
Effects of Sports Participation and Availability of Resources in Schools on Physical Activity and Fitness Levels of School Children: A Survey

¹Esht Vandana and ²Ajita

¹Department of Sports Sciences, Punjabi University, Patiala (Punjab), India

Email: vandyesht@gmail.com

²M.M. Institute of Physiotherapy and Rehabilitation,
Maharishi Markendeshwar University, Mullana, Ambala (Haryana), India

ABSTRACT

Children spend more than quarter of a day's time in school, and in turn are largely being influenced by school environment. As less emphasis is given to sports activities in schools, aim of the present study was to evaluate the effects of sports participation and availability of facilities in school premises on the fitness levels of school children. A study was conducted on 45 school children between age group of 10-14 years in 3 schools of Punjab. Level of sports participation and its availability in school premises was evaluated with the help of a structured questionnaire. Physical activity per day was asked individually and Metabolic Equivalent of Task was calculated. Physical fitness level of each participant was also measured by AAPERD scale for physical fitness in young population. Main outcome measures were (a) level of sports participation and its availability in school premises (b) physical activity per day in MET-MINUTE, and (c) physical fitness level of each participant. Level of sports participation was significantly associated with physical activity per day and the physical fitness level of participants (95% CI, $P \leq 0.05$). A significant difference was found between level of sports participation and physical activity per day among two groups of boys and girls participants (95% CI, $P \leq 0.05$). However no difference was found between the levels of sports participation and physical activity per day when participants were divided in to two groups, according to their age at 95% CI, ($P > 0.05$). Availability of sports facilities and participation in school premises invariably influence physical activity and physical fitness level of school children. Hence the Sports activities should be promoted in schools in order to maintain higher physical fitness level of children, leading to more healthy individuals.

Key words: Sports participation, Physical activity, metabolic equivalent, Physical fitness, School children.

INTRODUCTION

Children spend more than one fourth of their day in school, and their psychology and personality is largely influenced by school environment.¹ Apart from classrooms, games, both indoor and outdoor, greatly contribute to the overall development of children.² While indoor games enhance psychomotor coordination, analytical and reasoning skills, along with building the memory and vocabulary of players, outdoor activities help them boost their physical strength and endurance. Sports also inculcate the spirit of healthy competition and teamwork.³⁻⁵ Nowadays, the concept of play has changed drastically. Digital media is consuming the time children used to spend playing indoors and/or outdoors.^{6,7} Children now draw satisfaction and pleasure by

playing console based games. Moreover, children are glued to the innumerable shows aired on television or games available on the internet and/or mobile phones.⁷ Some parents might understand the importance of sports as a means to improve the physical and mental capabilities of their children, but most of them merely think of it as a wastage of time. In the present scenario, less emphasis is given on sports in schools. The availability and accessibility of sports facilities in schools also contribute to excellence in sports participation.⁸ Further the sports participation in schools might also influence the overall physical activity in children. Promoting physical activity in children increases physical activity levels in adulthood, thereby reducing incidence of stress and other chronic diseases.⁹ Researches indicate that physical activity reduces adiposity in both normal and overweight children, improving Musculoskeletal and cardiovascular health and fitness, as well as intellectual performance, by having a positive influence on concentration and memory.^{10, 11} Muscle strength and muscular endurance form an important component of physical fitness, which can be assessed by performing various tests, as described later. In the present study the effects of sports participation and availability of facilities in school premises on the physical activity and fitness level of school children are evaluated.

METHODOLOGY

Forty-five school going children (boys=22, and girls=23) from different classes between the age group of 10- 14 years were randomly selected from 3 government sponsored and privately owned school located in Malwa region of Punjab, India. Subjects with history of any prior medical or surgical ailments were excluded. Written informed consent was obtained from the parents of children participating in the study. The study protocol was approved by institutional ethics committee of Faculty of Medicine, Department of Sports Sciences, Punjabi university, Patiala.

The level of sports participation and its availability in school premises were evaluated with the help of a structured questionnaire filled in by each participant. The students were asked about their participation in sports during and after school hours. They were also asked about the availability of sports provisions and resources, sports grounds, courts, availability of coaches, the level of competition, and opportunities to participate at various levels. The students were asked about the number of hours being spent in sports activities during and after school hours. Students not participating in sports were questioned about the barriers preventing them from participating.¹²

The physical activity per day was asked from each participant and Metabolic Equivalent of Task (MET) was calculated using a validated Youth Physical Activity (PA) Questionnaire for children.¹³ Hours of physical activity in a day were calculated based upon self reports by the students, and METs for each activity were determined from the compendium of PA for youth.¹⁴ Similarly, sedentary hours were calculated and METs for each sedentary activity were

determined.¹⁵ Physical activity level was divided into fairly light (≤ 30 minutes), light (30 mins-2 hours), moderate (2-3 hours) or heavy (>3 hours) according to the time spent in doing physical activity per day.¹⁶

The Physical fitness level of all the participants was assessed by measuring two components of physical fitness, viz. muscle strength and muscle endurance using AAHPERD scale for physical fitness in young population.¹⁷ Flexed arm hang test was used in all the participants to measure upper body strength and endurance by timing how long the subject could hang himself, with his chin above the bar using an overhand grip, positioning the body with the arms flexed and the chin clearing the bar, the chest held close to bar with legs hanging straight. The total time in seconds was recorded till the subjects' chin fell below the level of the bar or the head tilted backwards to enable the chin stay level with the bar.¹⁸ Push-up (press up) fitness test measures upper limb and abdominal muscle strength and endurance, and was performed by the boys participating in this study. The hands and toes of the subject touched the floor, with the body and legs in a straight line, feet slightly apart, arms extended at shoulder width apart, and at right angles to the body. Keeping the back and knees straight, the subject lowered the body till there was a 90-degree angle at the elbows, then returned back to the starting position with the arms extended. This action was repeated, and continued till exhaustion, or they could do no more in rhythm.¹⁸ Euro fit Sit up Test was used to measure the endurance and strength of the abdominal muscles, and was performed by all the girl participants. The aim of this test was to perform as many sit-ups as one could in 30 seconds. The subject was made to lie down on the mat with the knees bent at right angles, with the feet flat on the floor and held down by a partner, and the fingers interlocked behind the head. The chest was raised, when commanded, so that the upper body was vertical, then the back returned to and touched the floor, and repeated for 30 seconds.¹⁸

STATISTICAL ANALYSIS

SPSS software (V.16.0; SPSS, Inc) was used for statistical analysis. The relation between level of sports participation and resources in school and physical activity and physical fitness were assessed using independent t test. Comparison of age with sports participation, physical activity and Physical fitness was done by using Analysis of Variance. Comparison of Gender with sports participation, physical activity and Physical fitness was done by using Analysis of Variance. Data are presented as mean $\pm$ SD in the following tables 3 and 4. CI was set at 95% for all statistical analysis.

RESULTS

In table 1, Subject characteristics were represented as mean $\pm$ standard deviation in both boys and girls. The mean age of subjects (boys) was 12.31 ± 1.04 years and that of girl subjects was 12.16 ± 1.29 years with a mean body mass index of $17.82 \pm 3.55 \text{ kg/m}^2$ for boys and a mean body mass index of $16.21 \pm 2.46 \text{ kg/m}^2$ for girls. Mean physical activity

duration per day in hrs was 1.59 ± 0.779 for Boys and 1.6 ± 0.89 hours for Girls. Mean Physical activity metabolic equivalent (MET-min) was 854.93 ± 375 for Boys and 666.9 ± 247 for Girls.

Table 1: Subject characteristics represented as mean and standard deviation (mean $\pm$ S.D.)

S.no.	Variables	Girls (n=23)	Boys (n= 22)
1.	Age (years)	12.16 ± 1.29	12.31 ± 1.04
2.	BMI (Kg/m ²)	16.21 ± 2.46	17.82 ± 3.55
3.	No. of subjects participating in sports in school	12	16
4.	No. of subjects participating in sports outside school	15	18
5.	Physical activity duration (Hours)	1.59 ± 0.779	1.6 ± 0.89
6.	Physical activity metabolic equivalent (MET-Minute)	666.9 ± 247	854.93 ± 375
7.	Sit ups (in 30 Seconds)/ Push ups (Maximum no.)	7.30 ± 1.16	14.45 ± 3.6
8.	Arm Hanging (Seconds)	3.21 ± 0.36	5.65 ± 1.48

In table 2, All the Subjects were divided into 2 groups, those participating in sports activities in school (Participants) were 28 in number (16 boys, 12 girls) and those not participating in sports activities in school (Non Participants) were 17 in number (6 boys, 11 girls). There was a significant difference of physical activity duration (Hours) and physical activity metabolic equivalent (MET-min) between the participants and non participants ($P < 0.05$). There was also a significant difference found among the results of Arm Hanging test ($p < 0.05$), Push up in boy subjects and Sit up test carried out in girl subjects in the participants and non participant ($p < 0.05$).

Table 2: Relationship of Sports Participation with Physical activity hours, met-min and physical fitness tests in both boys and girls using independent sample t test

Sports participation in school (n=45)	Physical activity per day in hours		Physical activity MET-min		SIT UPS in girls/ Push up in boys		Arm hanging in sec	
	Girls N=23	Boys N=22	Girls N=23	Boys N=22	Girls N=23	Boys N=22	Girls N=23	Boys N=22
Participation (28) Boys= 16 Girls= 12	$2.13 \pm 0.80^*$	$1.91 \pm 0.75^*$	$834.58 \pm 163.6^*$	$853.1 \pm 288.6^*$	$8.50 \pm 1.62^*$	16.6 ± 4.6	4.75 ± 0.52 $5.82 \pm 1.92^*$	6.62 ± 1.74
Non participation (17) Boys= 6 Girls= 11	$1.02 \pm 0.56^*$	$0.60 \pm 0.50^*$	$488.18 \pm 201.1^*$	$440 \pm 235.9^*$	$6.09 \pm 0.70^*$	12.3 ± 2.6	1.67 ± 0.2 $3.35 \pm 1.3^*$	4.67 ± 1.21

*($P < 0.05$)

In table 3, Subjects were divided into 2 groups according to age 10-12 years of age and 12-14 years of age group. There was no significant difference between Physical Activity, Arm hanging, Sit ups, Push ups test in between both the groups.

Table 3: Comparison of Sports participation, Physical activity, Physical fitness in between both gender boys and girls.

Subjects	Sports participation percentage	Physical activity per day in hours	Physical activity MET-min	Arm hanging test
Boys (N=22)	73% * N= 16	1.59± .779	854.93± 375*	6.77±1.71*
Girls (N=23)	52%* N= 12	1.60±.890	666.9±247*	3.35± .982*

*=(P<0.05)

Table 4: Comparison of Sports participation, Physical activity and Physical fitness in different age groups

Age in years	N boys	N girls	Sports participation (yes response)	Physical activity per day in hours	Physical activity MET-min	Sit ups	Push ups	Arm hanging
10-12	10	13	11	1.43±.846	699.54± 348.6	6.67±1.67	15.40± 3.71	2.08±.44
12-14	12	10	17	1.76± .795	816.19 ±301.7	8.09±1.57	15.58±5.35	2.10± .43

In table 4, Sports participation, physical activity and physical fitness was compared in between both gender boys and girls. Significant difference was found in sports participation and physical fitness in between both groups.

DISCUSSION

The main purpose of our study was to explore the relationship between level of sports participation, physical activity and physical fitness in school age children. Study was conducted on 45 school going children between 10- 14 years of age from Punjab. The subjects were divided into those participating and those not participating in sports activities in school.

Relation between sports participation and physical activity

As shown in table 2, Significant difference (p=0.05) was found in total duration of moderate to vigorous physical activity done per day in both participating and non participating group. The results were in accordance with Woods *et al* (2009)¹², who found similar results in their study. Significant difference (p=0.05) was found in physical activity metabolic equivalent (MET-

min) between those participating and not participating in sports activities. The results of this study showed that the students who were engaged in any Sports activity at school level were also actively involved in total moderate to vigorous physical activity per day as well as had higher metabolic equivalent as compared to students who did not participated in sports at school level. Although it might be a vice versa condition that children who participate in sports outside school are more likely to participate in sports in schools as well but the results in this study showed a significant positive association of sports participation in schools with total physical activity duration per day in school children. Further the students who reported presence of better facilities and availability of sports at school level showed significantly higher association with increased physical activity duration per day. Hence the participation as well as the availability of sports in school premises promote overall physical activity duration and metabolic equivalent in school children.

Relation between sports participation and physical fitness

The findings of this study showed significant difference ($p=0.008$) in the total number of Sit-ups performed in 30 seconds in both the participating and non participating group among the girl subjects of this study. The ability to perform sit ups in 30 seconds was significantly higher in those girl subjects who participate in any sport activity both in and out the school premises as compared to those who do not participate in any kind of outdoor game. However when similar equivalent test was performed by the boy subjects to check their upper limb and abdominal muscle strength, no significant difference ($p=0.338$) was found among the participating and non participating group. The results were similar to the findings of Singh et al (2012) who also found no significant difference between maximum number of push-ups in those participating and not participating in sports activities.¹⁹ The Arm Hanging test in boys also showed no significant difference among the two groups.

A significant difference ($p=0.025$) was found in arm hanging test among the girl subjects in both the groups. The subjects who were regularly participating in any kind of sports activities were able to hold longer ($4.75 \pm .52$ seconds) as compare to those who were not participating in sports ($1.67 \pm .20$) during the Arm Hanging test. This showed a significant improvement in strength of upper limb muscles in girl subjects participating in sports activities in and out the school premises regularly as compared to those not participating in sports.

Relation of Gender with sports participation

Among the girl and boy subjects of the study there was a significant difference in the response to sports participation while 73% of total boy participants responded yes to sports activity only 52% of total girl subjects responded in positive to participation in sports in and out the school premises.

While the total duration of time spent in physical activity per day showed no significant difference among the girl and boy participants, the physical activity metabolic equivalent showed significant difference among the two groups. The boy subjects of this study had significantly higher metabolic equivalent than their girl counterparts. This could be due to the reason that boys might engage in more vigorous physical activity as compared to girls. Also the difference might be due to the obvious morphological and physiological difference among the two.

When the common physical fitness test carried by both the girl and boy subject to check their upper limb muscle strength was compared it also showed significant difference between the two groups. The duration of arm hang test was significantly higher in boys (6.77 seconds) as compared to girl subjects (3.35 seconds). The results were in accordance to Singh *et al* (2012), who found similar results.¹⁹ The difference in muscle strength may be due to the reason that boys were more involved in moderate to vigorous physical activity on routine purpose as compared to their girl counterparts who were less engaged in physical activities. Also the obvious morphological and physiological difference among both boys and girls play a major role in their total muscle strength.

Relation of age with sports participation

To evaluate whether the difference in age plays any role over the sports activity among the school children of 10-14 years of age, all the subjects were divided according to age, into below and above 12 years of age. No significant differences were found in physical activity duration per day, physical activity (MET-min), duration of arm hanging, push-ups, sit-ups between 2 groups. The results were in accordance with Singh *et al* (2012), who found similar results in their study.¹⁹ Hence the results of this study suggest that age is not an important factor in determining physical fitness levels in pre-pubertal children. This could be due to the lesser difference of age among the two groups and as all the subjects belonged to same period of childhood. This might be the reason of finding similar trends in their physical activity.

CONCLUSION

The Results of this study showed that the Subjects who participated in sports were able to perform more physical activity. Also the components of Physical fitness were considerably more in subjects who participated in sports activities in schools, as demonstrated by physical fitness tests the results were especially significant in girl participants of this study. Hence the Sports activities should be promoted in schools in order to maintain higher physical fitness level of children, leading to more healthy individuals.

ACKNOWLEDGEMENTS

We thank all the participants in our study.

REFERENCES

1. Sylva K (1994). School Influences on Children's Development. *J Child Psychol Psychiat*, 35 (1): 135-170.
2. Godbey G (2009). Outdoor Recreation, Health, and Wellness: Understanding and Enhancing the Relationship. *Resources for the Future Background Study*. Outdoor Resources Review Group, Washington DC.
3. Miller K (1989). The Outside Play and Learning Book: activities for young children. *Beltsville*. Gryphon House, Lewisville.
4. Rivkin M S (1995). The Great Outdoors: restoring children's right to play outside. National Association for the Education of Young Children. Washington, DC.
5. Rivkin M S (2000). Outdoor Experiences for Young Children. Available at: www.vtaide.com/png/ERIC/Outdoor-XP.htm
6. Moore, R C, Wong, H H (1997). Natural Learning: The life history of an environmental schoolyard. *Berkeley*. MIG.
7. Clements R (2004). An Investigation of the Status of Outdoor Play. *Contemporary Issues in Early Childhood*, 5 (1): 68-80.
8. Olajide O A (2004). Sports facilities: a problem of school sports in Nigeria. *International Journal of Emotional Psychology and Sport Ethics*, 6: 19-23.
9. Trudeau F, Shephard R J (2005). Contribution of School Programmes to Physical Activity Levels and Attitudes in Children and Adults. *Sports Med*, 35 (2): 89-105
10. Byrd-Williams C E, Belcher BR, Spruijt-Metz D *et al* (2010). Increased physical activity and reduced adiposity in overweight Hispanic adolescents. *Med Sci Sports Exerc*, 42 (3): 478-484.
11. Laguna M, Ruiz J R, Lara M T, Aznar S (2013). Recommended levels of physical activity to avoid adiposity in Spanish children. *Pediatr Obes*, 8 (1): 62-69.
12. Woods C B, Tannehill D, Quinlan A, Moyna N, Walsh J (2010). The Children's Sport Participation and Physical Activity Study (CSPPA). Research Report No 1. *School of Health and Human Performance, Dublin City University and the Irish Sports Council*. Dublin, Ireland.
13. Cancela J M, Ayán C, Castro A (2013). An evaluation of questionnaires assessing physical activity levels in youth populations. *J Child Health Care*, 17 (3): 274-293.
14. Van Remoortel H, Camillo C A, Langer D *et al* (2013). Moderate Intense Physical Activity depends on selected Metabolic Equivalent of Task (MET) cut-off and type of data analysis. *Plos one*, 8 (12): 1-9
15. McArdle W D, Katch F I, Katch V L (1994). Essentials of exercise physiology. *Lea and Febiger*. Philadelphia, PA.
16. Chicharro J L (2006). Physical activity and health in childhood and adolescence. *Ministry of Health and Ministry of Education and Science*. Madrid, Spain.

17. American Alliance for Health, Physical Education, Recreation and Dance (1980). *Lifetime health-related physical fitness test manual*. Reston, VA.
18. California Department of Education (2012). 2012-13 Physical Fitness Test. *California physical fitness test reference guide*. California, CA.
19. Singh A, Uijtendewilligen L, Twisk J W, van Mechelen W, Chinapaw MJ (2012). Physical activity and performance at school: a systematic review of the literature including a methodological quality assessment. *Arch Pediatr Adolesc Med*. 166 (1): 49-55.