Examining children’s physical activity and play behaviors during school playtime over time

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Received on July 23, 2010; accepted on February 3, 2011

Abstract

School playtime (recess) provides children an opportunity to engage in a range of active and sedentary play behaviors on a daily basis. However, little data have investigated changes in playtime behaviors over time. The aim of this study was to investigate how children’s physical activity levels, the size of their social group, play behaviors and social interactions changed over one academic year (Study 1), and during the transition from Year 5 (aged 9–10 years) to Year 6 (aged 10–11 years; Study 2). Primary school children were directly observed during school playtime using the System for Observing Children's Activity and Relationships during Play. Results revealed children engaged in moderate-to-vigorous physical activity for at least half of the intervals observed. Incidents of physical antisocial behavior significantly decreased, while incidents of verbal antisocial behavior and time spent alone increased across Study 1. Incidents of verbal antisocial behavior, time spent alone and engagement in playground games significantly decreased across Study 2. The data suggest that children are highly physically active during school playtime, and while their play behaviors and activity levels fluctuate, these fluctuations were generally small over one academic year and in the transition between Year 5 and Year 6.

Introduction

‘Play’ describes the various activities and behaviors that children engage in during unstructured time [1]. Though difficult to define due to the complexity of the behavior [2], it is generally accepted that play is fun, enjoyable, freely chosen, intrinsically motivated and flexible [3–5]. Play is also important in the development of children’s social, emotional, physical and cognitive skills [6]. Additionally, because of its frequent active nature, play contributes to the health and fitness of children, particularly as it accounts for a substantial proportion of preschool and primary school children’s physical activity opportunities [4, 7].

Time spent outdoors is associated with increased physical activity levels [8], and school playtime (known as recess and lunchtime internationally) provides daily opportunities for children to be physically active in an outdoor environment. Children best accumulate physical activity in unstructured environments where they are free to interact with peers [9]. Although somewhat constrained by playground size, equipment and supervisory staff, playtime typically provides the only opportunity where children can play informally with others during the school day [10]. In recent years, there has been a trend to reduce the frequency and duration of playtime (and sometimes eliminate it altogether) because of the pressures of the academic curriculum.
and behavioral problems occurring on the playground [11, 12]. This is a concern, particularly as playtime provides a substantial amount of the recommended minutes of physical activity for health purposes [13], is associated with improved classroom behavior [14] and provides an opportunity for children to develop social and physical skills [12].

During playtime, children’s behavior is a result of individual personal characteristics interacting with both the physical and the social environment [3, 15]. Previous research has demonstrated that gender differences exist in both children’s physical activity levels and play behavior, suggesting that children utilize their playtime to engage in a range of different behaviors. Boys, for example, tend to engage in higher levels and more intense physical activity [16–18] with their activities typically centering around competitive ball games [19]. In comparison, girls often engage in socializing behaviors [19]. It should be noted that playground life has its own unique structure, history and hierarchies [20], which are often self-governed by the children [10]. Understanding behaviors within this context is important [12–13]; however, little research has focused specifically on how children’s physical activity levels and their play behavior change over time. In addition, though playground hierarchies are often based around age, it is not widely known whether the transition in to the last year of primary school itself changes children’s physical activity levels and play behaviors. This information could encourage schools to provide playtime on a daily basis and/or develop interventions that aim to not only increase boy’s and girls’ physical activity levels but also contribute to their overall healthy growth and development [21]. Of the methods available to record activity and behavior, direct observation is particularly useful because it allows for the simultaneous recording of social and physical contexts of physical activity during playtime [22].

Therefore, the primary aim of this study was to investigate changes in children’s physical activity and play behavior during playtime over one school year and during the transition from one school year to the next. A secondary aim was to investigate gender differences in children’s physical activity levels and play behaviors.

**Method**

**Participants**

Following ethical approval from the University Ethics Committee, eight primary schools in a large city in the North West of England were recruited to participate in a longitudinal multidisciplinary study of the effects of after-school clubs and a lifestyle intervention on children’s habitual physical activity, fundamental movement skills (FMS) and laboratory markers of health (A-CLASS Project) [23]. The schools were located in areas of low-socioeconomic status. Briefly, the eight schools were randomly allocated to one of the four groups (two schools per group), which were (i) a Physical Activity Signposting Scheme, where children received weekly active homework sessions across the study; (ii) a High-Intensity Physical Activity after-school program; (iii) an after-school program that focused specifically on FMS and (iv) a control group that received the standard curriculum delivered by schools [23].

All children from Year 5 (n = 491; aged 9–10 years) in these schools were invited to participate and asked to return informed written parental consent, child assent and medical forms. Exclusion criteria included current use of prescription medication, any personal history of asthma/respiratory problems, heart or vascular complaints or family history of sudden death. In addition, children with a body mass index (BMI) score in the higher 50th percentile relative to children in their year group at school were targeted for inclusion. This was due to an increased prevalence of overweight and obesity observed in this age group within the city where the research took place [24]. Two hundred and ninety-two children returned informed written parental consent to participate in the study (58% response rate), and 152 children (62 boys and 90 girls) met all the inclusion criteria.
Settings
Each school had one playground which consisted of a tarmac surface area that was available to children during playtime. The playgrounds varied in size, layout and physical structures for activities [e.g., football (soccer) posts, seating]. They had painted playground markings such as racing lanes, painted targets and lines for hopscotch, which differed in number and configuration across the schools. One school also had a grassy area, but children were not observed in this location. In each school, morning, lunchtime and afternoon playtimes were communal, where all children in Years 1–6 had access to the playground simultaneously. All schools provided small pieces of portable equipment such as footballs, bats and skipping ropes for use. Teachers supervised the morning and afternoon playtimes, while lunchtime assistants supervised the lunch playtime. Four schools had three playtimes per day (morning, lunch and afternoon), while the remaining four had two (morning and lunch). The average total daily playtime duration was 84.4 (±10.2) min (range = 75–105 min). During this time, children were not permitted to remain in the classrooms unless they were completing schoolwork or being disciplined.

Measures
Observation instrument
The System for Observing Children’s Activity and Relationships during Play (SOCARP) was used to simultaneously observe and record children’s physical activity levels, the size of their social group, activity type and social interactions during playtime [25]. Targeted children were observed for 10 min continuously using time sampling with alternating 10-s record intervals being paced by audio cues on a MP3 player. At the record prompt, the observer noted the child’s physical activity level, group size, activity type and social interactions. At the end of the 10-min observation period, the number of adults supervising playtime, equipment availability (Yes/No) and observation stop time were recorded. Each observation period yielded 30 observations (10 min × 3 observe-record intervals per minute). A full description of the observer codes, protocol and recording forms are available from the first author.

Observer training. All observations were conducted by the first author and two other trained observers (June and October 2007). Training included familiarization with the protocol and codes, memorizing codes and coding conventions and practicing observations using video examples of playtimes with trainer feedback. An assessment of observer reliability was conducted by comparing the observer scores of other observers with those of the first author on pre-recorded video examples. Inter-observer reliability criteria was set at >80% using interval-by-interval agreement for each category. Initial training required 20 hours to reach acceptable inter-observer scores. Prior to the October 2007 assessments, a retraining and assessment workshop was conducted, where feedback from pre-recorded assessments was provided to identify and reduce observer drift from the gold standard definitions [26]. Overall reliabilities for the assessed variables were 91% for activity level, 93% for group size, 90% for activity type and 88% for interactions.

Validity. The SOCARP physical activity codes have been used previously in BEACHES (Behaviors of Eating and Activity for Children’s Health: Evaluation System) [27] and SOFIT (System for Observing Fitness Instruction Time) [28]. Construct validity of these codes have been determined using heart rate monitoring [27, 28] and uni-axial accelerometry [25].

Anthropometrics
In addition to being observed, all children visited the university laboratory to have markers of health and anthropometric measures assessed. These assessments included body composition, bone and cardiovascular health, psychological well-being and physical fitness, and these have been described in detail elsewhere [23]. Briefly, measures of stature (to the nearest 0.1 cm) and body mass (to the nearest 0.1 kg) were recorded using the Leicester Height Measure and analog Seca Scales (Seca Ltd, Birmingham, UK), respectively, using standardized techniques. BMI was calculated and children were
classified as normal weight, overweight or obese using age and sex-specific UK reference curves [29].

Procedure
Data were collected at each school for 3 days during three different time points (totals = 72 observation days, 101.3 hours of observation). The observations occurred during Autumn term 2006 (September to November), Summer term 2007 (June to July) and Autumn term 2007 (October to November). Data were only collected during playtimes when children could access the playground (i.e. generally every day except for heavy rain). Schools with days of no or partial playtime were revisited to obtain three complete days of data. Data were collected ‘live’ on 27 days and from video during 45 days. Videotaped playtimes were recorded using a digital video tape camcorder and analyzed later in the university laboratory.

Observers arrived at schools prior to morning playtime and obtained information concerning the duration of each playtime and the playground environment. Five minutes before scheduled playtimes, observers entered the playground and positioned themselves in an inconspicuous place where they could see the whole playground. SOCARP observations were initiated immediately when child participating in the project entered the playground. After observing the target child for 10 min, the observer focused on the next target child; this process continued until the end of playtime. In Autumn 2006, children recruited into the study wore colored sashes during playtime so observers could identify them. This procedure was not necessary during subsequent observations, as observers were able to identify the children easily.

Data analyses
Throughout the study, efforts were made to collect data on all children at all three time points. A number of factors influenced this plan, including (but not limited to) children being absent or kept from playtime for disciplinary or academic reasons. On initial examination of the data, 90 children (37 boys and 53 girls; 59% of sample) had been observed in Autumn 2006, Summer 2007 and Autumn 2007. In comparison, 107 children (42 boys and 65 girls; 70% of sample) had data for Autumn 2006 and Summer 2007 (7 months between measures), and 110 children (43 boys and 67 girls; 72% of sample) had data for Summer 2007 and Autumn 2007 (3 months between measures). In order to retain more children in the analyses, we decided to split the data into two discrete time periods and match children’s data across these periods. This enabled us to examine physical activity levels and behaviors across one school year (Study 1; Autumn 2006 to Summer 2007), allowing comparisons with previous studies [19, 30], and to document changes in activity and behavior as a result of moving from Year 5 into Year 6, which is the last year in elementary school (Study 2; Summer 2007 to Autumn 2007). Children moved from Year 5 into Year 6 at the start of September 2007 following a 6-week summer holiday. The class compositions did not change during this time and enrollment within each school remained relatively stable across the study.

For activity level, group size and activity type, the proportion of the time spent in each category was calculated and used in subsequent analyses. For social interactions, a percentage occurrence of the total interactions observed for each child was determined and used in the analyses. Descriptive data for age, stature, body mass and BMI were calculated for each time point. Gender differences in these data were assessed using independent t-tests. The main analysis consisted of a 2 (time point in Study 1 or 2) × gender (boy, girl) analyses of variance, with the dependent variables being the codes within the four specific SOCARP categories, namely physical activity level, social group size, activity type and social interactions. Post hoc analyses were conducted on significant statistical interactions. All analyses were conducted using SPSS v17, and significance level was set at P = 0.05.

Results
The descriptive (mean ± SD) anthropometric characteristics of the children across Time 1 and Time 2
are shown in Table I. No significant gender differences were found within these data. Children with three playtimes (89.9 ± 8.0 min) had significantly more time for play compared with those with two playtimes (77.5 ± 2.5 min), although no significant differences were found between the percentage of moderate-to-vigorous physical activity (MVPA) or sedentary time they accrued. Additionally, no differences were observed between children with complete data (i.e. observation data at 3 time points) and partial data (1–2 time points) on these descriptive variables at each time point ($P > 0.05$).

Tables II and III show the proportion of time spent in the different SOCARP categories across Study 1 and Study 2. The amount of time children spent alone increased significantly across Study 1 ($P = 0.03$; Table 2). In Study 2, the amount of time children spent alone significantly decreased ($P = 0.01$). A similar and significant trend was observed for antisocial verbal behavior. Incidents of physical antisocial behavior and ignoring negative interactions initiated by other children decreased during across Study 1 ($P = 0.04$). The proportion of time spent standing increased ($P = 0.02$) and engaging in playground games ($P = 0.05$) significantly decreased across Study 2.

A number of significant gender differences were found to be consistent across Study 1 and Study 2. Girls spent proportionally more time than boys standing and engaged in small groups, playground games, sedentary activities, locomotion and pro-social physical behaviors. In contrast, boys spent proportionally more time engaged in walking and vigorous activity, MVPA, large groups, sports and antisocial behaviors (Tables II and III). Girls spent nearly twice as much time in playground games than boys. Moreover, 24% of boys’ intervals included antisocial behaviors compared with 10% for girls.

Time by gender interactions were observed for participation in small groups (Study 1) and playground games (Study 2). Paired samples $t$-tests revealed that the proportion of time girls spent in small groups decreased significantly across Study 1 ($P < 0.01$), and the time spent by girls in playground games significantly decreased across Study 2 ($P < 0.01$). No significant differences or interactions were found for the remaining variables.

**Discussion**

The aim of this study was to examine changes in children’s physical activity and play behavior during playtime over one school year and during the transition from one school year to the next. This study found several changes in children’s physical activity and play behaviors across Study 1 and Study 2. In relation to changes across the whole school year (Study 1), significant increases were observed in the time children spent alone and in their incidents of antisocial verbal behaviors. In the present study, a high proportion of children were classed as either overweight (35.5% of sample) or obese (13.5% of sample). Research has suggested that overweight and obese children are often socially withdrawn and display aggressive–disruptive behavior [31].

**Table I. Descriptive anthropometric data of children in Study 1 and Study 2**

<table>
<thead>
<tr>
<th></th>
<th>Study 1</th>
<th></th>
<th>Study 2</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Boys ($n = 42$)</td>
<td>Girls ($n = 65$)</td>
<td>Boys ($n = 43$)</td>
<td>Girls ($n = 67$)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>9.7 ± 0.3</td>
<td>9.7 ± 0.3</td>
<td>10.4 ± 0.3</td>
<td>10.4 ± 0.3</td>
</tr>
<tr>
<td>Stature (m)</td>
<td>1.40 ± 0.07</td>
<td>1.38 ± 0.06</td>
<td>1.43 ± 0.07</td>
<td>1.43 ± 0.07</td>
</tr>
<tr>
<td>Body mass (kg)</td>
<td>37.7 ± 9.2</td>
<td>36.6 ± 8.5</td>
<td>40 ± 9.8</td>
<td>39.8 ± 9.2</td>
</tr>
<tr>
<td>BMI (kg.m²)</td>
<td>19.1 ± 3.4</td>
<td>19.1 ± 3.2</td>
<td>19.3 ± 3.5</td>
<td>19.4 ± 3.2</td>
</tr>
<tr>
<td>% Overweight</td>
<td>35.7</td>
<td>33.8</td>
<td>28.6</td>
<td>30.8</td>
</tr>
<tr>
<td>% Obese</td>
<td>19.0</td>
<td>9.2</td>
<td>11.9</td>
<td>10.8</td>
</tr>
</tbody>
</table>
and that children rejected by their peers are less likely to play with others [20]. This may explain this finding to some extent. Interestingly, both time spent alone and antisocial behaviors decreased following the transition into Year 6, which is the final year in English primary schools (Study 2). The playground hierarchy is typically based around age [3, 20], and it is possible that the children’s social status changed as a result of this transition. Blatchford et al. [19] reported that girls tend to interact with children of different ages, and younger girls may have played with the older girls in this study as it can provide elevated social status within their peer group [19]. This may, in particular, explain the decrease in the amount of time girls spent alone in Study 2. While the present study did not record the age mix of children of their social groups, there may be potential for encouraging older children to engage in physically active play behaviors with younger children.

It should be noted that the majority of children’s social interactions were positive. This is an important finding, as children’s behavior during playtime is often cited as a contributing factor to decreased playtime length or the removal of playtime altogether [12, 21]. This finding shows that playtime is an opportunity for children to engage in social behaviors, and reducing/removing playtime could influence both physical and social health. Some gender differences were observed, with girls engaging in more incidents of pro-social behaviors than boys, which supports previous research [19, 30]. The greater number of incidents of antisocial behaviors by boys may be linked to the competitive nature of the games they played, such as football [soccer]. Previous research has suggested that competitive games can increase the incidence of disputes over the rules and collisions during the game [25], though conflict resolution is one skill that can be developed through such interactions [21]. Overall, the data suggest that

<table>
<thead>
<tr>
<th>Variable</th>
<th>Autumn 2006</th>
<th>Summer 2007</th>
<th>ANOVA (P-values)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys (n = 42)</td>
<td>Girls (n = 65)</td>
<td>Boys (n = 42)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gender effect</td>
</tr>
<tr>
<td>Sitting</td>
<td>3.9 ± 10.3</td>
<td>7.2 ± 10.2</td>
<td>6.4 ± 14.8</td>
</tr>
<tr>
<td>Standing</td>
<td>31.8 ± 19.8</td>
<td>41.6 ± 13.5</td>
<td>28.2 ± 16.4</td>
</tr>
<tr>
<td>Walking</td>
<td>40.9 ± 18.4</td>
<td>35.9 ± 14.1</td>
<td>43.6 ± 15.4</td>
</tr>
<tr>
<td>Vigorous</td>
<td>22.0 ± 13.7</td>
<td>14.6 ± 9.3</td>
<td>21.7 ± 15.4</td>
</tr>
<tr>
<td>MVPA</td>
<td>62.9 ± 20.9</td>
<td>50.5 ± 14.6</td>
<td>65.2 ± 19.1</td>
</tr>
<tr>
<td>Social group size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>10.6 ± 12.5</td>
<td>5.7 ± 14.1</td>
<td>12.8 ± 14.7</td>
</tr>
<tr>
<td>Small (2–4 children)</td>
<td>34.4 ± 33.5</td>
<td>66.3 ± 34.2</td>
<td>35.3 ± 29.1</td>
</tr>
<tr>
<td>Medium (5–9 children)</td>
<td>25.0 ± 32.4</td>
<td>24.4 ± 29.3</td>
<td>21.5 ± 21.7</td>
</tr>
<tr>
<td>Large (10+ children)</td>
<td>30.0 ± 38.5</td>
<td>3.6 ± 13</td>
<td>30.2 ± 38.3</td>
</tr>
<tr>
<td>Play behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sporting games</td>
<td>34.2 ± 41.6</td>
<td>2.0 ± 11.4</td>
<td>38.7 ± 38.9</td>
</tr>
<tr>
<td>Playground games</td>
<td>28.1 ± 32</td>
<td>46.5 ± 31.1</td>
<td>21.3 ± 28.6</td>
</tr>
<tr>
<td>Sedentary activities</td>
<td>18.8 ± 22.6</td>
<td>28.4 ± 19.8</td>
<td>23.2 ± 24.7</td>
</tr>
<tr>
<td>Locomotion</td>
<td>18.9 ± 19.6</td>
<td>23.0 ± 18.2</td>
<td>15.9 ± 12.1</td>
</tr>
<tr>
<td>Social interactions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td>34.2 ± 20.1</td>
<td>46.2 ± 21.1</td>
<td>30.5 ± 35.1</td>
</tr>
<tr>
<td>VS</td>
<td>32.6 ± 20.6</td>
<td>36.3 ± 17.2</td>
<td>37.1 ± 23.1</td>
</tr>
<tr>
<td>PC</td>
<td>17.0 ± 23.3</td>
<td>7.0 ± 8.9</td>
<td>12.1 ± 16.9</td>
</tr>
<tr>
<td>VC</td>
<td>5.8 ± 9.3</td>
<td>2.7 ± 5.5</td>
<td>13.0 ± 17.3</td>
</tr>
<tr>
<td>Ignore</td>
<td>10.4 ± 16.3</td>
<td>7.8 ± 10.6</td>
<td>6.7 ± 10.6</td>
</tr>
</tbody>
</table>

Totals may not add up due to rounding. Lying down data not presented due to lack of occurrence during playtime. PS, pro-social physical interactions; VS, pro-social non-physical interactions; PC, physical conflict (antisocial physical); VC, verbal conflict (antisocial non-physical); I, ignore (ignore negative interaction initiated by another child). NS, non-significant.
while some individual social interactions may be negative during playtime [19, 32], this period is an important arena for developing social and conflict management skills [11–12].

In the present study, the time children spent standing increased as they moved from Year 5 into Year 6. This is an interesting finding, particularly as time spent in sedentary activities did not increase. A decrease was observed in the amount of time spent in playground games and this was largely attributable to the activities the girls engaged in. Anecdotally, observers noted that girls appeared to increase their involvement in sports games, particularly football. Research has indicated that boys often actively exclude girls from football games [33, 34] and that girls need to demonstrate competence before boys allow them to play [35]. Specifically, while the girls might be allowed to join the game, they could not be an active participant unless they were skilled (e.g. receive passes). This may account for some of the changes observed in these variables across Study 2.

Previous research has documented decreased engagement in playground games across one school year in younger populations, particularly by girls [19, 30]. These studies, however, examined changes in playground games and behavior over time following point of entry in to primary school. This is in contrast to the present study, which to the best of our knowledge is the first to report changes that follow the transition across school years while attending the same school and remaining with the same school class. In the present study, playground games included activities such as chasing games, skipping, racing and verbal games involving actions (e.g. ring-a roses), which are similar to the activities that were documented previously [19, 20]. Blatchford [20] noted that over time such games may become boring or be perceived as childish and that basic games are often replaced with more complex ones.
Study 2 results indicate a change in the activities children engaged in during playtime and that more ‘traditional’ playground games were being replaced, though no significant changes were observed in the remaining play behavior categories (Table III). This is an interesting consideration for future research, and such information may inform the development and implementation of playtime interventions.

A number of gender differences were observed, with boys engaging in more walking and vigorous activity and girls spending more time standing. These findings are consistent with previous research that used objective monitoring during playtime [13, 36]. This may be explained by the finding that boys spent more time engaged in sports activities (e.g. football), while girls spent more time in playground games (e.g. dancing, skipping), sedentary activities and locomotor behaviors. Notably, across the measurement periods, boys and girls engaged in moderate-to-vigorous physical activity >50% of playtime (Tables II and III), though this is method dependent. This suggests that children took the opportunity that playtime provided to engage in physical activity, and it further highlights the importance of playtime in the accumulation of recommended minutes of physical activity for health purposes [13].

Previous research noted that boys view playtime time as an opportunity to engage in sport and competition, while girls see it as an opportunity to socialize and engage in sedentary play [19, 20, 33, 34]. In the current study, time spent engaged in playground games accounted for a large proportion of the girls’ activity. Anecdotal observations suggest that these activities were mostly co-operative games, during which participants were often required to wait their turn (e.g. waiting in line for skipping). As such, girls were engaged in active games but these involved extended periods of standing. This may have contributed to girls’ lower physical activity levels and more time spent standing. Conversely, the main choice of activity for boys was football (coded as a sport by SOCARP), an activity known to dominate available playground space as boys territorialize large open spaces for this game [20, 33, 34]. In addition, Beth-Halachmy [37] noted that boy’s social groups tend to be larger than girls’ and that football typically requires large numbers to play it [34]. Notably, time spent in larger groups has been found to be positively associated with physical activity engagement [25]. Comparatively, research suggests that girls prefer to play in smaller groups [37], and the present study supports this notion. Girls tend to play in smaller play spaces [34], though the casual nature of this association has not been established. Taken together, these findings suggest that the playground environment and structure affords boys more opportunities to engage in physically active behaviors than girls. Interestingly, social group sizes did not significantly change across time, with the exception of time spent alone, which increased in Study 1 and decreased in Study 2. Overall, it appears that the social structure of the playground is well established by the time children reach the latter years of their elementary education [20], and this may be due to remaining with the same class peers over time. Researchers, therefore, need to be aware of this when designing playtime interventions.

A strength of this study is its use of a validated direct observation instrument to document changes over time. Some limitations, however, warrant attention. First, the focus of the A-CLASS Project was to recruit children with the top 50% BMI for children in their year at school. This limits the generalizability of these findings. Second, the use of colored sashes to identify the children at baseline may have caused some reactivity. Third, the time points within the study consisted of different lengths and seasons. There may be seasonal influences on the data, though the extent of this is unknown as the weather and temperature was not recorded during observations. Lastly, information concerning specific play spaces and peer acceptance of activity behaviors were not collected and this would have enriched the information [4].

**Conclusions**

School playtime provides children with daily opportunities to engage in play behaviors in...
a relatively unstructured environment. Some changes in children’s activity levels and play behaviors were observed across one school year and across the transition between school years. Engagement in playground games significantly decreased across Study 2, while changes were observed in antisocial behaviors across both Study 1 and Study 2. As expected, gender differences were also observed, with girls engaging in less physical activity and sports than boys during playtime. Overall, the results suggest that while children’s play behaviors and activity levels do fluctuate, the fluctuations are generally small over time. Recently, Ramstetter et al. [21] stated that playtime is a child’s personal time and that it has physical, mental, and social health benefits. This study found that antisocial behaviors accounted for only a small proportion of the interactions observed. Reducing or removing playtime from the school day due to curricular pressures or behavioral reasons may negatively impact on children's play choices, physical activity levels and social behaviors.

**Funding**

Neighbourhood Renewal Fund; Liverpool City Council; Liverpool Active City.

**Conflict of interest statement**

None declared.

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