



Are Children and their Parents More Active when Children Engage in More Structured Activities?

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ABSTRACT

International Journal of Exercise Science 11(5): 106-115, 2018. Children's participation in sport/physical activity programs (structured activity) may play a critical role in promoting (or hindering) activity in children and their parents. The purpose of this pilot study was to determine if the amount of time children spend participating in structured activity correlates with physical activity levels (moderate to vigorous physical activity (MVPA)/day and steps/day) in children and their parents. Convenience sampling was used to collect data from 14 parent-child pairs with children ranging from ages 7-10 years. Parental and children's daily physical activity levels (MVPA/day and steps/day) were determined from pedometer data using a Piezo-SC Step Pedometer. Parents also completed a questionnaire that outlined how many hours/week their children participated in structured activities. A Pearson-product moment correlation analyses between hours per week in structured activity and children's steps/day ($r = .16, p = .60$) and MVPA ($r = .12, p = .68$) were not significant. Similarly, there were no significant relationships between children's participation (hours per week) in structured activity and parent's steps/day ($r = .16, p = .59$) and MVPA/day ($r = .20, p = .50$) respectively. These results suggest that children and parental physical activity is predicated on complex, interrelated factors. Contrary to popular thinking, parents whose children are engaged in more structured physical activities are not less physically active than other parents; the reality is neither are sufficiently active. Altering these perceptions are important in future intervention strategies that aim to promote activity.

KEY WORDS: Pedometers, steps, pediatric activity, parental activity

INTRODUCTION

Children are often thought of as the epitome of physical activity; yet, only 9% of Canadian children aged 5-17 years old achieve the minimum physical activity guidelines (20). Currently, the guidelines state that children aged 5-17 should obtain 60 minutes of moderate to vigorous physical activity (MVPA) a day, or 12,000 steps while people aged 18-64 are recommended to achieve 150 minutes of MVPA per week (or 10,000 steps per day) (6, 20, 24). Physical inactivity or low levels of physical activity contribute to the development of non-communicable diseases such as cancer, cardiovascular disease and diabetes, while also increasing the risk of future

comorbidities (15, 21). Contrarily, physical activity has been shown to improve mood and quality of life while also reducing feelings of depression and anxiety (21). In an era where cost effective health care is at a premium, possible solutions to improve physical activity involvement are needed.

Research has shown that children's physical activity at school varies considerably, with some children obtaining 20 minutes more of MVPA than others during the school day (3). Other studies have shown that only 45% of children achieved more than 30 minutes of MVPA during school days and that more than 15% of students had less than 15 minutes per day of MVPA at school (7, 14). Importantly, children can obtain up to 50% of their recommended physical activity in the after school period (3-6 p.m.) termed the "critical window" (1, 19). One possible method to increase physical activity in this "critical window" is through sport and physical activity programs (termed structured activity in this paper). If structured activity programs fall within this range, there are immense opportunities to promote physical activity, while attenuating sedentary behaviours.

Both sport and physical activity programs have been shown to decrease sedentary time along with improving creativity and developing important social skills in children (13, 18). Despite being involved in these programs, engaging in sedentary behaviours for long periods of time throughout the day may result in children not meeting physical activity requirements and perpetuating negative complications. When considering parent's activity levels, continually balancing their children's needs with personal time constraints and family responsibilities can make being sufficiently active difficult (17). If parents enroll their children in structured activity programs, the associated responsibilities and demands of their children's physical activity engagement may influence their own activity levels. Despite these potential physical activity barriers, it is both possible that parents with children in many activities could be active (meeting activity guidelines) or inactive (not meeting activity guidelines) depending on their situation. Elucidating this research question may have implications for parents and their children in attaining recommended physical activity levels.

Thus, the purpose of this pilot study was to explore if the amount of time children spend participating in structured activity programs is correlated with their activity levels (MVPA per day and steps per day) and their parent's activity levels. It was hypothesized that because of additional opportunities to be physically active, children who participated in more structured activities per week would be more physically active compared to those who engaged in fewer structured physical activities. It was also hypothesized that, because of the constraints imposed from physical activity opportunities, parents with children who participated in many hours of structured physical activity per week would be less physically active than parents with children who participated in fewer structured physical activities each week.

METHODS

Participants

Convenience sampling was used to invite parents and their children (from a local after-school physical activity program) aged 7-10 years old to participate in this study. The local after-school program consisted of one, two-hour session per week for 10 weeks. This physical activity program emphasized inclusive, cooperative games aimed at facilitating the development of physical literacy skills such as jumping, running, throwing and catching. For parents with more than one child in the program, the youngest child was included in the study. Parental involvement was decided on a voluntary basis by the mother and father. In total, 17 parent-child pairs consented to this study, providing a total of 34 participants (see Table 1 for sample characteristics). Research Ethics was obtained from the local university's Research Ethics Board prior to data collection.

Protocol

Parents were asked to complete a short questionnaire regarding their children's physical activity. The questionnaire asked, "Is your child currently enrolled in an organized sport or after-school physical activity program?" and instructed parents to complete a chart indicating the type of activity, the total number of activity sessions per week and length of activities in a normal week. From the questionnaire chart, the total number of hours per week spent in structured activity was calculated by multiplying the length of typical activities and the total number of activity sessions. This was done in an attempt to standardize children's involvement in structured activity programs. For example, some children may be involved in activities six times per week, but if these activities only last 15 minutes, the physical activity and/or time constraints may not be as demanding (or vice versa).

Upon receipt of the completed questionnaire, the parent and child were asked to wear pedometers (Piezo Step RX, StepsCount) for all waking hours of a week (7 days). Pedometers have been shown to be a valid and reliable tool to measure steps and exercise intensity (12). The pedometers calculated total steps (through pendulum mechanics), and exercise intensity (time spent above a step intensity threshold). Instructions specified not to wear the pedometers for water-based activities (i.e., bathing, swimming, etc.). Parents were also asked to fill out a physical activity log to record any non-wear time for themselves and for their child. The parents were instructed to indicate the time the pedometers were put on in the morning and taken off at night for them and their child.

Statistical Analysis

For each parent-child pair in the study, their total number of steps and minutes of MVPA were recorded and averaged over the number of full pedometer days (3-7 days) of data. This provided an overview and indication of activity levels for both the parent and child. Although each parent-child pair was asked to wear their pedometers over the course of a week, data were still included in the analyses provided there were at least three complete (10+ hours) days of wear time according to previously established standards (6, 9, 26). To determine the relationship between children's participation (total hours per week) in structured activity and

their physical activity levels, a one-tailed Pearson Product correlation analysis was conducted. Similarly, a one-tailed Pearson Production correlation analysis was used to assess the relationship between children’s participation (total hours per week) in structured activity and their parent’s physical activity levels.

In addition to the correlation analysis, the children were divided into average activity (≤ 2 times per week) and high activity (≥ 3 times per week) users based on the definition (regular activity involvement once a week) provided by Statistics Canada (5). To decide on the cut-point, we took into account both the definition, and the fact that the sample participated in the same after-school program at least once a week. This secondary analysis was completed to further investigate if possible differences in parental and children’s physical activity occurred at the average structured activity participation threshold. Independent *t*-tests were used to analyze potential mean differences between the two groups (average vs. high structured activity levels) regarding parents and their children’s physical activity levels (MVPA per day and steps per day). An α -level of $p \leq 0.05$ was used to determine significance and all data was analysed using SPSS 22.0.

RESULTS

Although 17 parent-child pairs consented to participate, only the data from 14 parent-child pairs were used in this study. This was because one child lost the pedometer, another set was not returned, and one child was eliminated because he was considered an outlier with more than 30,000 steps per day. To be included in this study, parents had to fill out the questionnaire and have obtained sufficient pedometer data (minimum of 10 hours for at least three days) (6, 9, 26). After fulfilling these requirements, 28 participants (14 parent-child pairs) were included in these analyses. Descriptive statistics of parents and their children are provided in Table 1.

Table 1. Participant characteristics, including structured physical activity involvement and physical activity levels. Where appropriate, means \pm standard deviations are presented.

	Parent (n = 14)	Child (n=14)
Females	9	8
Age (years)	N/A	8.13 \pm 1.06
Number of activities/week	N/A	3.14 \pm 2.18
Hours/week in structured play	N/A	3.82 \pm 2.84
Steps/day	8,564.21 \pm 2,817.60	12,377.43 \pm 1,400.50
MVPA/day (mins)	54.68 \pm 17.64	81.98 \pm 9.97

The children in our sample participated in 3.14 ± 2.18 activities per week and about 3.82 ± 2.84 hours per week in structured physical activities. Parents achieved $8,564.21 \pm 2,817.60$ steps per day and 54.68 ± 17.64 minutes of MVPA per day while their children recorded $12,377.43 \pm 1,400.50$ steps per day and 81.98 ± 9.97 minutes of MVPA per day (Table 1). The correlation between hours per week in structured physical activity and children’s steps per day ($r=.16$, $p=.60$) and MVPA per day ($r=.12$, $p=.68$) were not significant. These findings were similar to

the results found between hours per week in structured physical activity and parents' steps per day ($r=.16$, $p=.59$) and MVPA per day ($r=.20$, $p=.50$) respectively.

Descriptive statistics (i.e., sex, age) and physical activity levels for children involved in an average or high number of structured physical activities are shown in Table 2.

Table 2. Means \pm SD of children grouped according to High (≥ 3 times) and Average (≤ 2) participation in structured activity per week.

	Average (n = 5)	High (n = 9)
Females	4	4
Mean Age (years)	8.00 \pm 1.22	8.22 \pm 1.09
Hours/week in structured activity	1.20 \pm 1.30	5.28 \pm 2.36

When the children were divided into average and high sport/activity users, there were no significant differences in children's and parents' MVPA per day and steps per day (Figure 1 and 2 respectively). Although parents of high sport/activity children had more MVPA per day (60.85 ± 17.82) and steps per day ($9,590.22 \pm 2,904.14$) compared to parents of average sport/activity users (43.58 ± 11.72 MVPA per day and $6,717.40 \pm 1517.03$ steps per day), these differences were not significant, yet they were trending towards significance ($t(12) = -1.93$, $p = .08$ and $t(12) = -2.04$, $p = .06$, respectively). Similarly, although, high sport/activity children had slightly more MVPA per day (83.05 ± 10.79) and steps per day ($12,550.78 \pm 1499.40$) compared to average sport/activity children (80.06 ± 9.10 MVPA per day and $12,065.40 \pm 1,299.54$ steps per day), these differences were not significant ($t(12) = -.52$, $p = .611$ and $t(12) = -.61$, $p = .56$, respectively).

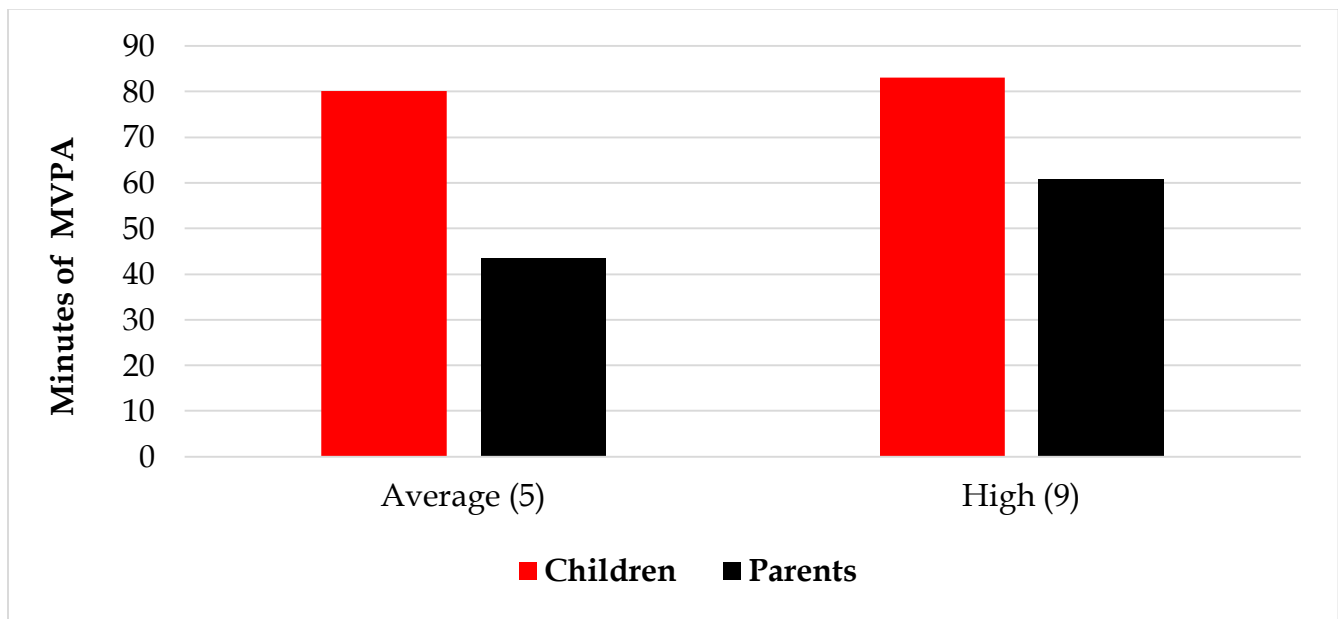


Figure 1. Means of MVPA/day of average activity users (≤ 2 times per week) and high activity users (≥ 3 times per week).

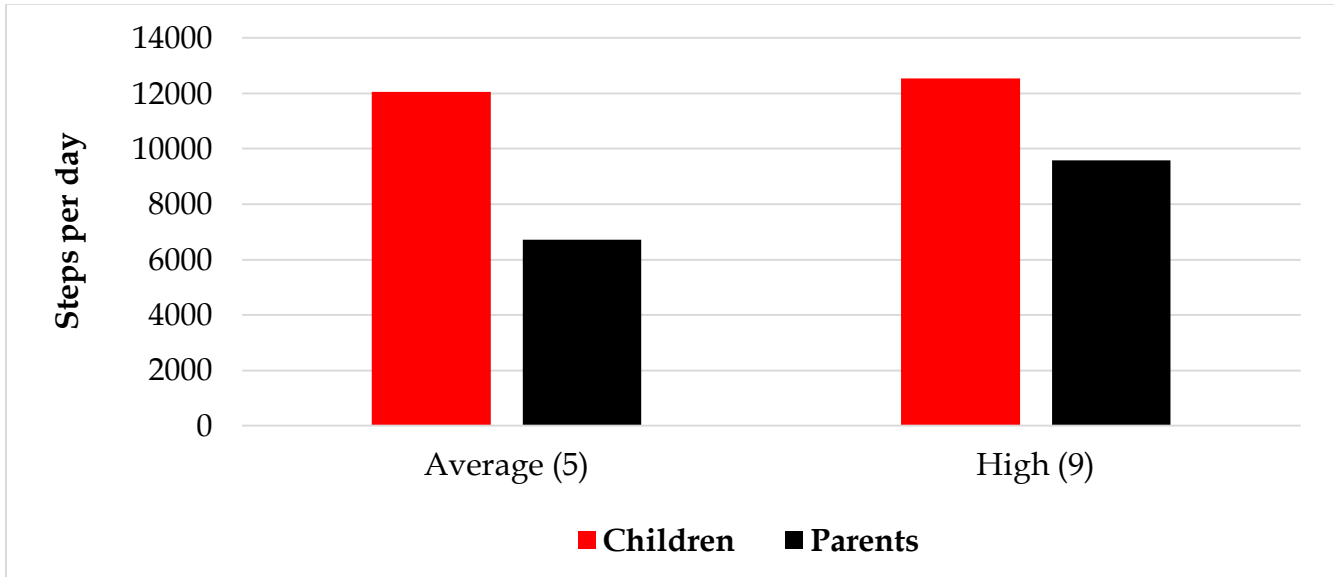


Figure 2. Means of steps/day of average activity users (≤ 2 times per week) and high activity users (≥ 3 times per week).

DISCUSSION

The purpose of this pilot study was primarily to explore the relationship between the number of hours that children engage in structured activity and their parent's physical activity levels. The lack of significant findings in the analyses indicate that the basis of children and parental activity levels are not related to the number of hours children participate in structured physical activity. Other influences such as parental encouragement, or intrinsic determinants (in both children and their parents) may be more prominent in dictating activity levels.

Twelve out of 14 children (86%) participated in more than one sport activity or physical activity program per week which is more than their age-matched counterparts (25). The children in this study, on average (~12,400 steps per day and ~82 minutes of MVPA per day) exceeded the minimum recommendations of 12,000 steps per day, and 60 minutes of MVPA per day respectively, making them more active than the average Canadian child (20). A closer look at the individual data showed that seven children (50%) had over 12,000 steps per day while all the children achieved the minimum MVPA guidelines. The parents of these children; however, did not meet the minimum step requirements (~8,500 steps per day) but were successful in meeting MVPA guidelines (~55 minutes of MVPA per day) (24). Only three parents (21%) achieved the minimum step recommendations while all parents were on track to achieve the MVPA recommendations, which is around the average physical activity for Canadians (~20%) (23). Children who participated in more structured physical activities accumulated slightly higher values of steps per day and MVPA compared to the children involved in less structured physical activity programming.

The lack of significance in the analyses between children's involvement in structured activity and children's physical activity levels was somewhat surprising and refuted our original hypothesis. Although children may be active for additional time because of their involvement in structured physical activity, their physical activity - or lack thereof at home and at school may be countering these active periods. Elementary school systems (3), physical environments, interpersonal factors (22), and parental features (16, 18) all influence children's physical activity levels. This reality makes it important to realize that although children participate in structured physical activities, their habits away from those structured events also contribute to their overall level of physical activity. Children may have reasons for choosing to not be physically active when at home. In one study, a child said she didn't play outside after school because, "... I get really scared that someone's going to take me", while another child commented that, "In the summer, I don't really like to play outside because it's too hot" (22). The time children spend outdoors directly correlates to physical activity levels, sedentary behaviours and physical function (10), which illustrates that many factors affect children's activity levels beyond the realm of structured play/sport participation. Although it is important that children realize that structured activity does not guarantee they reach minimum physical activity guidelines, it is also critical that parents appreciate this reality and aim to promote active habits with their children.

Our second hypothesis was that children who participate in more hours of structured activity per week will have less physically active parents. This hypothesis was also not supported by the study. Many parents are inactive (2) and face many barriers to living more physically active lives. One of the major barriers parents face is lack of time because of scheduling constraints (e.g., balancing children's sporting events, school travel, extra-curricular activities etc.) and parental responsibilities (e.g., job, lack of childcare etc.) (17). The perception of lack of time may be exacerbated because of feelings of guilt as parents may feel that taking time away from family to be physically active limits their time available to be with their children (8, 11). Although their children's participation in structured physical activities influences scheduling constraints and other parental responsibilities, parents seldom recognize the opportunities to be physically active while their children are at their programs. For example, instead of sitting or standing during practices or games, walking around the facility would disrupt sedentary time and provide some physical activity. The results from this study suggest that because there are many multi-faceted barriers, parental physical activity levels seem unconnected to their children's involvement in structured physical activities, although these activities may be exacerbating pre-existing perceptions (e.g., lack of time or the cultural perception of lack of time).

This pilot study was the first, to our knowledge, to investigate children's and parental activity levels in relation to children's participation in structured activity programs. Despite this novelty, there were some limitations to this study. The sample was relatively small and homogenous, as only the data from 14 Caucasian, parent-child pairs were included in this study. It is also important to mention that cultural aspects of the study could also pose limitations, as participant's physical activity may have been affected by a more sedentary North American culture (4). Additionally, the study consisted of more mothers (9) than fathers

(5), which may have impacted the interpretation of parental physical activity. Our study was strengthened by the use of pedometers - an objective measure of physical activity instead of subjective physical activity questionnaires or recall. To objectively identify high or low periods of physical activity, in addition to periods of sedentary behaviours, future research could measure the amount of children's and parent's physical activity in certain sports/activities using accelerometers or other devices that not only provide amount of physical activity, but intensity and time of day of the physical activity. Additionally, sampling a wide range of parental ages, races, and socioeconomic status could help for greater generalization of results.

The lack of significant relationships between the number of hours in structured physical activity and children's and parent's physical activity levels illustrates that physical activity is predicated on complex, interrelated factors. Having children involved in sports or physical activity programs does not guarantee that they will be more active, and altering this perception will be important in future intervention strategies that aim to promote activity. Further, parents should not look to justify their lack (or excess) of physical activity because of their children's involvement in structured activity. Although parents may have conflicting demands placed on them, spending more time being active with their children and remembering that they are role models, will not only increase their own activity levels, but help children be more active as well.

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