



Original research

Associations between organized sports participation and objectively measured physical activity, sedentary time and weight status in youth

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ABSTRACT

Objectives: The purpose of this study was to examine whether participation in organized sports is related to achieving physical activity recommendations, body mass index (BMI), objectively measured PA intensity and time spent sedentary.

Design: Cross-sectional study.

Methods: The sample comprised 973 children and adolescents (427 boys, 546 girls) aged 10–18 years (Mage=14.1±2.4). Organized sport was self-reported. Physical activity and time spent in moderate and vigorous intensity PA (MVPA) and sedentary time was assessed with accelerometers.

Results: More boys (51.3%) than girls (28.3%) reported to be involved in organized sports participation ($p<0.001$). Those who were engaged in organized sports were more likely to achieve physical activity guidelines (OR=1.64, 95% CI: 1.14–2.35, $p<0.01$), spent more time in MPA (OR=1.01, 95% CI: 1.01–1.02, $p<0.01$), VPA (OR=1.09, 95% CI: 1.05–1.13, $p<0.001$), and MVPA (OR=1.01, 95% CI: 1.01–1.02, $p<0.001$) than those who did not participate in organized sports. No associations between organised sport participation and time spent sedentary or BMI was observed.

Conclusions: Engagement in organized sports is related to higher levels of objectively measured MPA, VPA and achieving the recommended levels of MVPA in youth; however participation in sports appears unrelated to time spent sedentary and BMI. Our results suggest that promoting organised sport may increase physical activity of at least moderate intensity in young people.

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1. Introduction

Despite the well-established physical, social and mental health benefits of physical activity (PA),¹ a substantial proportion of children and adolescents are not active enough to benefit their health,^{2,3} and PA levels declines during the transition from childhood to adolescence, especially among girls.⁴

Studies have shown that organized sports participation is more stable over time,^{5,6} and it has been suggested that organized sports have an important role in preventing and reducing childhood obesity,⁷ and contribute to children and adolescents attaining PA recommendations.⁶ A clearer understanding of the relationships between context specific PA (e.g. sport participation), with overall PA, likelihood of achieving PA guidelines, and sedentary time may contribute to the development of more accurate preventive strategies to increase children' and adolescents' engagement in PA.

Participation in sports may also result in increasing time spent sedentary. Such possible increment of sedentary time has been hypothesized to occur because PA and sedentary time may act as gateway behaviours. Change in one behaviour may lead to a change in other behaviours.⁸ However, evidence from experimental studies using objective measures⁹ and observational studies using objective¹⁰ and self-report measures¹¹ of physical activity and sedentary time indicate that the association between sedentary and active behaviours may be asymmetrical; suggesting that both behaviours may co-exist. Therefore, the aim of this study was to examine whether participation in organized sports contributed to achieving PA recommendations, time spent in MVPA and sedentary and to body mass index (BMI). To address these research questions, we measured PA and sedentary time objectively in a large population based sample of Portuguese youth in combination with self-reported data on organized sports participation.

2. Methods

Data were collected from a representative sample of 2506 Portuguese children and adolescents aged 10–18 years

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Table 1
Descriptive characteristics of participants by gender.

	Total (n=973)		Boys (n=427)		Girls (n=546)		p
	n	%	n	%	n	%	
Organized sport ^a							<0.001
No	608	62.5	208	48.7	400	73.3	
Yes	365	37.5	219	51.3	146	26.7	
BMI ^a							0.030
Normal weight	747	76.8	342	80.1	405	74.2	
Overweight	226	23.2	85	19.9	141	25.8	
PA guidelines ^a							<0.001
Not accomplished	810	83.2	306	71.7	504	92.3	
Accomplished	163	16.8	121	28.3	42	7.7	
Sedentary time (min/day) ^b	561.3 ± 103.0		545.6 ± 112.5		573.6 ± 93.50		<0.001
Total PA (min/day) ^b							
LPA	249.5 ± 103.8		257.0 ± 108.6		243.7 ± 99.5		0.051
MPA	32.5 ± 21.0		39.7 ± 23.2		26.8 ± 17.0		<0.001
VPA	3.1 ± 4.3		4.4 ± 5.5		2.1 ± 2.6		<0.001
MVPA	35.6 ± 24.0		44.1 ± 27.2		28.9 ± 18.7		<0.001

PA, physical activity; LPA, light physical activity; MPA, moderate physical activity; VPA, vigorous physical activity; MVPA, moderate to vigorous physical activity.

^a Tested by Chi-square.

^b Testes by Mann-Whitney test.

($M_{age} = 14.1 \pm 2.4$), from a cross-sectional study aimed to examine associations between PA, physical fitness, and overweight prevalence. For the present study 973 participants (427 boys, 546 girls) providing data on objectively measured PA and weekly participation in organized sports were included. Written informed legal guardian and children and adolescents consent was obtained for each component of the study by the child's legal guardian and by all participants. The study was approved by the Institutional Review Board of the Faculty of Human Kinetics, University of Lisbon.

Participants' height was measured barefoot to the nearest 0.5 cm, using a portable stadiometer. Weight was measured in light clothing to the nearest 0.1 kg on an electronic scale (Omron HBF-500 Body Composition Monitor). BMI was calculated from the ratio weight/height². Participants were then classified into normal weight or overweight/obese based on age and sex specific cut off points proposed by the International Obesity Task Force.¹²

Participants were asked whether they practiced any organized physical activities. Organized sport was defined as sport activities guided by a coach or other adult, such as playing football or basketball in a club team. Responses were dichotomous (yes or no). The test-retest reliability was carried out within a one-week interval across 100 participants. Using intraclass correlation coefficient (ICC), the reliability was high ICC = 0.95.

PA and sedentary time were measured with the accelerometer GT1M Actigraph (Pensacola, FL, USA). Participants were given an information sheet providing instructions to wear the accelerometer on the hip secured by an elastic waist belt, during all waking hours except while bathing or doing other water-based activities. Prior to data collection accelerometers were tested to check abnormal functions and battery capacity. The devices were initialized as described by the manufacturer. Sequences of consecutive zeros for periods with 60 minutes were identified and were defined as missing data. At least three days of recording (two weekdays and one weekend day) with a minimum of 600 minutes wear time was required for inclusion in analysis. Activity levels were expressed in terms of overall PA (counts/min). Activity counts were summed for each hour that the accelerometer was worn between 7:00 AM and 24:00 PM to provide a representative image of daily activity. Time (min/d) spent in different sub-components of PA were calculated using the following intensity thresholds; <100 for sedentary time, 100 to 2019 for light PA (LPA), 2020 to 5998 for moderate PA (MPA), and ≥ 5999 for vigorous PA (VPA). Participants

were classified as meeting PA guidelines if they accumulated ≥ 60 min/day in MVPA.¹³

Descriptive statistics are presented as mean and standard deviation or percentages. Data were tested for normality. Mann-Whitney U-test and Chi-square test were used to compare differences between boys and girls in organized sport participation, BMI, achievement of PA guidelines, time spent in sedentary behaviours and PA intensity. ANCOVA and Chi-square test were performed to assess differences between those who reported participating in organized sports with those who did not participate in organized sports for achieving PA guidelines, time in sedentary behaviours, and PA intensity. Firstly, analyses were performed using age-groups (10–12 years, 13–15 years, and 16–18 years). However, results were not different among age-groups. Therefore, analyses were conducted with the entire sample, adjusting for age. Binary logistic regression analysis was used to estimate the relationship between organized sports participation and achieving PA guidelines, BMI, PA intensity and time spend sedentary. Overall analyses were adjusted for age and sex, and thereafter analyses were run separately for sex, because boys and girls have different patterns of organized sport participation.⁴ Data analysis was performed using SPSS version 22. The level of significance was set at 0.05.

3. Results

The descriptive data of organized sports participation and characteristics of participants are presented in Table 1. Slightly more than one third of participants participated in organized sports. Significantly more boys (51.3%) than girls (28.3%) reported to be involved in organized sports participation ($\chi^2(1) = 61.599$, $p < 0.001$). Similarly, the percentage of boys (28.3%) meeting PA guidelines of at least 60 minutes MVPA per day was significantly higher than girls (7.7%) ($\chi^2(1) = 73.230$, $p < 0.001$). Most participants were normal weight (76.8%), but almost 20% of the boys and 25.8% of the girls were classified as overweight/obese ($\chi^2(1) = 4.706$, $p = 0.030$). Time spent sedentary was on average 561.3 ± 103.0 min/day and the majority of time devoted to PA was of light intensity PA (LPA) (249.5 ± 103.8 min/day). Girls spent significantly more time sedentary than boys ($U = 98831.500$, $p < 0.001$). In contrast, boys spent more time than girls in LPA, MPA and VPA.

The relationships between organized sport participation and achieving PA guidelines, BMI, sedentary time and PA intensity are

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