



The Association Between Sports Participation and Physical Fitness

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Received 2022 April 14; Accepted 2022 April 27.

Abstract

Context: The increasing extent of physical inactivity among children, adolescents, and adults is one of the greatest public health concerns. Sport is a type of leisure-time physical activity. With improved knowledge regarding the health advantages of physical activity, the role of sports in society has become increasingly important for the promotion of public health. Recognizing the significance of the effects of sports participation on physical fitness, this study presents a review of the association between sports participation and physical fitness.

Evidence Acquisition: A search for literature was conducted on PubMed, Scopus, and Google Scholar using the terms “sports participation and physical fitness” to find the association between the key terms. A total of 21 studies met the inclusion criteria.

Results: Sports participation was found to be positively associated with physical fitness. Participation in sports was associated with more physical activity, less sedentary behavior, and improved physical fitness. Participation in club sports led to improved physical fitness, especially endurance and strength. Sports participation resulted in improved cardiorespiratory fitness, improved anaerobic performance, and higher levels of muscular strength.

Conclusions: Sports participation is associated with many health benefits, including improved physical fitness. As sports participation is a well-liked physical activity, making it easily accessible and spreading awareness about its benefits can lead to more healthy people and communities.

Keywords: Sports, Physical Activity, Physical Fitness, Cardiorespiratory Fitness

1. Context

Physical activity is any movement of the body caused by skeletal muscles that need the consumption of energy (1). Physical activity may include energy expending bodily movements produced during occupational, transport, domestic, and leisure time (2). Physical inactivity causes 6% of deaths worldwide and is the fourth major risk factor for deaths worldwide due to an increased risk of noncommunicable diseases (3). A number of health benefits are associated with physical activity, including physical fitness (4). Lower risk of development of chronic diseases and death is linked with physical fitness, which is the ability to perform everyday work with stamina and attentiveness, without becoming overly tired, and with the energy to enjoy leisure activities and respond to crises, and has aspects like flexibility, balance, speed of movement, cardiorespiratory fitness, and musculoskeletal fitness. Physical fitness usually improves with increased physical activity, and physical fitness leads to improved health outcomes (4). The increasing extent of physical inactivity

among children, adolescents, and adults is one of the greatest public health concerns faced by many countries (5). Sport is a type of leisure-time physical activity that is mostly planned, organized, and competitive, and in certain cases, played as an individual, while many times played as part of a team (6). With increasing awareness about the health benefits of physical activity, the role of sport in society has become increasingly important for the promotion of public health (7). Many nations across the world have realized the importance of sports in achieving public health goals (8). In recent times, new opportunities have arisen in sports participation as ‘informal’ participation is increasing rapidly compared to formal and traditionally organized club-based sports participation, although club sports are considered more beneficial than informal group sports or individual sports. Physiologically, the beneficial effects of club sports are mostly attributable to the strenuousness of exercise (9, 10). Recognizing the significance of the effects of sports participation on physical fitness, this study presents a

review of the association between sports participation and physical fitness.

2. Evidence Acquisition

A search for literature in the English language was conducted in April 2022 on different databases, including PubMed, Scopus, and Google Scholar, using the terms “sports participation and physical fitness” to find the association between the key terms. The inclusion criteria were the relevance of articles to the key terms and the selection of original research, including controlled clinical trials, and cross-sectional and longitudinal studies. 21 studies in total from 12 countries published between 1997 and 2020 met the inclusion criteria. Relevant information from each study was utilized to determine the effects of sports participation on physical fitness. The data from each study were analyzed to determine the relationship and association of sports participation with physical fitness.

3. Results

21 studies were reviewed to determine the association between sports participation and physical fitness. Samples for these studies were taken from 12 countries, including Austria, the USA, Germany, Estonia, Belgium, Portugal, Northern Ireland, Spain, Australia, Turkey, the Netherlands, and South Africa. [Table 1](#) shows studies from different countries describing how sports participation affects physical fitness. Most of the studies that were reviewed were conducted on younger populations and included an approximately equal number of male and female participants, except for those whose objective was to study only one gender, either male or female.

All studies that were reviewed describing a link between sports participation and physical fitness found a positive association. Participation in club sports led to improved physical fitness, especially endurance and strength ([11](#), [13](#), [16](#), [23](#), [27](#)). Those who participate in sports clubs or organized sports were more physically active, with a higher probability of participating in the recommended levels of physical activity ([16](#), [20](#), [23](#), [27](#)). Past sports participation was positively linked to later levels of physical activity, sports participation, and physical fitness ([12](#), [15](#)). Children who regularly participated in sports had higher levels of muscular strength ([13](#), [14](#)). Participation in many different sports for a longer duration of time resulted in an increased level of physical fitness compared to specializing in a single sport, especially in males ([14](#), [17](#), [24](#)). Sports participation resulted in improved anaerobic

performance ([14](#), [26](#)). Sports participation resulted in improved cardiorespiratory fitness and aerobic capacity ([16](#), [17](#), [21](#), [25](#), [27](#)). Spending more time participating in sports was positively associated with physical fitness ([18](#), [24](#)). Sports participation was linked with less whole-body fat. Sport participants were less likely to be overweight and mostly had lower BMI values ([19](#), [21](#), [26](#), [29](#), [30](#)). A higher percentage of boys than girls reported participating in organized sports ([20](#)). Teenagers who participated in sports during secondary school spent much less overall time sitting or engaging in sedentary behaviors than non-sport participants ([31](#)).

4. Discussion

Frequent physical activity significantly improves physical fitness and health status. Physically active children and young people have stronger bones, lower body fat, a lower risk of cardiovascular diseases, higher levels of cardiorespiratory fitness, and higher muscular endurance and muscular strength in comparison with inactive young people. At later ages, compared to physically inactive people, people who are physically active have greater levels of physical fitness, and a lower risk of developing chronic non-communicable diseases ([3](#), [4](#)). Obesity and overweight account for 5% of all deaths worldwide ([3](#)). Sports participation is associated with lower body fat, a lower BMI, and a lower risk of obesity ([22](#), [29](#), [30](#)).

Physical inactivity causes various negative muscular adaptations, including losses in muscle volume and power, which are more pronounced in older participants than in younger ones ([32](#)). Participation in sports and sports training involving resistance exercise enhances strength and physical performance by increasing muscle protein synthesis, promoting muscle growth, increasing muscular hypertrophy, preventing losses, and inducing considerable gains in myofiber and total muscle size, strength, muscle quality, and physical performance ([33](#)).

Although sports participation may increase physical fitness, knee symptoms, pain, and injuries are linked with certain sports. Competitive players are more likely to present with knee symptoms than recreational players. Precautions should be taken to avoid getting knee problems, particularly when participating at a high level of competition like combat sports, soccer, or basketball ([34](#)).

The heart and circulatory system are affected in different ways depending on the frequency, intensity, and duration of physical activity. Heart rate during resting and submaximal exercise is usually 5 to 20 beats lower after 6 months of regular vigorous exercise in individuals who

previously had no exercise or significant physical activity, with a 20% increase in stroke volume and improved myocardial contractility. Due to increased myocardial cell size, the volume of the atria and ventricles expands structurally with slight changes in wall thickness, which results in increased heart size. Physical activity may result in increased heart capacity, the formation of new capillaries, and increased aerobic capacity (35).

Physical activity and sports participation contribute to good health by improving cardiorespiratory fitness (2). Cardiorespiratory fitness is a robust predictor of mortality and cardiovascular disease, as improved cardiorespiratory fitness leads to less mortality and a lower risk of cardiovascular disease (35). However, with an estimated frequency of 1 in 80 000 athletes per year, sudden cardiac death is one of the major causes of death in athletes (36). Sudden cardiac death is a death that occurs unexpectedly less than an hour after the start of symptoms in situations where the death is witnessed, and less than 24 hours after the individual was last seen alive and healthy in circumstances where the death is unwitnessed (37).

The most common cause of sudden cardiac death among athletes is a previously identified or unidentified heart problem. The majority of sudden cardiac death incidents in athletes aged 35 and up are caused by atherosclerotic coronary artery disease. Genetic and other acquired cardiovascular disorders, particularly cardiomyopathies, are more common causes in athletes under the age of 35. Sudden cardiac death may be the first sign of many of these illnesses, while some may have had earlier symptoms that may include pain in the chest, fainting, and sudden ventricular arrhythmias. Cardiac societies have developed preparticipation screening guidelines for athletes based on the available data. Elite athletes should be screened, according to the European Society of Cardiology and the American Heart Association. Screening programs for all players have been introduced by the Fédération Internationale de Football Association (FIFA). The Wilson and Jungner criteria are not only for athletes and have been designated by the World Health Organization for evaluation of screening programs for all masses, including cardiac screening of school children before participation in sports (36).

Sports participation in childhood is linked to HRQoL (Health-Related Quality of Life) in young adulthood, whether it is in the form of individual or team sports, or an unstructured physical activity like backyard games. In childhood, increased participation in organized sports, competitive sports, team sports, endurance sports, and informal group sports are all independently linked to better HRQoL in young adulthood (38). Sports

participation appears to be connected to better subjective health outcomes in middle-aged males, according to the majority of research examining health and health-related quality of life (39). In terms of bone health, past physical activity and professional involvement in sports can protect postmenopausal women from osteoporosis (40).

The majority of people with physical disabilities do not engage in sports on a regular basis, which may raise their risk of developing secondary health problems. Selection of the most appropriate sport, keeping in view the hurdles and assets for sports participation, promotes the extent of sports participation for people with physical limitations (41).

4.1. Conclusions

With the increased awareness of health issues, the importance of being physically fit can't be denied. Sport is a well-liked leisure physical activity all over the world, especially among the younger population. Along with being a pleasant leisure-time or competitive activity, sports participation is also associated with many health benefits, including improved physical fitness. As sports participation is a well-liked physical activity, making it easily accessible through sports clubs or other opportunities, and spreading awareness about its benefits can lead to more healthy people and communities. The advantages of participation in sports are not limited to just children, adolescents, and younger adults; sports participation is also beneficial for middle-aged and older adults. Although participation in sports is positively associated with physical fitness, care should be taken to avoid injuries as they may lead to different health problems. Also, in cases of competitive, strenuous sports, cardiac screening is recommended before participation to avoid any cardiac problems.

Footnotes

Authors' Contribution: Study concept and design: S. T.; analysis and interpretation of data: S. T.; drafting of the manuscript: S. T.; critical revision of the manuscript for important intellectual content: S. T.

Conflict of Interests: The author has no conflict of interest due to any organizational, financial, or personal reason.

Funding/Support: This research received no specific grant, funding, or support.

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Table 1. The Association Between Sports Participation and Physical Fitness

Author(s)	Study Design & Sample	Findings
Drenowatz et al., 2019 (11)	Longitudinal study from 6 till 14 years age of 3293 Austrian children and adolescents	Participation in club sports was linked to improved physical fitness, particularly in terms of muscular strength, endurance, and speed. Differences due to participation in club sports decreased during 6 to 10 years (elementary school) but increased during 10 to 14 years of age (middle school).
Perkins et al., 2004 (12)	Longitudinal study of 600 American respondents at age 12 years, 17 years, and 25 years	Sports participation during childhood and adolescence was discovered to be positively associated with participation in sports and physical activity during early adulthood.
Golle et al., 2014 (13)	4-year longitudinal study of 172 German children (age: 9 - 12 years)	Children who participated in sports clubs on a regular basis showed much better endurance and lower-extremity strength development than their non-participating counterparts.
Hoffman et al., 2005 (14)	Cross sectional study of 44 American fifth grade children (11.2 ± 0.3 year)	Subjects who participated in recreational sports programs throughout the year fared much better on the upper body and lower body strength and power tests compared to non-participants or participants in only one sport, suggesting that children who regularly participate in recreational sports on a year-round basis may have higher levels of muscular strength and anaerobic power.
Phillips & Young, 2009 (15)	Cross sectional study of 221 adolescent Urban American ninth-grade girls	Those who participated in at least two teams were more likely than those who did not participate in any team to finish the three-stage step test without reaching their target heart rate. A positive association was found between past sports participation and current levels of physical activity and fitness.
Riso et al., 2019 (16)	Cross-sectional study of 256 Estonian preschoolers aged 6 to 7 years	Physical fitness was linked to weight status and body composition, as well as physical activity level. Children who participated in sports clubs had greater cardiorespiratory fitness, and vigorous, and moderate-to-vigorous physical activity compared to children who did not.
Renfrow et al., 2011 (17)	Cross-sectional study of American middle school and high school students	Males who participated in more sports had higher healthy fitness zone attainment in cardiorespiratory fitness, body fat and muscle mass, muscle strength, endurance, and flexibility compared to males who participated in fewer sports, probably due to the longer and more extreme nature of the sports they participated in.
De Meester et al., 2020 (18)	Cross-sectional study of 558 (8-11-year-olds) Flemish students divided into 4 groups with different physical fitness and fitness enjoyment	Regardless of their enjoyment levels, both groups with relatively high fitness spent more duration of time in organized sports (2.01 hours and 2.29 hours) compared to the two groups with low fitness (1.08 hours and 0.98 hours).
Drenowatz et al., 2013 (19)	Cross-sectional study of 995 German primary school children	Children who participated in organized sports at least once a week were more physically fit and less likely to be overweight.
Marques et al., 2016 (20)	Cross-sectional study of 973 Portuguese children and adolescents aged 10 - 18 years	A higher percentage of boys (51.3%) were participating in organized sports compared to girls (28.3%). Organized sports participants had higher probability to meet the recommended physical activity guidelines and to spend more time engaging in moderate and vigorous intensity physical exercise than those who did not.
Boreham et al., 1997 (21)	Cross-sectional study of 1015 school children from Northern Ireland, aged 12 and 15 years	Physical activity was linked to lower systolic blood pressure, a better lipid profile, and better cardiorespiratory fitness. Sports activity was linked with less fatness and better cardiorespiratory fitness in 15-year-old females. A very small decline (-20 percent) in physical activity (boys) or sports involvement (girls) was strongly connected to the probability of exposure to numerous risk factors, according to odds ratios derived using logistic regression. Males compared to females and older children compared to younger children had stronger associations.
Ara et al., 2004 (22)	Cross-sectional study of 114 Spanish boys (9.4 ± 1.5 years). 63 physically active boys and 51 non-physically active boys	In prepubertal males, regular sports participation minimum of 3 hours per week, in addition to physical education, is linked to enhanced physical fitness and lower truncal and whole-body fat.
Telford et al., 2016 (23)	Longitudinal study of Australian youth (134 boys, 155 girls) aged 8 - 16 years	At all age groups, sports club members were more physically active than non-members; boys and girls walked an extra 1800 steps and 590 steps per day, respectively, and engaged in an extra 9 minutes and 6 minutes of moderate to vigorous physical activity per day, respectively. Sports participants had a greater level of fitness (boys 27%, girls 20%), and sport participant females had 2.9 % less body fat. Sports participants' higher fitness scores were maintained throughout time, although their increased physical activity decreased during adolescence, which was especially noticeable among girls, and then only 20% sports club members had the daily required one hour of moderate to vigorous physical activity.

Fransen et al., 2012 (24)	Cross sectional study of 735 Flemish boys in three groups (6 to 8 years, 8 to 10 years, and 10 to 12 years of age)	The eldest group demonstrated that sampling various sports had a positive influence on strength, speed, endurance, and gross motor coordination. Every age group saw a positive effect from spending many hours per week participating in sports. 10 to 12 years old boys who spent more hours in many sports did better than boys who specialized in one sport, according to multiple comparisons.
Kayihan, 2014 (25)	Cross-sectional study of 236 Turkish volunteers (Mean Age: 16 years \pm 1) including 80 non-sports participants, 84 martial arts athletes and 72 team sports athletes	Body height and aerobic capacity were significantly higher in the team sports group compared to the martial arts and non-sports groups, while muscular endurance and flexibility were significantly higher in the martial arts group compared to the team sports and non-sports groups.
Zwinkels et al., 2018 (26)	Controlled 6 months clinical trial of 71 Dutch children and adolescents (8 -19 years) with different chronic health problems including genetic, neurological and, cardiovascular problems from four special education schools assigned as sport or control group based on the presence of school-based sports	Anaerobic performance improved by 16 percent in the sport group after participating in a school-based sports program. Furthermore, when compared to the control group, the athletic group lost 2.8 percent more fat mass. Aerobic performance showed no alterations.
Silva et al., 2013 (27)	Cross-sectional study of 310 Portuguese participants aged 11 - 18 years	Across all levels of competitive sports participation, there were positive and substantial trends in cardiorespiratory fitness and objectively measured physical activity. Independent of moderate to vigorous physical activity levels, participation in competitive sports at club levels improved the chances of being fit and is more effective than other organized or unorganized sports in achieving healthy levels of cardiorespiratory fitness and recommended levels of moderate to vigorous physical activity.
Pastor et al., 2003 (28)	Cross-Sectional Study of 1038 Spanish adolescents aged 15 - 18	Sports participants perceived increased physical fitness leading to a perception of improved health.
Deforche et al., 2012 (29)	Cross-sectional study of 3214 Flemish obese and non-obese schoolchildren	When compared to their non-obese counterparts, obese participants performed worse on all physical performance tests except for demonstrating increased handgrip strength. Both groups engaged in identical leisure-time physical activity, but compared to their obese peers, nonobese boys participated more in sports.
Agata & Monyeki, 2018 (30)	Cross-sectional study of 238 South African adolescents, mean age 14.9 \pm 0.8 years	The sport participation group had lower BMI component values, higher physical fitness scores in selected categories such as sit-ups and maximal oxygen intake, and more social support than the non-sport participation group. For both groups, there was a negative relationship between physical fitness components and the majority of body composition components.
Prat et al., 2020 (31)	3 years longitudinal survey of 113 Spanish students (secondary school till first year university)	Teenagers who participated in individual sports and team sports spent a much shorter duration of time sitting (110.5 fewer minutes and 126.4 fewer minutes, respectively, per day on weekends) than non-sport participants. Sport participation-based interventions reduce sitting time spent on some domain-specific behaviors from secondary school to university, potentially reducing the increase of sedentary behavior during adolescence.