Hashim, 2017). The Children's Attraction to Physical Activity (CAPA) questionnaire instrument, for the Cronbach Alpha, which is .85. Therefore, this value can explain why the questionnaire instrument Children's Attraction to Physical Activity (CAPA), is very relevant to be used in the learning and teaching process for the subject of Physical Education and Health and it is very suitable to be used in this study.

#### *Data Analysis*

In this study, the researcher used the computer software Statistical Package for the Social Science for Windows 25.0 (SPSS). The data obtained will be analyzed using descriptive statistical analysis and inferential statistical analysis. In this study, descriptive statistical analysis such as mean, standard deviation, and percentage were used to get a true picture of the study sample's demographic data, and interest in physical activity. Therefore, research questions, the Analysis of Covariance (ANCOVA) statistical analysis will be used to answer the research question.

## Results

Table 1 shows, the demographic data for all the variables in this study. The total frequency for the age of 11 years old

is 240. Next, the gender frequency of the primary school children (N=120) indicates that the male and the female also (N=120). The frequency for the BMI category for the highest BMI is underweight (N=172), normal weight (N=43), and overweight (N=25). Meanwhile, the performance achievement of interest in physical activity for male students in the treatment group was higher (mean=104.28, SD=7.69) compared to male students in the control group (mean=89.83 SD=9.88). Meanwhile, the performance achievement of interest in physical activity for female students in the treatment group was higher (mean=104.33, SD=11.29) compared to female students in the control group (mean=88.56 SD=7.62).

Table 1.  
Demographic data

Variables	Frequency (n)	Percentage (%)	Mean $\pm$ SD
Age			
11	240	(100.0)	
Gender			
Male	120	(50.0)	
Female	120	(50.0)	
Environment			
Rural	114	(47.5)	
Urban	126	(52.5)	
Body Mass Index (BMI)			
Underweight	172	(71.67)	8.75 $\pm$ 4.06
Normal	43	(17.92)	
Overweight	25	(10.42)	
Obesity	0		
Interest in Physical Activity (CAPA)			
Treatment			
Male	60	(25.0)	104.28 $\pm$ 7.69
Female	60	(25.0)	89.83 $\pm$ 9.88
Control			
Male	60	(25.0)	104.33 $\pm$ 88.56
Female	60	(25.0)	11.29 $\pm$ 7.62

Table 2.  
Two-Way ANCOVA Analysis of Interest in Physical Activity  
Male Tests of Between-Subjects Effects (Tests of Between-Subjects Effects)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11312.633	2	5656.317	154.013	.000	.725
Intercept	746.775	1	746.775	20.334	.000	.148
Pra CAPA	5059.630	1	5059.630	137.766	.000	.541
Group	6444.875	1	6444.875	175.485	.000	.600
Error	4296.958	117	36.726			
Total	1137523.000	120				
Corrected Total	15609.592	119				

a) R Squared = .725 (Adjusted R Squared = .720)

b) Computed using alpha = .05

The results of the Two-Way ANCOVA Analysis in Table 2, show that there is a significant main effect of the independent variable (Gender/Male),  $F(1,117) = 175.485$ ,  $p = .0001$ ,  $p < .05$ , eta squared = .600 by controlling for covariate effects. The analysis showed that there was a significant difference in the mean post-score for Interest in Physical Activity between the treatment groups for male students by controlling for the pre-score of Interest in Physical Activity after going through the SPARK Program. A total of 54% of the total variance can be explained when controlling for the effect of the pre-score for Interest in Physical Activity after being given the SPARK program intervention on the achievement of the post-score of Interest in

Physical Activity.

The results of the Two-Way ANCOVA analysis in Table 3, show that there is a significant main effect of the independent variable (Gender/female),  $F(1,117) = 363.741$ ,  $p = .0001$ ,  $p < .05$ , eta squared = .757 by controlling covariate effects. The analysis showed that there was a significant difference in the mean post-score for Interest in Physical Activity between the treatment groups for female students by controlling for the pre-score of Interest in Physical Activity after going through the SPARK Program. A total of 66% of the total variance can be explained when controlling for the effect of the pre-interest in Physical Activity score after being given the SPARK program intervention on the achievement of the post-interest in Physical Activity score.

Table 3.  
Two-Way ANCOVA Analysis of Interest in Physical Activity  
Tests of Between-Subjects Effects (Tests of Between-Subjects Effects)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	14545.565	2	7272.782	233.612	.000	.800
Intercept	246.817	1	246.817	7.928	.006	.063
Pra CAPA	7101.608	1	7101.608	228.114	.000	.661
Group	11323.935	1	11323.935	363.741	.000	.757
Error	3642.427	117	31.132			
Total	1143585.000	120				
Corrected Total	18187.992	119				

a. R Squared = .800 (Adjusted R Squared = .796)

b. Computed using alpha = .05

## Discussion

In achieving the goal of an active and healthy lifestyle among children, a planned and systematic program needs to be built and can be used at any time. Currently, various types of programs have been introduced by previous researchers to increase physical activity, and enjoyment while learning the subject of physical education, and health, for example, the CATCH (Coordinated Approach to Child Health) program, the SPARK program, and the TGFU (Teaching Games for Understanding).

Researchers selected the SPARK program as the intervention to demonstrate its efficacy in enhancing the physical fitness and health of primary school children. The SPARK program is specifically designed to promote physical activity and instill an active and healthy lifestyle in children. The planned activities aim to enhance physical skills, improve fitness, and make the overall experience enjoyable for the participants. Consequently, this suggests that the intervention through the SPARK program contributes to enhancing the physical activity and fitness levels of the participants in the study. This disparity highlights that the SPARK program yields a positive impact on the development of interest in physical activity among both boys and girls in the treatment group, distinguishing it from boys and girls in the control group. The SPARK intervention resulted in significantly lower sedentary times and higher levels of physical activity

in adolescent boys, indicating its potential to influence sedentary and physical activity behaviors (Brusseau et al 2019). Similarly, Roth et al., (2019) found a positive intervention effect on physical education enjoyment among the middle school Latinx student population in Los Angeles, California.

The findings of the analysis obtained are almost in line with the findings of the study obtained (Fu et al., 2016; Roth et al., 2019), who stated that the SPARK program has a significant effect on changes in physical activity, cardiorespiratory endurance, and motivation during physical activity among boys and women. In addition, this statement is also supported by the findings of previous researchers who explained that there was a significant difference in the changes between the treatment group and the control group for the pre-test and post-test, on all variables after the subjects underwent the intervention program (McKenzie et al., 2016; Gill et al., 2019).

Meanwhile, gender differences in CAPA scores have shown girls have a lower attraction to physical activity compared to boys (Wu et al. 2023). A nationwide study has revealed that the majority of Malaysian children not only have low levels of PA level but they are also sedentary, with screen times exceeding the maximum recommendations (Lee et al., 2015). Maintaining enjoyment in an activity requires careful consideration of time allocation and the inclusion of a variety of interesting activities. The SPARK program effectively captured the interest of both boys and girls in the treatment group, making the activities enjoyable compared to the control group, which followed regular Physical Education classes. The intervention program facilitated by the SPARK program proves to be well-suited for children, as the activities are presented in an easily approachable yet fun manner. Importantly, the program allows children to engage in planned activities that align with their abilities without coercion or embarrassment (Yuksel et al., 2020).

## Conclusions

The SPARK program has shown significant promise in enhancing physical fitness, health, and enjoyment of physical education among primary school children. The intervention has led to notable reductions in sedentary behaviour and increases in physical activity levels, particularly among males compared to females. Additionally, the intervention program has positively influenced physical education enjoyment among primary school children, underscoring its broad applicability and effectiveness across diverse populations. Despite these encouraging findings, several limitations must be acknowledged. The study's sample size and demographic diversity were limited, potentially affecting the generalizability of the results. Future research should aim to include larger and more varied populations to validate and extend these findings. While the SPARK program has demonstrated short-term effectiveness, the long-term

sustainability of its benefits remains uncertain, and longitudinal studies are essential to determine whether improvements are maintained over time. Further research should also investigate which specific components of the SPARK program contribute most significantly to its success, allowing for the optimization of the intervention.

To build on the findings of this study, future research could explore several key questions, such as how the SPARK program can be adapted to better serve underrepresented populations, what the long-term impacts of the program are on children's health and fitness as they transition into adolescence and adulthood, and which elements of the program are most effective at promoting sustained physical activity and enjoyment in physical education. The implications of this study for health policies and educational institutions are profound. Given the alarming levels of sedentary 800racticin and low physical activity among children, there is a pressing need for health policies that support the integration of structured programs like SPARK into the school curriculum. Policymakers should allocate funding and resources to facilitate this implementation. Educational institutions must prioritize physical education and cultivate an environment that encourages regular physical activity, which is vital for helping children develop lifelong healthy habits.

Overall, the SPARK program represents a promising strategy for enhancing physical activity and health among children. By addressing the identified limitations and exploring future research avenues, we can deepen our understanding of its impact and optimize its effectiveness, contributing to the well-being of children and advancing broader public health goals. Promoting children's involvement in physical fitness activities and fostering a healthy lifestyle within the community should commence early on, continuously nurturing their enthusiasm for physical activities as they grow. The SPARK program specifically targets changes in body fat percentage, cardiovascular levels, and interest in physical activity, aiming to revolutionize physical fitness activities by addressing both physical skills and health aspects. The study's anticipated outcomes hold promise in offering valuable insights that could aid teachers in captivating children's interest and encouraging active participation in Physical Education classes. With the SPARK program's approach, there is potential to inspire children to be more active and enjoyable to physical activity not only during school hours but also beyond, contributing to the cultivation of a lifelong commitment to physical well-being. Therefore, it can increase physical activity and minimize sedentary and excessive screen time among children.

In conclusion, the SPARK program emerges as a promising intervention to instill a passion for physical activities in children, potentially influencing their habits both within and outside the school setting. This proactive approach, if widely adopted, could significantly contribute to the broader goal of promoting a healthy lifestyle among children and the community as a whole. The SPARK

programs can foster behavior and environmental change by providing structured programs and the role of the teachers in shaping the children's attitudes.

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