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**Differences in the physical activity, sedentary time and BMI of Finnish
grade five students**

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Differences in the physical activity, sedentary time and BMI of Finnish grade five students

Abstract

Background: This study examined the distribution of objectively measured physical activity (PA) and sedentary time (ST) of fifth grade students during the school, leisure-time and physical education (PE) classes. Demographic, anthropometric and PA data were collected from 17 representative Finnish schools.

Methods: To estimate the PA and ST, participants ($N=592$) wore wGT3X-BT Actigraphs for seven consecutive days. Comparisons were made between genders and different BMI groups.

Results: From the study sample, 43.7% met the MVPA guidelines. Participants spent 62.2% of the day sedentary and 8.2% they were moderately or vigorously active. Boys performed more moderate to vigorous PA (MVPA) than girls, and girls were more sedentary during school day. Boys had more MVPA than girls in leisure-time, but in ST there were no differences. However, an examination of PA assessed during PE classes revealed no differences between boys and girls. Normal weight boys engaged in more MVPA than overweight and obese children. No differences were found for girls.

Conclusions: The PE levels differs between different BMI groups in leisure-time and during school but not during PE lessons. Targeted efforts for overweight children should be targeted or compulsory PE should be increased to reach the PA guidelines.

Keywords: physical activity; adolescent; accelerometry, physical education, body weight

Introduction

Research has detailed that insufficient levels of physical activity (PA) and excessive levels of sedentary time (ST) has become a major concern in developed countries¹⁻². As a result of insufficient PA and excessive calorie intake, the obesity epidemic among children has become a crucial major health concern³. Regular PA and especially moderate to vigorous physical activity (MVPA) have variety of health benefits, including significant caloric expenditure and hence, prevention and control of obesity⁴. Overweight has also been found to be a barrier for PA among children⁵. This study examined differences in PA and ST among 11-12 years old Finnish children and different BMI groups during week days and weekends.

PA guidelines for children aged 5-17 outline that at least 60 minutes of MVPA every day is necessary to facilitate gain health benefits⁶. During the school day there is potential for engagement in PA, however, previous studies have shown that European schoolchildren (aged 10-12) spent only 5% in MVPA during recesses⁷ and much of their time during school day is spent in sedentary behaviors (e.g. in Brazil among 7-12-year-old children)⁸. In previous studies boys (aged 9-12 Hungarians)⁹, normal weight children⁷ and children with high cardiorespiratory fitness (European children aged 12-17)¹⁰ have been assessed as more active than their peers during school days.

Researchers reported that leisure-time is crucial period for MVPA,¹¹⁻¹² and most of their sedentary time occurs between 3pm and 9pm¹³⁻¹⁴. According to Arundell et al. (2015)¹⁵ children aged 8 years spend only 40.9 minutes in light physical activity (LPA) and 17.6 minutes in MVPA during leisure-time. It has also been found that 10-18-year-old Portuguese children participating in organized sport engage in more MVPA than

nonparticipants¹⁶. However, in another study, MVPA levels during free-play activity were higher than during organized or structured activity sessions among primary school students. The study also detailed the analyses of the mean MVPA durations in different activities as follows: free play indoors (12.1 minutes), organized PA indoors (9.2 minutes), free play outdoors (12.7 minutes), and organized PA outdoors (5.7 minutes)¹⁷.

Previous research has shown that during school physical education (PE) classes the mean proportion of time spent in MVPA is 40.5% (4-12-year-old children)¹⁸. Mooses et al.¹⁹ also found that during PE lessons students spent 28.6% in MVPA and 29.3% of ST (7-12-year-old Estonian children). In another study, involving children aged 11-12 in the US, results showed that 38.4% of their time was spent in MVPA and 18.3% in ST²⁰. However, the context of PE activities significantly influences the level of MVPA accumulated during lessons (children aged 8-9 in England)²¹.

The distribution of the type of daily activities in which children engage varies depending on the age of children. Younger children tend to accumulate more MVPA and less ST than older children²². Previous research has found that weight status predicts MVPA but not ST during school day^{7,23}. Overweight/obese children engage in less MVPA than normal weight children^{7,23}. Leisure-time differences in MVPA have been found between different BMI groups²³. However, there are also studies that reveal a lack of differences in MVPA between different BMI groups²⁴. Findings have also shown that there are no differences between different BMI groups in LPA or ST during school day, or leisure-time^{7,24}. Daily percentages of the time spent in different intensity activities among primary school students has been reported as ST 57-63% LPA 31-37% and MVPA 5-6%^{23,25}. Increase of BMI among children and adolescents' is evident,

since 1975 BMI has increased 0.32 kg/m² per decade²⁶. While the world mean for girls was 17.2 for girls and 16.8 for boys in 1975, the values were 18.6 and 18.5 in 2016, respectively. However, there has been some plateau recently, mostly in northwestern Europe, high-income English-speaking and Asia-Pacific regions for both sexes²⁶.

The current study investigated the distribution of periods of PA and ST in a cohort of fifth grade students (11-12 years old). More specifically, this study investigated differences between gender and BMI groups, and the associations among children's BMI and different PA levels during weekdays, weekends and PE lessons. Although previous research related to these topics has been undertaken, it is based on LPA and MVPA levels during school days or leisure-time. This study includes more comprehensive analysis of LPA, moderate (MPA) and vigorous (VPA) PA collected during PE lessons, the school-day and leisure-time separately. Hence, this study provides data to extend and support current information in the area of children's PA engagement. Data has shown that during the school days children are mostly sedentary and only engage in low levels of MVPA, boys are more active in PE lessons than girls²⁷ and the influence of BMI on MVPA and ST are contradictory^{23,24}. The aim of this study is to investigate 1) PA intensities among 11-12-year-old children during week and weekend, 2) level and intensity of PA during school day, PE lessons and leisure time, and 3) level and intensity of PA among boys, girls and different BMI groups.

Methods

This study used data from the research project "Associations between Move! – monitoring and feedback system for physical functional capacity and Finnish students' physical performance, physical activity engagement and motivation in physical education. Study targeted children's PA and sedentary behaviors. In total, 592 children

(309 girls, 283 boys) aged 11-12 years (Mean =11.3, SD=0.3) participated in the study. Data were collected across 37 different classes across 17 socio-demographically representative Finnish schools in September 2017. Participants' stature was measured to the nearest 0.1 cm using portable measuring equipment by leading researcher. Body mass was measured to the nearest 0.1 kg using calibrated scales for children in light clothing and barefooted. For each participant, BMI was calculated and z-scores were assigned to each child²⁸. Mean BMI was 18.80 (SD 3.06) (girls 18.78 [2.98], boys 18.84 [3.17]). Children were categorized as underweight, healthy weight, overweight and obese²⁸ (table 1). Because of the small number of underweight participants, these were combined to normal weight cohort in the analysis.

Children were fitted with a wGT3X-BT Actigraph accelerometer (Pensacola, FL) by trained researchers at the beginning of the data collection period. Participants were asked to wear the accelerometer for seven consecutive days (with exception of sleep-time and water-based activities) on their right hip attached via an elastic belt. The epoch length was set at 15 seconds and data was processed using Actilife Lifestyle monitoring System, version 6.12.1. Non-wear time was defined as 30 min of consecutive zeros. Analyses were restricted to 453 participants (76.5% of 592 participants) who provided at least three days (two-week days + one weekend day) of valid accelerometer data (mean 5.24, range 3-7). Three-day measurement has proven to be reliable method when investigating PA and ST²⁹. A valid day was defined as recording at least 500 min of measured wear time between 07:00 and 23:00. In previous studies it has been shown that at least 360 minutes should have been measured for a valid day³⁰. To avoid possible bias in PA levels and ST, children who provided three valid days of accelerometer data

were compared with those who provided four or more days. No differences between MVPA levels were found.

Standard cut-points were used to define the mean daily percentage of time spent at various intensities: sedentary (0-100CPM), light (101-2295CPM) and moderate to vigorous (>2295CPM)³¹. Light intensity and moderate to vigorous were divided into two categories to allow closer examination (LPA1 101-1197, LPA2 1198-2295, MPA 2296-4011, VPA 4012-19999). The relative time in which children participated in LPA, MVPA or ST was calculated as percentages [(certain activity level time / total wear time)×100].

PA and ST levels were studied during the different phases of the day. An official timetable for each participant was obtained from the school. In addition, and for reliability reasons, participants were asked to fill out diaries indicating the beginning and the end of the school day. They also provided information regarding how they travelled their school trip and whether they were sick or not. In addition, PE lessons were tracked from the accelerometer data, based on the school timetable of the students. PA in different sections of the day were compared between boys and girls using independent t-tests. In addition, different BMI groups were also compared using MANCOVA. The numbers of participants meeting the PA guidelines were compared between groups using chi-square tests. Linear regression was used to predict the PA and ST based on gender and BMI.

Ethics statement

Ethical approval was obtained from the university of [REDACTED] ethics committee.

Written parental consent and child assent to complete the study were obtained prior to participation.

Results

Analysis of the total wear time revealed that the percentage distribution for categories of the children's activity time was 62.5% in sedentary behaviors, 29.4% in LPA (LPA1=22.7%, LPA2=6.7%) and 8.1% in MVPA (MPA 5.0%, VPA=3.1%) during week days and 61.00% in sedentary behaviors, 31.1% in LPA (LPA1=24.0%, LPA2=7.1%) and 7.9% in MVPA (MPA=5.0%, VPA=2.9%), during weekend days. Examination of the total level of LPA indicated that 40.7% was accumulated during school days (girls 39.4%, boys 42.4%) and 59.3% during leisure-time (girls 60.6%, boys 57.6%). Total level of MVPA was represented by 43.3% accumulated during school day (girls 41.7%, boys 45.0%) and 56.7% accumulated during leisure-time (girls 58.3%, boys 55.0%). The total level of ST was represented by 39.1% accumulated during school day (girls 39.4%, boys 37.7%) and 60.6% during leisure-time (girls 60.6%, boys 62.3%). During the study, boys performed more MVPA than girls (64.03 [± 14.34] minutes vs 54.90 [± 21.05] minutes daily). (Table 2). A simple linear regression was calculated to predict the participant's BMI based on their gender. Significant equation was not found ($F(1, 438) = 0.172, p = .679, R^2 = .000$).

Comparisons between different BMI groups revealed that normal weight boys (67.55 [± 24.13] minutes) had more MVPA than overweight (53.40 [± 23.66] minutes) or obese children (48.64 [± 12.86] minutes) ($p = 0.14-.009$) in weekdays, but not in weekend days. Results for LPA showed there were no differences between groups. Among girls, differences between BMI groups were not found. Different activity levels during the school day and leisure-time were distributed in the BMI groups as follows: normal

weight (LPA 41.0%/59.0%, MVPA 43.2%/56.8%, ST 39.1%/60.9%), overweight (LPA 42.3%/57.7%, MVPA 46.9%/53.1%, ST 39.7%/60.3%), obese (LPA 41.4%/58.6%, MVPA 43.3%/56.7, ST 38.5%/61.5%). Comparing the proportion of participants who meet the PA recommendation of 60 min of daily MVPA between different BMI groups revealed that normal weight children (46.9%) met the recommendations more often than overweight (34.5%) and obese children (27.3%) ($p=.029$). A higher percentage of normal weight boys (58.2%) met the recommendations than overweight (30.8%) or obese boys (26.7%) ($p=.004$). Among girls, the difference between normal weight (38.8%), overweight (37.5%) and obese girls (27.8%) was not statistically significant. (Table 3).

PA and ST during school day

During school day children spent 60.7% engaged in sedentary behaviors, 30.5% in LPA and 8.8% in MVPA (girls= 63.2%/28.9%/7.9%, boys 57.4%/32.5% 10.1%). Comparison of PA levels between boys and girls during school day demonstrated that boys were more active during the school day ($p<.001$) while girls were more sedentary ($p<.001$). Boys had more LPA1, LPA2, VPA, MVPA ($p<.001$) and MPA ($p=.002$) than girls. Between different BMI groups it was found that during the school day obese children engaged in higher levels of LPA1 ($p=.015$), LPA2 ($p=.030$) and LPA ($p=.009$) than normal weight children. On the contrary, obese children had lower levels of VPA than normal weight ($p<.001$) and overweight ($p=.009$) children and lower levels of MVPA than normal weight ($p=.015$). (Table 3 & 4).

A multiple linear regression was calculated to predict the PA and ST based on gender and BMI. Significant regression results were found for school-day ST ($F(2, 438) = 41.582, p<.001, R^2=.140$), LPA1 ($F(2, 438) = 16.124, p<.001, R^2=.059$), LPA2 ($F(2,$

438) = 40.087, $p < .001$, $R^2 = .136$), LPA ($F(2, 438) = 24.451$, $p < .001$, $R^2 = .087$), MPA
 ($F(2, 438) = 34.492$, $p < .001$, $R^2 = .119$), ($F(2, 438) = 25.530$, $p < .001$, $R^2 = .091$) VPA (F
 (2, 438) = 25.530, $p < .001$, $R^2 = .091$) and MVPA ($F(2, 438) = 35.601$, $p < .001$,
 $R^2 = .122$).

213 ***PA and ST in leisure-time***

214 During leisure-time children spent 63.1% of time engaged in sedentary behaviors,
 215 29.2% in LPA and 7.6% in MVPA (girls=63.6%/29.2%/7.2%, boys=
 216 62.6%/29.2%/8.2%). Likewise, during leisure-time boys engaged in more MPA
 217 ($p = .021$) and MVPA ($p = .046$) than girls. During the leisure-time period girls spend
 218 more time sedentarily ($p = .036$). During leisure-time obese children spent more time in
 219 LPA1 than normal weight children ($p = .018$) and more time in LPA1 ($p = .041$) and LPA
 220 ($p = .044$) than overweight children. Again, normal weight children spent more time in
 221 VPA than overweight ($p = .007$) and obese children ($p = .004$). Normal weight children
 222 had more MVPA than overweight children ($p = .012$). (Table 3 and 4).

224 A multiple linear regression was calculated to predict the PA and ST based on gender
 225 and BMI. Significant regression results were found for leisure-time LPA1 ($F(2, 438) =$
 226 3.187, $p = .042$, $R^2 = .012$), MPA ($F(2, 438) = 4.939$, $p = .008$, $R^2 = .019$), VPA ($F(2, 438)$
 227 = 8.466, $p < .001$, $R^2 = .004$) and MVPA ($F(2, 438) = 35.601$, $p < .001$, $R^2 = .122$).

228 ***PA and ST during PE lessons***

229 During PE lessons children spent 34.0% of their time in sedentary behaviors, 41.0% in
 230 LPA and 25.0% in MVPA (girls=36.1%/40.5%/23.4%, boys=31.5%/41.7%/26.8%).
 231 During PE lessons there was a statistical difference in ST between boys and girls
 232 ($p = .016$). Instead, in PA categories there were no differences between genders, or

between different BMI groups. Likewise, no differences were found when different BMI groups were compared between genders. However, children who met the WHO recommendations for PA engaged in more MVPA (girls $p=.013$, boys $p<.005$) and lower level of ST ($p=.001$) during PE lessons was found for the boys than those who did not met the recommendations. (Table 3 and 4).

A multiple linear regression was calculated to predict the PA and ST based on gender and BMI. No significant regression results were found for PE lesson PA or ST variables.

PA and ST during weekends

During weekends boys spent more time in LPA2 and MPA than girls ($p=.009-.010$) but for ST there were no differences. Normal weight children had more VPA than overweight ($p=.044$) and obese ($p=.018$) children. All BMI groups had less MVPA during weekends when compared to weekdays ($p=.001-.030$). Normal weight and obese children also had less VPA during weekends ($p=.003-.004$) than week days. Normal weight and obese children also had less MPA during weekends ($p=.002-.005$). Obese children also spent less time in LPA1 and LPA during weekends ($p=.016-.018$) than week days.

Discussion

The present study was designed to investigate difference in PA and ST for a sample of 5th grade students over a continuous five weekday and two weekend day period. Comparisons were made between different gender and BMI groups during the school-day, leisure-time, PE-lessons, and weekend days. This study revealed detailed

information regarding objectively measured PA among 11-12-year-old students. The results of this study indicated that there are significant differences between genders and different BMI groups in PA and ST during school day and leisure-time but not during PE lessons.

Distribution of different activity levels are in line with a previous study that involved children of the same age, whereby, daily percentages in ST (62.5%), LPA (29.4%) and MVPA (8.1%) are comparable to the results reported by Trost²⁵ (63%, 31% and 6%, respectively). Marques et al.¹⁶ reported findings supporting the current results demonstrating that boys engaged in more MVPA than girls during school day and in leisure-time. The present study found that the difference primarily exists because of higher proportion of VPA among boys. Mean times for MVPA among boys (64.0 min) and girls (54.9 min) in this study, were higher than times found for boys (40-50 min) and girls (23-43 min) in data collected across five European countries³². Even though girls performed less MVPA, it is notable that during leisure-time girls accumulated a larger portion of their daily PA (both MVPA and LPA) than boys. Similar results have also been reported in Australian samples¹³. In addition, normal weight boys met the recommendations for daily PA more consistently than overweight or obese boys, a pattern also shown in similar research³³. This type of PA behavior could be explained by higher usage of video/computer games³⁴ or screen time³⁵ among boys. High screen time is especially concern, if children are not meeting the recommendations for PA. It has been found that children with simultaneous influence of high screen time and lack of PA are 3 to 4 times more likely to be overweight³⁶.

The current study determined that during both the school day and leisure-time periods, obese children had more LPA1, but less VPA than normal weight children. A similar

pattern was found during leisure-time among overweight children. These results, however, were not replicated during PE lessons with time in MVPA being similar for all children. This finding highlights that PE does have the capacity to promote equity in MVPA engagement for all weight groups, however, a previous Czech study did not report any similarity between the MVPA of children in relation to their body weight status³⁷. This highlights the importance of compulsory PE lessons for school aged children, especially for overweight children. Since there were no differences in BMI groups during PE lessons it may be that these children do not move in other contexts and hence, PE may be the only time period where they are encouraged to move and have the possibility to engage in a variety of different sports and physical activities. The pedagogical intent of PE also has other important objectives beyond PA, including social and psychological objectives³⁸. In PE lessons, various activities contribute to engagement in PA differently. For example, ball games accumulate more MVPA and less ST than gymnastics or track and field lessons³⁹ or in movement lessons²¹. However, for boys and girls, it was found that during PE lessons girls recorded a higher level of sedentary time than boys. This is in line with previous research highlighting the more active participation of boys during PE lessons and the more sedentary participation of girls²⁰.

This study details differences in the patterns of engagement in PA between girls and boys and between different BMI groups across the day, including time spent in PE. Findings that support the claim that a focus should be maintained on obese and overweight boys and provide activities specifically designed for these groups. In addition, targeted interventions could be directed to immigrant children, since these groups seems to be in risk group when entering to new culture with westernization of eating habits, body image perceptions and PA⁴⁰. Even though girls have less MVPA

there are no differences between different BMI groups. Hence, more attention should be focused on girls PA during school day and leisure-time, how to promote PA and activate more generally. While schools have promoted PA during the day in Finland, it seems that increasing compulsory PE would be the most potential way to increase PA for all students.

Abbreviations

BMI=body mass index

CPM=counts per minute

LPA=light PA, LPA1 & LPA2 indicates the intensity of LPA

MPA=moderate PA

MVPA=moderate to vigorous PA

PA=physical activity

SD=Standard deviation

ST=sedentary time

VPA=vigorous PA

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Table 1. Physical characteristics and % of meeting the PA guidelines of the participants with valid PA data.

	Girls	Boys	All
	Mean (SD)	Mean (SD)	Mean (SD)
	(n=258)	(n=189)	(n=453)
Age (years)	11.25 (3.20)	11.27 (0.33)	11.26 (0.32)
Height (cm)	148.08 (7.22)	148.40 (6.45)	148.21 (6.90)
Weight	41.40 (8.61)	41.91 (4.40)	41.62 (8.94)
BMI (kg/m ²)	18.78 (2.98)	18.84 (3.17)	18.80 (3.06)
Weight status			
Underweight (%)	2.0	2.1	2.0
Normal weight (%)	78.5	75.9	77.4
Overweight (%)	12.5	13.9	13.1
Obese (%)	7.0	8.0	7.4
% of children meeting PA guidelines			
Week day	39.8	57.7	47.5
Weekend day	34.0	44.8	38.6

453 Table 2. Differences between boys and girls in intensity levels (minutes)*.

	Girls (n=259)	Boys (n=194)	p	All (n=453)
Mean time spent in PA and ST, average day (week days)				
LPA	214.66 (41.39)	223.26 (41.62)	.022	218.57 (41.68)
MVPA	56.51 (19.85)	65.38 (24.10)	<.001	60.55 (22.31)
ST	474.08 (58.83)	444.13 (65.73)	<.001	460.45 (63.78)
Mean time spent in PA and ST, average day (weekend day)				
LPA	213.43 (51.18)	217.20 (60.81)	.426	215.07 (55.54)
MVPA	51.87 (32.42)	59.35 (39.00)	.055	55.12 (35.58)
ST	424.69 (86.31)	414.13 (101.17)	.309	420.10 (93.11)
Mean time spent in PA and ST, average day (week total)				
LPA	215.17 (38.85)	222.88 (40.47)	.041	218.48 (39.66)
MVPA	54.90 (21.05)	64.03 (24.34)	<.001	58.95 (22.79)
ST	463.09 (56.57)	441.02 (64.52)	<.001	453.79 (60.15)

454 * Minutes shown as absolute values. In the analyses, wear-time considered.

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456 Table 3. Differences between BMI groups in different intensity levels (minutes)*.

School day	Normal weight	Overweight	Obese	F (2,438)	<i>p</i>
ST	181.92 (24.98)	180.57 (24.60)	173.94 (22.77)	0.79	
LPA1	69.14 (15.34)	72.77 (16.00)	77.79 (14.57)	4.50	1<3
LPA2	20.37 (5.12)	20.63 (5.23)	23.01 (4.14)	3.37	1<3
LPA	89.51 (18.89)	93.41 (19.69)	100.80 (17.41)	4.75	1<3
MPA	17.07 (5.62)	16.64 (5.97)	16.46 (4.09)	0.36	
VPA	9.78 (5.34)	9.00 (5.11)	5.61 (3.51)	9.99	1>3, 2>3
MVPA	26.85 (9.72)	25.64 (10.0)	22.07 (1.10)	4.15	1>3
Leisure-time				F (2,438)	
ST	285.87 (52.17)	282.43 (54.39)	289.59 (61.84)	0.09	
LPA1	101.66 (22.91)	99.72 (24.31)	113.50 (27.56)	3.95	1<3, 2<3
LPA2	29.95 (10.16)	27.44 (9.18)	32.45 (11.40)	2.05	
LPA	131.61 (30.73)	127.16 (31.67)	145.95 (36.44)	3.24	1<3
MPA	21.45 (9.56)	18.43 (9.10)	20.95 (10.03)	2.51	
VPA	14.64 (10.23)	11.14 (9.20)	8.84 (8.16)	8.81	1>2, 1>3
MVPA	36.09 (18.13)	29.58 (16.88)	29.79 (16.57)	5.66	1>2
PE				F (2,398)	
ST	30.52 (14.67)	29.79 (15.39)	30.22 (15.22)	0.72	
LPA1	24.87 (7.10)	23.72 (7.21)	24.97 (7.79)	0.96	
LPA2	12.24 (5.01)	11.94 (5.58)	11.53 (4.82)	2.05	
LPA	37.11 (9.45)	35.67 (10.75)	36.50 (9.64)	0.75	
MPA	13.65 (8.07)	14.56 (8.05)	13.74 (8.43)	1.02	

VPA	8.50 (7.68)	9.98 (9.21)	9.54 (9.27)	0.24
MVPA	22.15 (13.38)	24.54 (13.67)	23.28 (16.85)	0.33

* Minutes shown as absolute values. In the analyses, wear-time considered.

Table 4. Differences between boys and girls in different intensity levels (minutes)*.

School day	Boys	Girls	F (1, 438)	p
ST	170.50 (24.75)	188.80 (22.11)	22.26	<.001
LPA1	73.87 (15.40)	67.40 (14.94)	14.20	<.001
LPA2	22.68 (5.09)	19.10 (4.53)	16.40	<.001
LPA	96.55 (18.64)	86.50 (18.14)	13.38	<.001
MPA	19.21 (5.91)	15.36 (4.73)	9.61	.002
VPA	10.78 (5.99)	8.25 (4.55)	12.94	<.001
MVPA	29.99 (10.34)	23.61 (8.15)	14.88	<.001
Leisure-time			(1,438)	
ST	288.26 (85.19)	299.1 (77.47)	4.44	.036
LPA1	102.51 (33.82)	107.37 (30.80)	0.01	.939
LPA2	31.84 (13.21)	29.67 (10.85)	1.98	.160
LPA	134.35 (44.78)	137.05 (39.99)	0.12	.733
MPA	23.01 (11.41)	20.44 (9.79)	5.37	.021
VPA	14.42 (11.68)	13.77 (9.62)	1.86	.173
MVPA	37.43 (21.20)	34.21 (17.99)	3.99	.046
PE			F (1,398)	
ST	29.28 (14.52)	32.11 (32.11)	5.81	.016
LPA1	24.40 (7.63)	24.37 (6.91)	0.96	.328
LPA2	12.19 (5.51)	11.74 (5.19)	2.13	.139
LPA	36.60 (10.62)	36.11 (9.24)	2.11	.147
MPA	14.44 (8.31)	13.30 (8.20)	2.68	.102

PA differences in fifth graders

VPA	9.50 (8.68)	8.26 (7.32)	1.33	.249
MVPA	23.94 (14.79)	21.56 (21.56)	2.72	.100

459 * Minutes shown as absolute values. In the analyses, wear-time considered.

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