Associations between Family Nutrition and Physical Activity Behaviors and Successful Learning Characteristics in Elementary School Children

Presented by Jenny Jackson, MS, RD
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Project Directors: Katherine B. Gunter, PhD and Deborah John, PhD

Learning Objectives

• Attendees will:
  – be able to describe the relationships between family-level nutrition and physical activity environmental and behavioral characteristics and indicators of successful learning among a sample of elementary school children.

The Issue

• Childhood obesity
  – Multiple risk factors
    • Genetic, psychological, sociocultural, environmental
  – Multiple consequences
    • Increased risk for chronic disease, social and psychological problems
    • Negatively associated with academic achievement*

• Nutrition and physical activity
  – Key behavioral factors involved in energy balance
  – Also connected with school performance**

Prevalence of Overweight K-6th Graders among a Sample of Oregon Children

<table>
<thead>
<tr>
<th>Grade</th>
<th>K</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys Measured</td>
<td>151</td>
<td>160</td>
<td>191</td>
<td>164</td>
<td>160</td>
<td>169</td>
<td>145</td>
<td>1151</td>
</tr>
<tr>
<td>Girls Measured</td>
<td>114</td>
<td>127</td>
<td>133</td>
<td>120</td>
<td>162</td>
<td>149</td>
<td>112</td>
<td>917</td>
</tr>
<tr>
<td>Total Measured</td>
<td>276</td>
<td>287</td>
<td>324</td>
<td>284</td>
<td>322</td>
<td>318</td>
<td>257</td>
<td>2068</td>
</tr>
</tbody>
</table>

Environment influences behavior

• The home environment plays a key role in obesity prevention.*
  – Children obtain more than half their daily energy from foods consumed at home.**
• Food availability, family food rules, parental influences, and family meal patterns influence risk for childhood obesity.

*Taras and Potts-Datema 2005
**Kriekmier et al 2010
The Question

Are aspects of the home environment associated with risk for childhood obesity also associated with learning?

Study Aim

• To determine whether family nutrition and physical activity environmental and behavioral factors are associated with successful learning skills.

Methods

• Participants
  – Parents of K-5 students at 3 elementary schools in Corvallis, OR.
• Procedures
  – Online survey, February 2013
    • Invitation to participate via school email listserv
    • Parent report of child/family nutrition and physical activity and child learning characteristics
• Data analysis
  – Descriptive, correlation, and linear regression analyses

Measures

• Demographics
  – Child/caregiver
• Family Nutrition and Physical Activity (FNPA) screening tool
  – Measure of family/child food and physical activity behaviors, family home characteristics, family rules governing food and PA
  – Validated measure of risk for overweight

The Family Nutrition and Physical Activity (FNPA) screening tool

<table>
<thead>
<tr>
<th>Nutrition</th>
<th>Physical Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 10 items</td>
<td>• 10 items</td>
</tr>
<tr>
<td>• 5 domains</td>
<td>• 5 domains</td>
</tr>
<tr>
<td>Family meal patterns</td>
<td>Screen time behavior</td>
</tr>
<tr>
<td>Family eating habits</td>
<td>Healthy environment</td>
</tr>
<tr>
<td>Food choices</td>
<td>Family activity involvement</td>
</tr>
<tr>
<td>Beverage choices</td>
<td>Child’s activity involvement</td>
</tr>
<tr>
<td>Restriction and reward</td>
<td>Family routine (sleep)</td>
</tr>
</tbody>
</table>

Item Response Categories

<table>
<thead>
<tr>
<th>Safe</th>
<th>Respectful</th>
<th>Responsible</th>
<th>Social Emotional Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeps hands and feet to self</td>
<td>Shows respect for classmates, adults and property</td>
<td>Follows directions</td>
<td>Establishes friendships</td>
</tr>
<tr>
<td>Carefully uses materials</td>
<td>Works and interacts well with others</td>
<td>Completes work in a reasonable amount of time</td>
<td>Accepts correction or redirection</td>
</tr>
<tr>
<td>Makes appropriate choices</td>
<td>Respects the personal space of others</td>
<td>Takes responsibility for picking up after him/herself</td>
<td>Verbalizes feelings appropriately</td>
</tr>
</tbody>
</table>

Characteristics of a Successful Learner (CSL)

<table>
<thead>
<tr>
<th>Safe:</th>
<th>Respectful:</th>
<th>Responsible:</th>
<th>Social Emotional Growth:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

Characteristics of a Successful Learner (CSL)

– School district determined indicators of learning behaviors
– Item response categories
  • Emergent (1)
  • Developing (2)
  • Proficient (3)
  • Exceeds (4)
Results

- 122 surveys received from a total of 544 families reached (22% response rate)

Final sample size = 85

Demographics

- Gender:
  - Male: 51%
  - Female: 49%

- Grade in School:
  - Kindergarten: 21%
  - Grade 1: 12%
  - Grade 2: 24%
  - Grade 3: 16%
  - Grade 4: 15%
  - Grade 5: 12%
  - Grade 6: 10%

Results: Demographics

- Child Race/Ethnicity:
  - White: 85%
  - Hispanic: 2%
  - Asian: 6%
  - Other: 7%

- Eligibility for Free/Reduced School Meals:
  - Yes: 14%
  - No: 86%

- Parent Education:
  - High School: 2%
  - Some College: 12%
  - 4 or more years of college: 88%

Results: Mean FNPA and CSL Scores

- FNPA: 3.45 (0.28)
- CSL: 2.87 (0.54)

Results: Unadjusted correlations between CSL and FNPA Scores

Positive correlations were also found for family eating habits, beverage choices, and restriction/reward domains as well as fast food and sweetened beverages (p<0.05).

Multiple linear regression analyses examining associations between the FNPA and CSL

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>FNPA</td>
<td>0.54</td>
<td>0.02</td>
<td>0.31</td>
</tr>
</tbody>
</table>
| Adjusted for school, grade, race/ethnicity, eligibility for free and reduced school meals, and parent education. The unstandardized coefficients reflect the increase in characteristics of a successful learner score for each 1 point increase in the FNPA-related score.

Family Eating Habits          | 0.32     | 0.01     | 0.08     |

Nutrition Component           | 0.74     | 0.00     | 0.11     |

Adjusted for school, grade, race/ethnicity, eligibility for free and reduced school meals, and parent education. The unstandardized coefficients reflect the increase in characteristics of a successful learner score for each 1 point increase in the FNPA-related score.
Results

Multiple linear regression analyses examining associations between the FNPA and CSL

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>p</td>
<td>95% CI</td>
</tr>
<tr>
<td>Restriction and Reward</td>
<td>0.27</td>
<td>0.02</td>
<td>0.05, 0.49</td>
</tr>
<tr>
<td>Fast Food</td>
<td>0.26</td>
<td>0.01</td>
<td>0.06, 0.46</td>
</tr>
<tr>
<td>Sugar-Sweetened Beverages</td>
<td>0.37</td>
<td>0.00</td>
<td>0.14, 0.59</td>
</tr>
</tbody>
</table>

Adjusted for school, grade, gender, race/ethnicity, eligibility for free and reduced school meals, and parent education.

The unstandardized coefficients reflect the increase in characteristics of a successful learner score for each 1 point increase in the FNPA-related score.

Conclusion

• Among the variables studied, six were positively and statistically associated with successful learning:
  – Total FNPA and Nutrition component
  – Two domains:
    • Family eating habits
      – Less eating while watching TV = less fast food
    • Restriction and reward
      – Monitor eating of junk food + do not use candy as reward
  – Two items:
    • Families that eat less fast food
    • Children who drink fewer sugar-sweetened beverages

• More favorable family nutrition and physical activity environments and behaviors may positively influence learning-related skills in elementary-age students.

Limitations

• Observational, cross-sectional study
• Sample size
• Selection bias
• Measures
• No adjustment for classroom/teacher
• Other variables?

Implications

• Home environments that promote healthy eating and activity behaviors may also support healthy weight status, reduced risk for chronic disease, and learning outcomes.

• Together with the current emphasis on improving school nutrition and physical activity environments, increased efforts to support healthy lifestyle habits in the family home environment are also warranted.

Next steps

• Special thanks to...
  – Corvallis Schools and study participants
    – Franklin, Hoover, and Lincoln elementary schools
  – OSU CPHHS faculty mentors
    – Kathy Gunter, PhD
    – Deborah John, PhD
    – Adam Branscum, PhD
    – Donna Champeau, PhD
  – Hallie E. Ford Center for Children and Families
Thank you!