Policy and Environmental Influences on Physical Activity in Preschool Children

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Active Play → Self Regulation

Self Regulation → Math

Self Regulation → Vocabulary

Self Regulation → Reading

Math → .431**

Vocabulary → -.565*

Reading → .369**

*p < .05  **p < .01
Outline

- Center policies and practices
- Outdoor Environment
- Playground Attributes
- Experimental Studies
- Conclusions
Dowda et al. (2009)

- 20 early childhood education centers
- Private (11), Religious (6), Head Start (3)
- 299 children (50% boys)
- Aged 3 to 5 years
- 49% African American
- Mean BMI 16.6 3.8

Dowda et al. Pediatrics 2009;123:e261-e266
Dowda et al. (2004)

- OSRAC-P (Brown et al. RQES 2006)
- Structured Interviews w/ Director
- Classroom and Playground Audit
- Early Childhood Environment Rating Scale-Revised Edition (ECERS-R)
FCCH policies and practices that influence PA

Gunter, Rice, Ward, Trost. In Review
Bower et al. (2008)

- 20 Child Care Centers in NC
  - Mean enrollment of 81
  - 33% African American
  - 80% participated in CACFP
  - 20% NAEYC Accredited

- Environment and Policy Assessment and Observation (EPAO)
  - (Ward et al. 2008 Am J Health Behav.)

- OSRAP (OSRAC-P)
## Correlation with Mean PA Level

<table>
<thead>
<tr>
<th>EPAO Subscale</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Opportunities</td>
<td>0.51</td>
</tr>
<tr>
<td>Sedentary Opportunities</td>
<td>0.21</td>
</tr>
<tr>
<td>Sedentary Environment</td>
<td>-0.23</td>
</tr>
<tr>
<td>Portable Play Environment</td>
<td>0.33</td>
</tr>
<tr>
<td>Fixed Play Environment</td>
<td>-0.28</td>
</tr>
<tr>
<td>Staff Behaviors</td>
<td>0.35</td>
</tr>
<tr>
<td>PA Training and Education</td>
<td>0.40</td>
</tr>
<tr>
<td>Physical Activity Policy</td>
<td>0.16</td>
</tr>
<tr>
<td>PA Environment Total Score</td>
<td>0.34</td>
</tr>
</tbody>
</table>

High vs. Low EPAO Centers

### Best Predictors of PA and SED Behavior

<table>
<thead>
<tr>
<th>Predictor</th>
<th>%MVPA</th>
<th>%SED</th>
<th>Mean PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Opportunities</td>
<td>0.47</td>
<td>-0.57</td>
<td>0.61</td>
</tr>
<tr>
<td>Sedentary Environment</td>
<td>-</td>
<td>0.34</td>
<td>-0.56</td>
</tr>
<tr>
<td>Portable Play Environment</td>
<td>0.29</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fixed Play Environment</td>
<td>-0.30</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PA Training &amp; Education</td>
<td>-</td>
<td>-0.29</td>
<td>0.39</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.40</td>
<td>0.42</td>
<td>0.60</td>
</tr>
</tbody>
</table>

Boldermann et al. (2006)

- 11 Preschool in Stockholm
- 197 children
- Aged 4.5 – 6.5 years
- Outdoor Environment Assessment
  - Total Outdoor Area
  - Shrubbery & Broken Ground
  - Integration of play areas with vegetation

Indoor Space

Indoor Area

Cardon et al. (2008)

- 39 Preschools in Flanders
  - 415 boys, 368 girls
  - Mean age 5.3 +/- 0.4 years
- Influence of playground attributes on physical activity during recess
- Playground attributes Coded by research staff and verified by photography
- Physical Activity assessed with Pedometer
## Preschool Environmental Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child per m²</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Teacher</td>
<td>NA</td>
<td>-</td>
</tr>
<tr>
<td>Aiming Equipment</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Playing Equipment</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Recess Duration</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ground Surface</td>
<td>-</td>
<td>NA</td>
</tr>
<tr>
<td>Markings</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Vegetation</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Topography</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Toys</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

- Single Predictor 2-Level Model (Schools – Student)
- School explained 27% of variance in boys steps & 35% in girls steps

Cardon et al. (2008) IJBNPA
Hannon & Brown (2008)

- Playground Intervention
  - Hurdles
  - Hoops
  - Tunnels
  - Balance Beams
  - Target Toss/Throw sets
  - Playground balls

- 1 Center
- 64 3- to 5-year-olds
- ActiGraph GT1M
- 10 monitoring days
- 15-sec Epochs
- Sirard 2005 cutpoints
- OSRAC-P

Hannon & Brown (2008)

**Intervention effect: Starts day 6**

**Percent of recess time**

- Sedentary
- Light
- Moderate
- Vigorous

**Day**

1  2  3  4  5  6  7  8  9  10

Alhassan et al. (2007)

- Pilot RCT to determine the effects of increasing outdoor playing time on PA
- 33 Latino children attending 1 Head Start
- Actigraph worn Mon A.M to Fri A.M.
- After Tues randomized to either Recess (N=18) or Control Conditions
- Recess groups received 60 mins of additional Recess

Alhassan et al. (2007) Int J Pediatric Obesity
MVPA Levels During Recess

Control

- 92% SED
- 3% LIGHT
- 5% MVPA

Recess

- 93% SED
- 2% LIGHT
- 5% MVPA

Alhassan et al. (2007) Int J Pediatric Obesity
RCT on Outdoor Playtime

Alhassan et al. (2007) Int J Pediatric Obesity
Move and Learn Curriculum

• Movement-based curriculum based on *Let’s Move, Learn, and Have Fun!* – a teacher and caregiver resource developed by Kansas Nutrition Network and Kansas State University Research and Extension.

• Integrated movement into all learning areas – math, social studies, science, language arts and nutrition education.

• Activities included counting and number recognition games using scarves and balloons and music-based chasing/imagination games addressing concepts in language arts, social studies and nutrition education.

• Teachers were required to include two "move and learn" curriculum activities lasting 10-minutes or longer in each 2.5 h session.
<table>
<thead>
<tr>
<th>Lesson Context</th>
<th>% MVPA 1</th>
<th>Odds Ratio</th>
<th>95% C. I.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Circle Time</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>22.8</td>
<td>2.6</td>
<td>2.2 – 3.0 *</td>
</tr>
<tr>
<td>Control</td>
<td>10.3</td>
<td>1.0</td>
<td>referent</td>
</tr>
<tr>
<td><strong>Transitions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>42.0</td>
<td>0.8</td>
<td>0.7 – 1.0</td>
</tr>
<tr>
<td>Control</td>
<td>46.3</td>
<td>1.0</td>
<td>referent</td>
</tr>
<tr>
<td><strong>Snack Time</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>2.5</td>
<td>1.3</td>
<td>0.8 – 2.2</td>
</tr>
<tr>
<td>Control</td>
<td>3.3</td>
<td>1.0</td>
<td>referent</td>
</tr>
<tr>
<td><strong>Unstructured Outdoor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>78.3</td>
<td>1.4</td>
<td>1.2 – 1.8 *</td>
</tr>
<tr>
<td>Control</td>
<td>71.7</td>
<td>1.0</td>
<td>referent</td>
</tr>
<tr>
<td><strong>Unstructured Indoor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>26.7</td>
<td>1.2</td>
<td>1.1 – 1.3 *</td>
</tr>
<tr>
<td>Control</td>
<td>23.5</td>
<td>1.0</td>
<td>referent</td>
</tr>
</tbody>
</table>

*Trost et al. JPAH 2008;5:88-103*
Classroom MVPA

![Bar chart showing MVPA mins for Intervention and Control groups before and after intervention.](Image)

Trost et al. JPAH 2008;5:88-103
Summary

• A number of factors are responsible for the marked between-center variability in physical activity and sedentary behavior.

• Attributes of play areas
  ▪ Size of play area (density)
  ▪ Portable vs. Fixed

• Outdoor time is important, but multiple recess breaks are better than single prolonged breaks

• Staff training and behaviors influence level of physical activity
Thank You!