

Engagement in Physical Activity During Recess: Gender and Grade Level Differences in the Elementary Grades

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Background: There are many purported benefits to recess including engaging in physical activity, forming positive peer relationships, and taking a break from the classroom. Current research, however, is inconclusive regarding the presence of gender and developmental differences in physical activity that takes place during recess. The purpose of this study was to examine differences in the amount of physical activity that occurs during recess across gender and grade level. **Methods:** Students from first- and sixth-grade classrooms participated in the study, and physical activity was measured using accelerometers to record the number of steps taken during recess. **Results:** A 2×2 factorial ANOVA indicated sixth grade males engaged in more physical activity than sixth grade females, first grade males, and first grade females. **Conclusions:** Because they are not engaging in as much physical activity as their sixth grade male counterparts, ways to help female and younger students take more steps during recess should be explored.

Keywords: accelerometers, exercise, pediatrics, development

Due to increased emphasis on academic instructional time to meet adequate yearly progress, there has been a decline in the number of classrooms utilizing recess since implementation of the No Child Left Behind Act (NCLB). For example, the Center for Education Policy (CEP) reported a 20% decrease in recess time.¹ Although intended to increase learning time and ultimately improve student achievement, this decline may be detrimental to student performance. Research from the U.S. and abroad suggests that recess may be beneficial to students' physical, cognitive, and emotional development.²⁻⁶ Despite the apparent positive outcomes associated with recess, it remains unclear exactly how much physical activity (PA) occurs during recess time. The purpose of this study was to examine the amount of PA that occurs during recess time, and determine if there are differences in the amount of recess PA by gender and grade level.

Recess may be important for several reasons. It is a time to take a break from academics, a time to socialize, and a time for PA.^{6,7} Studies have indicated that recess participation can lead to increases in cognitive development and functioning, as well as academic engagement and performance.^{8,9} Research also has suggested that achievement is mediated by positive peer interactions, which are formed and fostered during recess.^{2,8} In addition, recess may be a time for students to develop crucial peer relationships, which may lead to better school adjustment and overall mental health.²

While recess has multiple positive benefits for children, perhaps none is more important than the opportunity to engage in PA. Previous studies have suggested that PA can have positive outcomes not only for children's health (physical and mental) but also their academic achievement.¹⁰⁻¹² Some physical health benefits, for example, include increased energy and prevention of disease, particularly

heart disease and type II diabetes.¹² In addition, MacKelvie et al¹³ found that girls who participated in a school-based exercise program over a period of 2 years made significant increases in their bone density. Sallis et al¹⁴ demonstrated that participation in an exercise program at school led to superior cardiovascular health compared with a nonparticipating control group. Finally, school based exercise programs have resulted in significant weight reduction in preschoolers.¹⁵ It is important to note, however, that these studies focused on school based exercise programs other than recess.

Results of previous studies also suggest that participation in PA contributes to overall mental health.¹¹ For example, Chilean researchers examining the effects of PA on mental health observed a 13.7% decrease in anxiety levels and a 2.3% increase in self-esteem for 15-year-old students.¹⁶ Similarly, Wiles et al¹⁷ found that adolescent students (ie, 11 to 14 years old) in northwest England who met the recommended level of PA had fewer emotional problems, as measured by a strengths and difficulties questionnaire.

In addition to promoting physical and emotional well-being, studies have also shown that PA is related to positive academic performance. For example, Blythe¹⁸ found students receiving special education services made greater progress in reading when they participated in a school-based developmental exercise program. PA also has been shown to be related to academic achievement in a regular education population. Castelli et al¹⁰ studied PA in 259 students in an urban district in Illinois. These researchers examined the correlation between Illinois Standards Achievement (ISA) test scores and physical fitness levels. They found the amount of third and fifth graders' aerobic activity was positively related to academic achievement. In a quasi-experimental study, Sallis et al¹⁹ concluded that participation in a school-based exercise program did not hinder academic performance even though it slightly decreased instruction time. According to the National Association for Sport and Physical Education,^{20(p1)} recess is "an essential component of a comprehensive school PA program." It is a time for children to grow socially, mentally, and physically by means of problem solving, cooperation, play time, following rules, and engaging in games that require physical movement. They recommend that students be provided at least

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20 minutes of recess per day. Current literature on recess attempts to examine and define the amount of PA that occurs during recess time. Most studies focus either on gender differences, age/grade level differences, or both.^{21–24}

Results of studies examining gender differences in PA during recess are inconsistent. Mota et al²³ examined the PA of 22 Portuguese students (8–10 years of age). These researchers found that girls were more involved in moderate-to-vigorous physical activity (MVPA) than boys during recess (38% of recess time devoted to MVPA to 31%, respectively); however, daily accelerometer counts did not differ by gender. (MVPA was calculated based on the number of steps per minute during a 60-minute recess period.) There were several limitations of the study, though. Most notably, participants were not followed over an extended period of time. In addition, the study took place in Portugal and therefore may not generalize to children in other countries.

In contrast, other researchers have found that boys participated in more PA than girls.^{21,24–26} Ridgers et al²⁴ studied 116 boys and 112 girls, ages 5 to 10, from 23 schools in northern England. They used accelerometer data collected during recess periods to compare the amount of MVPA by gender. Results of an ANCOVA (using BMI and play duration as covariates) indicated that boys engaged in MVPA during recess 39.2% of the time while girls engaged in MVPA 23% of the time. The gender by age group interaction and main effect for grade level were not statistically significant. Similar to the Mota et al²³ study, data were only collected over a short period of time (1 day), and it is unclear if results would generalize to other to other populations.

Ridgers and Stratton²⁶ further examined gender differences in PA during recess. In this study, 207 boys and girls (ages 6 to 11) from 18 schools had their heart rate measured (via telemetry) for 1 school day. Time spent in recess was measured from the beginning of recess to the end of recess, and heart rate was used as the measure for PA. Boys were found to engage in MVPA 30% of the time, whereas girls engaged in such PA 24% of the time. The gender by age group interaction and main effect for grade level were not statistically significant. Similarly, using uni-axial accelerometer to assess the PA of 210 children (Grades 3 to 6) over a 5-day period, Ridgers et al²⁵ also found that boys engaged in more PA than girls. Further, Roberts et al²⁷ found that boys ages 9 to 11 engage in more recess-based physical activity than their female peers using the System for Observing Children's Activity and Relationships during Play (SOCARP).

Beighle et al²² also used pedometers to assess PA that occurs during recess. Intermediate students' (N = 270, Grades 3 to 5) PA was measured over a period of 4 weeks, both during recess and after school. The results indicated that boys spent 78% of their recess time engaged in PA compared with 63% for girls. Results from this study should be interpreted with caution, though, given pedometers are susceptible to detecting motions other than actual steps.

In addition to differences in the amount of PA that takes place during recess, Holmes²⁸ examined the frequency of recess activities based on students' age and gender. While the results provide insights regarding specific characteristics of students participating in each activity, perhaps the overall trends are most informative. Specifically, younger students tended to participate in "chase" games (eg, one child running after another), girls tended to spend more time talking to peers and/or teachers, and older boys tended to participate in organized sport activities.

Although several research teams have examined grade-level differences in recess activity, results have been inconsistent. Teleford

et al²⁹ compared the amount of PA exerted by 2 age groups (5 to 6 and 10 to 12 years of age) among 919 Australian students using a parent PA questionnaire and 8 days of accelerometer data. The researchers found that the younger group of students participated in 4 hours of PA per day whereas the older students accumulated only 2 hours of PA per day. This study measured PA both inside and outside of school. As such, the authors were unable to identify differences that occurred specifically during recess.²⁹

In contrast, Babkes and Sinclair²¹ found that fifth graders engaged in more PA during recess than their younger counterparts. These researchers measured PA by videotaping recess behaviors rather than the accelerometer approach used in other studies. In addition, Ridgers et al²⁵ found differences in PA based on grade level such that third and fifth graders engaged in more PA than fourth and sixth graders. Finally, contrary to previous studies documenting grade-level differences, Ridgers et al²⁴ and Ridgers and Stratton²⁵ found no differences in PA during recess by grade-level/age.

Recess may represent a low-cost method for increasing PA within the school day. Previous researchers have examined the amount of PA occurring during recess;^{21,23,24,26} however, the literature is inconclusive regarding gender and age/grade level differences in the amount of PA that takes place during recess. As such, the purpose of the current study was to determine if there were differences in recess PA by gender and grade level (first vs. sixth grade).

This study addressed limitations of previous work in 3 ways. First, the study used accelerometers to measure PA, as these devices are more accurate and objective than pedometers or behavior coding, respectively. Second, accelerometer data were collected for a 2-week time period, which is significantly longer in duration than in previous studies where recess PA data typically were collected for only 1 day, with the exception of 1 study. Data collection across multiple days was intended to eliminate any differences in PA resulting from a novelty effect. Third, the study specifically examines the interaction between grade level and gender. While previous studies have examined both characteristics, they have either not tested for statistical significance or results have been inconclusive; therefore, the current study will help answer this question.^{24,25} The primary hypothesis for the current study was that boys exert more PA during recess (as measured by steps per day) than girls. This hypothesis was based on the Babkes and Sinclair²¹ and Ridgers et al²² studies. In addition, based on the work of Castelli et al,¹⁰ it was hypothesized that sixth grade students take more steps during recess than their first grade counterparts.

Methods

Participants

Participants were enrolled in a small, rural school district in a mid-Atlantic state. In the district's elementary school, 33.3% of students were eligible for free or reduced lunch, and 98.8% of the student population was Caucasian. Participating students (N = 101) were all Caucasian and drawn from 4 first grade classrooms and 3 sixth grade classrooms. (The grade levels were chosen to maximize the age difference between groups in an elementary school setting.) Within those classrooms, 75% of first-grade boys (n = 21), 82% of first-grade girls (n = 30), 76% of sixth-grade boys (n = 19), and 81% of sixth-grade girls participated (n = 31). Participants and their parents provided consent, and they were treated in accordance with the ethical standards of the American Psychological Association.

Materials

Accelerometers. New Lifestyles Accelerometer Activity Monitors (Model NL-800) were used to measure each participant's PA during recess. These monitors attach at a student's waistline either on a belt or directly to the waist of their pants. Teachers spot checked students each day to assure that the accelerometers were worn appropriately. Accelerometers provide data that are more accurate than traditional pedometers because they measure vertical motion, allowing users to more accurately judge whether movements are truly steps.³⁰ The Journal of the American Medical Association indicates that 2000 steps equals approximately 1 mile and causes people to expend approximately 100 calories.³⁰ Furthermore, strong correlations have been found between accelerometer data and diary methods for recording PA³¹ ($r = .85$), as well as energy expenditure using a portable metabolic system³² ($r = .89$). In addition, accelerometers are an effective measuring tool and acceptable to wear to most students.³³

Weather Reports. The weather during the recess time period was recorded each day of the study to potentially help explain outliers and observed patterns in the PA data. Specifically, temperature (in degrees Fahrenheit) and precipitation type (ie, sunny, cloudy, partially sunny, raining, snowing, other precipitation [eg, sleet, hail, etc]) were recorded.

Teacher Recess Reports. Teachers recorded the number and duration of daily recess periods. In addition, teachers completed a questionnaire based on the work of Stellino and Sinclair,⁴ which included items assessing availability of equipment, accessibility, play space, safety, and structure. No reliability or validity evidence is published for this measure. They also completed a brief questionnaire at the end of each week to report any anomalies in the recess schedule that occurred during the week (eg, field trip, class reward kickball game, broken monkey bars).

Student Recess Journals. Each student received a recess journal to record the activities in which they participated during recess. The recess journal included a checklist of potential recess activities (eg, basketball, jump rope), as well as a place to write other activities not included on the checklist.

Procedure

Data for the study were collected in the early spring (mid March) in an effort to minimize missing data resulting from illness, cancellation of recess due to weather, etc. Informed consent was sent home to the parents of each participant. Teachers were trained to properly attach the accelerometers to ensure that participants' steps were accurately measured. Teachers observed students during recess to assure they were using their accelerometers. The children's recess

steps were then collected during a 2-week period. Due to weather conditions and field trips, 8 days of data were collected from the sixth-grade participants and 7 days of data were collected from the first graders. Each participant's average steps per day were calculated by adding the total number of steps for the entire data collection period and dividing the total by the number of days of data collection for that particular participant.

Participants donned their activity monitors before recess and took them off as soon as they returned to the classroom. After recess, students spent approximately 3 minutes writing about their recess activities in their journals. Each student was assigned the same accelerometer to use throughout the study. Accelerometers record data daily and retain that data for 7 days; as such, graduate students recorded the total number of steps every Friday of the data collection period. Teachers completed a questionnaire at the beginning of the study that described the nature (eg, rules, expectations) of recess. Teacher reports on the number and duration of recess periods during each week were also collected on Fridays.

During data collection, the temperature was relatively consistent for the 2 weeks of data collection with average lows in the mid-thirties and average high temperatures in the high fifties. It rained on 3 of the days during data collection. The first-grade students missed 2 recess periods due to rain, and the sixth graders missed 1 recess period due to rain. In addition, both the first and sixth graders missed recess 1 day due to field trips.

Design and Analysis

To test the hypotheses that PA would differ as a function of gender and grade level, a 2 (gender) $\times$ 2 (grade level) factorial ANOVA was conducted. The dependent variable was the average number of steps per day. Before running these analyses, homogeneity of variance (HOV) across factor levels was assessed using Levene's test ($\alpha = .05$). To determine if the data were approximately normally distributed, skew and kurtosis values were examined. The guidelines typically used for univariate normality are ± 2 and ± 7 for skew and kurtosis, respectively, and these criteria were used to determine if the data meaningfully deviated from a normal distribution.³⁴ Teacher reports on recess duration as well as the weather also were examined to potentially explain any outliers.

Results

Descriptive statistics are presented in Table 1. Results from the Levene's test indicated that the assumption of homogeneity of variance (HOV) was violated $F_{3,97} = 2.882$, $P = .04$; however, the variance ratio of the highest to lowest variance ($F_{\max}$) was less than a 4:1 ratio, indicating these analyses were most likely robust to this violation.³⁵ Furthermore, when there are unequal sample sizes and

Table 1 Means, Standard Deviations, Skew, and Kurtosis for Steps Taken (N = 101)

	First grade	Sixth grade	Total	Skew	Kurtosis
Males	1825.28 (426.19)	2269.91(386.56)	2036.48 (461.17)	.117	-.730
Females	1810.76 (252.84)	1905.79 (466.53)	1857.50 (373.44)	.405	-.088
Total	1816.62 (329.98)	2046.98 (468.68)	1928.38 (417.56)		
Skew	.441	-.019			
Kurtosis	.587	-.869			

the variance of the larger group is greater than the variance of the smaller group, an *a priori* significance level of .05 is considered to be conservative as a statistical significance level.³⁶ Therefore, obtained statistically significant results were deemed to be interpretable.

A statistically significant interaction effect was found between gender and grade level on the number of steps that students took during recess $F_{1,97} = 4.913$, $P = .029$, $\eta^2 = .048$. More specifically, males in sixth grade (mean = 2269.92, SD = 386.57) took more steps than females in sixth grade (mean = 1905.79, SD = 466.53), males in first grade (mean = 1825.28, SD = 426.19), and females in first grade (mean = 1810.76, SD = 252.84). A graph of these results can be found in Figure 1. Furthermore, a Helmert planned contrast³⁷ comparing the sixth-grade males to the other 3 groups revealed statistically significant differences $t(27.73) = -4.256$, $P < .005$. There was no statistically significant difference between sixth-grade females and the 2 first-grade groups in the number of daily steps taken during recess $t(47.95) = -.881$, $P = .38$. Additionally, there was no statistically significant difference between the first-grade

males and first-grade females in the number of steps taken during recess $t(29.55) = 29.554$, $P = .89$.

There were statistically significant main effects for both gender $F_{1,97} = 5.762$, $P = .018$, $\eta^2 = .056$ and grade level $F_{1,97} = 11.706$, $P = .001$, $\eta^2 = .108$. However, based on the statistical significance of the interaction and the planned contrasts, the observed main effects were the result of differences between the steps taken by sixth-grade males compared with the other groups, rather than the result of grade level or gender.

Percentage of students participating in each recess activity was calculated by dividing the number of students who reported participating in each activity by the total number of participants in each group. Not surprisingly, participants who took more steps during recess tended to engage in activities that require PA more frequently than those participants who took less steps during recess. Specifically, the primary differences between sixth-grade males and the other groups was that more sixth-grade males played basketball than any other group. Specific activities are reported in Figure 2.

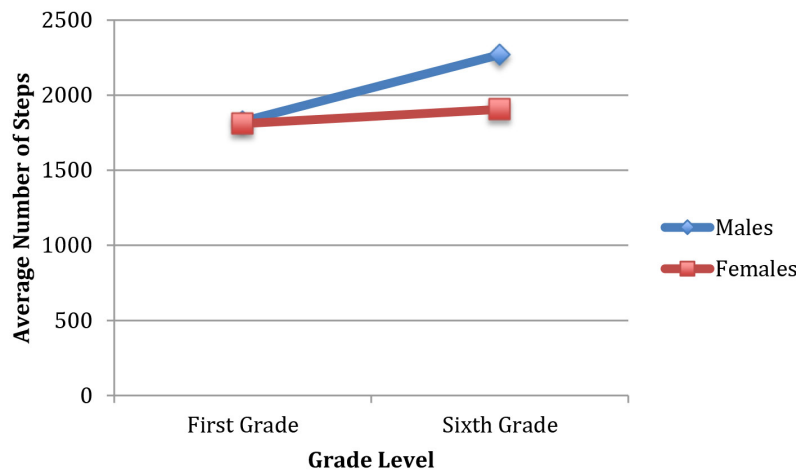


Figure 1 — Interaction of number of steps taken; gender by grade level.

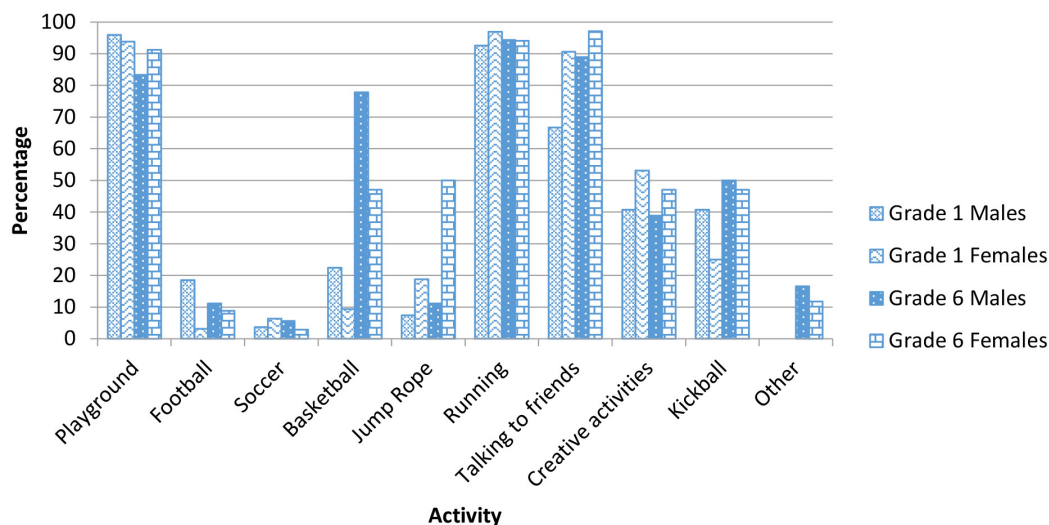


Figure 2 — Percentage of students participating in each activity by gender and grade level.

Discussion

Interpretation of Results Relative to Previous Research

The results of the current study both support and contradict previous studies of recess PA. Similar to the current study, Ridgers et al^{24,25} and Roberts et al²⁷ found that boys engage in more PA than girls; however, they did not observe a statistically significant grade/age level effect or interaction effect. Ridgers et al²⁴ used accelerometer data collected during 1 day of recess, though, and participants were divided into 2 age groups with mean ages of 6.3 and 8.7. They may not have found an interaction or grade level main effects because the 2 participant groups were closer in age than the groups in the current study. Furthermore, there were more participants in the older age group compared with the younger age group (151 and 56 participants, respectively). Ridgers et al²⁵ studied participants in third, fourth, fifth, and sixth grades and Roberts et al²⁷ also studied students ages 9 to 11. It is possible grade level did not contribute to the variance in PA because grade level was more on a continuum for these 2 studies, rather than 2 distinct developmental groups. Based on the findings from the current study, it is possible that the large number of older students contributed to the gender main effect. It is also possible that there is a threshold age where females begin to move less during recess than their male counterparts.

Ridgers and Stratton²⁶ also observed gender differences in PA. Like Ridgers et al,²⁴ they did not observe a statistically significant main effect for age/grade level differences or an interaction effect. The gender differences observed in both the Ridgers and Stratton²⁵ and Ridgers et al²⁴ studies are similar to the difference observed between sixth-grade boys and girls in the current study. These findings, however, are inconsistent with the first graders in the current study whose PA did not vary by gender. There are several methodological variations between the current study and the Ridgers and Stratton²⁶ study that may have accounted for the differences in results. Specifically, Ridgers and Stratton used a heart-rate measure (telemetry) rather than a measure of steps. An additional difference is that Ridgers and Stratton collected data for only 1 day, so a novelty effect may have been more likely to influence results than the current study, which included 2 weeks of data collection. In addition, these findings may be reflective of the activities that students reported engaging in at recess. For example, first-grade boys may be engaging in fewer organized sports and more activities that are similar to those of their first-grade female counterparts, like playing on the playground. Further, older boys may be able to move faster than younger boys because of differences in maturity of their physical development, and because they are faster, they are also likely to engage in the same activities as girls their age.

Beighle et al²² also examined the PA of participants in third to fifth grades, and results indicated that boys took more steps than girls. Although this finding is consistent with the sixth-grade participants in the current study, age/grade level differences were not examined by Beighle et al. In addition, there were several methodological differences between the studies. First, Beighle et al used pedometers instead of accelerometers, which can yield different estimates of PA. In addition, the Beighle et al sample did not include children from the primary grades. Finally, another important difference is that the current study only included recess PA and Beighle et al²² collected data all day.

Unlike the results of Beighle et al,²² Ridgers et al²⁴ and the current study, Mota et al²³ found that girls engaged in more PA than boys during recess. Mota et al collected 1 day of accelerometer data with a small sample of 8- to 10-year-old Portuguese students. Although Mota et al used accelerometers like the current study,

there were several other design differences (eg, data were collected in a different country, smaller sampling of activity, smaller number of participants). In addition, the Mota et al sample featured 8 to 10 year olds, which falls between the 2 age groups in the current study.

Babkes and Sinclair²¹ used videotaping to assess PA and found that fifth-grade students engaged in more PA than children in any other grade (K–4). Like several of the studies examining gender differences, Babkes and Sinclair did not consider interaction effects between grade level and gender. In addition to not considering the interaction effect, there were a few other methodological differences (measurement, length of data collection period) that may have contributed to the outcome.

Similar to the female subsample in the current study, several studies did not find grade level differences between older and younger grades.^{24,26} Teleford et al²⁹ concluded that younger students (ages 5 to 6) engaged in more PA than their older counterparts (ages 10 to 12). This finding is contrary to the males in the current study. Because the ages of the Teleford et al sample are very similar to those used in the current study, it is less likely that participant differences are the source of the difference between studies. Teleford et al,²⁹ however, measured participants' PA for the entire day, not just during recess. Therefore, the difference between the 2 studies may have been the result of the PA that occurs after school rather than during recess. For example, younger students may have less homework and therefore more time for PA after school.

While the results of the current study are somewhat inconsistent with the previous literature, most of the previous studies did not examine grade/age level and gender differences together. Other differences in outcomes across studies may have been the result of differences in participants, measurement, and/or procedures. Overall, the current study included a wider span between age/grade level comparisons, included data collection over multiple days, limited data collection to recess, and considered the interaction between grade level and gender. As such, additional studies are needed to determine if findings are replicable.

Types of PA During Recess

Students engaged in many different activities during recess: playing on the playground, jumping rope, playing basketball, playing kickball, and talking to friends. Visual examination of the daily activities for the 5 highest and 5 lowest number of step-takers revealed some potential activity differences between students who took greater or fewer steps. All 5 of the top step-takers noted playing games that involved running each day, and 4 of the top step-takers were sixth-grade males. Of these participants, 1 noted playing basketball everyday, 1 noted playing basketball and/or kickball everyday, and the other noted playing kickball everyday. The other participant in the top group was a sixth-grade female, and she noted playing kickball at recess everyday. This difference between the types of activity males and females engage in during recess is consistent with gender differences in organized games observed by Roberts et al,²⁷ with boys engaging in more organized, sports related activities than their female peers.

Conversely, the 5 students who took the least number of steps during recess varied in both group (age/grade level) and activities during recess. This group consisted of 2 first-grade boys, 2 sixth-grade girls, and 1 first-grade girl. Some examples of the activities of this group included jumping rope (3 participants) and playing on the playground (4 participants). In addition, 1 of the sixth-grade female students reported that the only activity she engaged in during recess was talking to friends. Finally, only 1 out of the 5 in the lowest group reported participating in an activity that requires higher levels of PA

such as basketball or kickball. Though self-reported and anecdotal, these data provide some indication that participating in activities requiring more PA leads to more step-taking during recess, and they are consistent with the findings observed by Roberts et al.²⁷ The self-reported activities also were somewhat consistent with the activity differences previously noted by Holmes, with younger students engaging in “chase” activities, girls engaging in talking to peers, and older boys engaging in most organized sports most often.²⁸ The 1 exception being that first-grade boys made up the largest percentage of students playing football in the current study compared with other groups (Figure 2).

Limitations

Due to field trips and rain, data were not collected for the full 2 weeks of the study. Specifically, sixth graders had 8 days of data and first graders had 7 days of data. Although these are fewer days than were originally intended, data were nonetheless collected on a greater number of occasions than most previous studies. In addition, physical activity was measured by the number of steps taken, rather than differentiating between light, moderate, and vigorous PA. Further, accelerometer data may be less effective at measuring PA in younger children due to variability in the type of movement taken (eg, swinging and climbing versus steps taken),³⁸ and the results in the current study may be influenced by this difference. Another limitation of the current study was that not all students recorded their recess activities on all days. Furthermore, because recess periods were 30 minutes in duration, students had plenty of time to engage in multiple activities, and many students recorded all of these activities in their recess journal. Due to these factors, it was difficult to determine the number of steps associated with specific activities, which in turn made it difficult to definitively identify the recess activities likely to lead to the most PA.

An additional potential limitation could have been the novelty effect of the accelerometers, and teachers anecdotally commented on how the children “enjoyed seeing the numbers go up” on their accelerometers during the first few days of data collection. However, students wore accelerometers a few days before the first day of data collection in an attempt to reduce novelty effects, and inspection of the accelerometer data did not appear to support teachers’ observations. Finally, participants were all Caucasian and from a single, Mid-Atlantic rural school.

Directions for Future Research

In light of the study’s limitations, there are several directions for future research. For example, future studies should determine if the current results generalize to urban and more ethnically diverse populations. Furthermore, future studies should explore if results are replicated when other forms of PA measurement, such as heart rate monitoring, are used. In addition, the results indicate that males engage in relatively similar levels of physical activity when they are younger, but differences emerge by the time they reach middle school. It would be useful to determine when the different trajectories in the amount of PA during recess begin to occur. It would also be useful to collect information as to why sixth-grade females do not engage in as much recess PA as their male counterparts.

Another extension of this research would be to explore how changes in recess affect the amount of PA taking place. Specifically, it is necessary to determine what modifications would help students engage in more PA. Two factors that increase the PA that occurs during recess is equipment availability and maintenance, as well as the

quality and involvement of recess supervisors.³ More specifically, in a systematic literature review, Escalante et al.³⁹ found that playground markings and playground equipment were both found to make an impact on recess physical activity; however, results were inconclusive. Additional research is needed to explore these modifications further.

In addition, based on the recess activity information collected in this study, it appears one potentially effective way to have kids take more steps during recess may be to have them engage in activities that result in higher PA such as basketball or kickball. Therefore, schools could consider encouraging student participation in activities that result in higher PA rather than unstructured recess time. One way schools could do this is by having activity time where students are expected to participate in a specific activity that requires PA, rather than merely going outside during recess to do whatever activity they choose. For example, Howe et al.⁴⁰ found that participation in a 9-week structured recess program lead to more moderate to vigorous physical activity than the control group. The American Academy of Pediatrics notes that this suggestion may be helpful in increasing recess PA, but it would be important to also determine if the increased structure would come at the cost of the other purported benefits of recess, such as getting a break from organized activity and allowing students autonomy when selecting recess activities.⁶

In addition, incorporating a way for students to move while they talk to their friends may be another effective way of increasing recess PA. For example, adding a walking path may help the students who like to talk to their friends during recess also get some exercise. However, further research is needed to determine if environmental interventions such as this would actually increase students’ PA level during recess.

Finally, while this study and previous research focus on the quantity and quality of the PA during recess, there is minimal research on the purpose of recess. Future researchers should explore what students, parents, teachers, and administrators hope to gain from recess. Upon establishing goals for recess, it will be easier to determine what modifications to recess activities and environment are needed to achieve these goals, while at the same time encouraging higher amounts of PA.

Conclusion

PA can have positive effects on students’ physical, mental, and social well-being. Given the increasing number of children who meet medical criteria for obesity, it is important to find ways to promote healthier lifestyles. PA during recess could be a low-cost but effective way to accomplish this goal. The current study examined differences in recess PA between gender and grade level. Results indicated sixth-grade males engaged in significantly more PA during recess than their sixth-grade female, first-grade male, and first-grade female counterparts. Future research should explore if these results generalize to urban areas and more ethnically diverse populations. Furthermore, ways to help female and younger students take more steps during recess should be explored.

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