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Measuring Recess Activity Using SOPLAY Revealed Sex and Seasonal Differences, Challenges in Fuel for Fun Impact Assessment

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**Abstract**

Objective: Examine outcomes and feasibility of measuring change in recess activity using System for Observing Play and Leisure Activity in Youth (SOPLAY) in impact assessment of Fuel for Fun, a school-based nutrition education program.

Study Design, Setting, Participants, and Intervention: Trained researchers scanned playgrounds of 8 FF schools during 4 grade recess. Playgrounds were mapped into distinct areas (range 4–21) in spring and fall.

Outcome Measures and Analysis: Observational data (s SOPLAY observation forms) were analyzed for contextual characteristics of areas including their accessibility, usability, and whether or not they were targeted areas. Separate scans are made for males and females, and simultaneous entries and exits were also recorded.

Results: In total, playground areas were scanned 2041 times (1,047 fall, 994 in spring) ranging from 6–52 depending on school. Overall, walking was the leading playground activity in the spring (37% sedentary, 45% walking, 18% vigorous) vs fall (33%, 35%, 32% respectively). Proportion of vigorous activity was greater in the fall than the spring for both boys and girls. In both spring and fall, sedentary boys had more sedentary activity than girls (boys 32%, 31%, 30% vs girls 50%, 46%); boys and girls walking activity was similar in spring and fall. Mixed grade recess, student migration between scanned areas, and inconsistent inter- and intra-scan recording challenged data collection and analysis.

Conclusions and Implications: Findings demonstrated seasonal and sex differences in playground activity levels. These outcomes and SOPLAY limitations informed FF impact assessment analyses.

**Methods**

**Design**

An observational series study of activity levels on playgrounds at each FF school at two time points.

**Data Collection**

Grades at each FF school (n=8) were divided into 2.OZ. A map of the OZ’s (see Figure 1) pinpointed observer location. Researchers arrived an hour prior to observation start time, a walk through of each target area was performed and researchers prepared mentally by scanning each area a few times before each collection period. Variables were recorded on observation forms (see Figure 2 and Figure 3). Recess times, which may have included more than 1 grade, were also recorded.

**Procedure**

1. Scan each area grid
2. Calculate separately for boys and girls and for SY, WK, and VA activity:
   - Sedentary Activity
   - Walking Activity
   - Vigorous Activity
3. Calculate percentage activity for each grade, sex, and season
4. Calculate MOZC
5. Determine each activity level count by summing total MOZC values and dividing by number of OZ scans
6. Calculate Total Activity Level (TAL) by summing YOZC + WW OZC + VA OZC
7. Divide WW OZC, YOZC, WOZC, and VA OZC by TAL to determine proportion of playground observed as sedentary, walking, and vigorous

**Results**

A total of 2,041 scans (1,047 in the fall, 994 in the spring) were completed from the observation zones of the 8 schools. Recess activity levels differed between the spring and fall and between boys and girls.

<table>
<thead>
<tr>
<th>Participant Characteristics: Spring 2013</th>
<th>Fall 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>18%</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>American Indian</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>67 (16.0%)</td>
</tr>
</tbody>
</table>

**Background & Aims**

**Fuel for Fun:** Cooking with Kids Plus Parents and Play, is an integrated research, extension, and education project targeting 4th grade students. Its long-term goal of reducing the risk of childhood obesity will be addressed by promoting healthful food and activity environments, policies and behaviors through: 1) building and testing the efficacy of a 4th grade comprehensive school- and family-based intervention, 2) applying it to an after-school setting to broaden its reach, and, 3) disseminating both versions through outreach.

**About SOPLAY**

SOPLAY is a validated tool for directly observing physical activity and associated environmental characteristics in free play settings (e.g., recess and lunch at school). SOPLAY provides objective data on the number of participants and their physical activity levels during play and leisure opportunities in targeted areas. Separate scans are made for males and females, and simultaneous entries for contextual characteristics of areas including their accessibility, usability, and whether or not supervision, organized activities, and equipment are provided. The predominant type of activity engaged in by areas is also recorded (e.g., basketball, dance).

**Terminology**

Observation Zone (OZ): Playground area viewed by trained observer.

Scan: Act of counting persons engaged in activity in an OZ. Counts are specific to activity level (Sedentary: SY, Walking: WK, Very Active: VA) and sex (Boys, B; Girls, G).

SY activities: Little or no movement—when energy expenditure is less than that of normal walking; e.g., sitting, standing, playing card games, laying down, reading, socializing, waiting, watching a TV program.

WK activities: Locomotion or transfer of weight from one foot to another, including up to or down a line. Playing a moving ball, where energy expenditure is greater than a walk; e.g., hopping, running, jumping, tumbling. VA: A person carrying a load while walking, doing sit ups.

VA activities: Little or no movement—when energy expenditure is less than that of normal walking; e.g., sitting, standing, playing card games, laying down, reading, socializing, waiting, watching a TV program.

VA activities: Locomotion or transfer of weight from one foot to another, including up to or down a line. Playing a moving ball, where energy expenditure is greater than a walk; e.g., hopping, running, jumping, tumbling. VA: A person carrying a load while walking, doing sit ups.

**Data Analysis**

Steps to determine playground proportion of SY, WK, and VA activity level, separately for boys and girls:

1. Calculate each OZ to tally instances of observed activity levels.
2. Calculate each OZ the number of times according to the research protocol.
3. For each OZ, calculate mean OZ count (MOZC) by summing total OZ counts and dividing by number of OZ scans.
4. Calculate each activity level count by summing total MOZC values and dividing by number of OZ scans.
5. Calculate Total Activity Level (TAL) by summing SY OZC + WK OZC + VA OZC.
6. Divide WW OZC, YOZC, WOZC, and VA OZC by TAL to determine proportion of playground observed as sedentary, walking, and vigorous.

**Example Calculation**

A playground with 9 OZ, each with 2 scans resulted in the following tallies for girls:

<table>
<thead>
<tr>
<th>Area</th>
<th>G SY</th>
<th>G WK</th>
<th>G VA</th>
<th>G SY</th>
<th>G WK</th>
<th>G VA</th>
<th>G SY</th>
<th>G WK</th>
<th>G VA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**References**

3. The observational, real-world nature of using SOPLAY in this context made it difficult for us to control for the overlap of recess times of different class grade levels.

**Challenges**

- Student migration between observation zones made observations challenging.
- Accurate data entry and analysis proved to be challenging. Many opportunities existed for error with approximately 1000 scans at each time point and multiple steps involved in the conversion of raw counts from scans to the proportion of each physical activity level.

**Conclusion**

- **Sex and season differences in recess physical activity levels were detected.**
- The many challenges associated with SOPLAY use, including recess scheduling, student migration between areas, and complex data analysis informed planning for future data collection and analysis.
- Data collection and analysis using SOPLAY require significant research investment.