Influences of the Home Environment and Daily Routines on Sleep and Obesity

Blake L. Jones, Ph.D.
Human Development and Family Studies
Purdue University
Overview of Presentation

• Obesity

• Link between sleep and obesity

• The home environment and routines

• Implications
Childhood Obesity Trends

- Since 1980, child obesity rates have tripled
- 17% of children and adolescents are obese
  - Obesity rates increase across childhood
- 15% low-income preschool-aged children are obese

Racial and ethnic disparities
- Highest rates (Ogden et al., 2010)
  - Hispanic boys
    - 26.8% compared to 16.7% for NH white boys
  - African American girls
    - 29.2% compared to 14.5% for NH white girls

http://www.cdc.gov/obesity/data/childhood.html
Childhood Obesity Outcomes

- **Stability of obesity**  (CDC.Gov website; Parsons et al., 1999)

- **Parent BMI**  (Parsons et al., 1999)

- **Associated health risks**
  - Asthma
  - Type 2 Diabetes
  - Heart disease
  - High blood pressure
  - Sleep problems
  - Social discrimination

- **Stigma and self-esteem**
  - Academic and social functioning
  - Persist into adulthood

- **Adiposity rebound in children**  (Rolland-Cachera et al., 2012)
  - Begins around age 6; worse if rebound before 5.5 years

Influences on Child Obesity

**Family/Home Environment**
- Family food environment
- Parent work schedules
- Parental education
- Family Interactions
- Mealtime climate
- Parent routines
- Parent race
- Family SES
- Parent BMI

**Family**

**Child**
- Race
- Gender
- Media use
- Bedroom TV
- Sleep routines
- Physical activity
- Food consumption
Sleep and Obesity

• Prevalence of childhood sleep problems
  • Range from 20-41% of children (just reported) (Archbold et al., 2002; Mindell et al., 1999; Owens et al., 2000)

• Insufficient sleep linked to obesity (Chaput et al., 2006; Chen et al., 2002; Gupta et al., 2002; Snell et al., 2007; Taveras et al., 2008)

• Sleep problems tend to be chronic (Kataria et al., 1987; Pollock, 1994)

• Inconsistent routines relate to sleep problems (Mindell et al., 2009)

• Similar to obesity, racial/ethnic minorities more likely to experience insufficient sleep starting as infants (Nevarez et al., 2010)

• So why might sleep and obesity be linked together?

• Routine of insufficient sleep creates a vicious cycle
  • Body craves more energy-dense foods to keep going
  • BMI increases, leading to decline in sleep quality
  • Hormones are affected, changing metabolism
    • Melatonin, Cortisol, Leptin, Ghrelin, Insulin (e.g., Prinz, 2004; Taheri et al., 2004)
Sleep and Obesity

• Links in preschool children

• **Study 1** — (Dev, McBride, Fiese, Jones, & Cho, 2013)
  • Analysis of 22 previously identified risk factors for child obesity
  • Of the 22 entered in the model, only 3 were significant
    • Child Sleep (OR = 2.2)
    • Parent BMI - Parent was Obese (OR = 1.9)
    • Restrictive Feeding Practices (OR = 1.75)

• **Study 2** — (Jones, Fiese, & the STRONG Kids Team, in press)
  • Children who did not get at least 10 hours of sleep per night were 2.87 times more likely to be classified as “at-risk-for-overweight” or obese (BMI ≥ 85th percentile)
    • After controlling for gender, age, race, SES, parent BMI, parent education, and single-parent households
Child Sleep Duration Results

Adjusted for child gender, child age, child race, parent education, and SES

- Bedroom TV
- TV ≥2 hr/day
- Overweight
- Obese

≤ 7 hrs (n=40)
8 hrs (n=170)
9 hrs (n=144)
10 hrs (n=235)
≥ 11 hrs (n=144)
Sleep Differences by Race and SES

Note: $N = 730$. After controlling for child age, child gender, and parent education, there were significant differences across race for average sleep hours per night, $F(3, 719) = 8.087, p < .001$
Bedroom TVs and Obesity

- **Bedroom TVs related to:**
  - Increased TV viewing  (Barr-Anderson et al., 2008)
  - Poor educational achievement  
    (Barr-Anderson et al., 2008)
  - Decreased sleep duration  
    (Mindell et al., 2009; Owens et al., 1999)
  - Fewer family meals  
    (Barr-Anderson et al., 2008)
  - Decreased physical activity  
    (Barr-Anderson et al., 2008)
  - Differences in race and other demographics  
    (Dennison et al., 2002)
  - Increased BMI  
    (Dennison et al., 2002)
Bedroom TV Prevalence

2001 - American Academy of Pediatrics recommendations “Children, Adolescents, and Television”
- “Limit children’s total media time to no more than 1 to 2 hours of quality programming per day.”
- “Remove television sets from children’s bedrooms.”

In 1999, 32% of 2-to-7-year-olds had a BTV (Roberts et al., 1999)
By 2002, 38% of preschool children had a BTV (Dennison et al., 2002)
As of 2014, 60% of adolescents had a BTV.
- Associated with 1 pound gain per year (Gilbert-Diamond et al., 2014)

However, few studies have followed up on BTV prevalence for preschool children.
Bedroom TV Findings

Our study included 2-to-4-year-old children \( (n=743) \):

- **69.2% of children had bedroom TVs**
- **32% at time of the 2001 AAP recommendations**

Presence of a bedroom TV associated with:

- Family income
- Child age, gender, and race
- TV viewing hours/day
- Sleep hours/day
Bedroom TV Prevalence by Race

Children using WIC were more likely to have a BTV
• \( \chi^2 = 20.582, p < .001 \)

African American children were more likely to have a BTV
• \( \chi^2 = 21.870, p < .001 \)
## Bedroom TVs Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>BTV</th>
<th>No BTV</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV viewing hours/day</td>
<td>1.9 hours**</td>
<td>1.6 hours</td>
</tr>
<tr>
<td>% viewed TV ≥ 2 hours/day</td>
<td>38.8%*</td>
<td>29.6%</td>
</tr>
<tr>
<td>Sleep hours/night</td>
<td>9.3 hours**</td>
<td>9.7 hours</td>
</tr>
<tr>
<td>% sleep &lt; 10 hours/night</td>
<td>51.2%*</td>
<td>41.6%</td>
</tr>
<tr>
<td><strong>Overweight</strong> (BMI &gt; 85&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
<td>30.4%</td>
<td>28.0%</td>
</tr>
<tr>
<td><strong>Obese</strong> (BMI &gt; 95&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
<td>15.2%</td>
<td>12.6%</td>
</tr>
</tbody>
</table>

Note: Using ANOVA tests, we controlled for child gender, child age, child race, parent education level, and SES. *p < .05, **p < .01
Implications

~Child sleep is often insufficient
   • Supports previous research for 10 hour minimum (2-4y)
     (Bell et al., 2010; Jiang et al., 2009; Parenting Science website)

~Too many children have bedroom televisions

~Family mealtimes are important and we need to limit distractions

Targets for intervention

• Encourage children and adolescents to get enough sleep, focusing on sleep routines and environments
• Remove bedroom TVs (easily modifiable risk behavior)
• More efforts are needed that focus on helping children from minority and low-income families
• Encourage family mealtimes with less distractions
Food/Mealtime Environments

Food consumption is associated with:

- Household and food environments
- Attention
- Stress perceptions
- Availability of healthy foods in the home

*USDA recommendations for mealtimes with children

Avoid rushed/hurried meals
Mealtimes should be pleasant & relaxed
Family style feeding - children learn to regulate feeding
Make mealtimes a predictable routine
Parents and adults should model healthy eating

- Family EATS study - (Kong, Jones, Fiese et al., 2013)
  - Family mealtime interactions differ by race in low-income families
Attention, Stress, and Eating

Attention

- TV & other non-food environmental stimuli related to almost 300 more calories consumed during meals (e.g., Bellisle, Daliz, & Slama, 2004; Stroebele & DeCastro, 2004)
- “Mindless Eating” studies (Brian Wansink)

Perceived Stress

- Increased sweets consumption (Epel et al., 2001)
- More snacking & less “meal-type” foods (Oliver & Wardle, 1999)
- Increased fat consumption (Torres & Nowson, 2007)

Gender Differences in perceived stress and food consumption

- Women ate more sweets & calories (Epel et al., 2001)
- Perceived stress related to increased consumption of sweets and decreased consumption of vegetables for women, but not for men (Mikolajczyk et al., 2009)
Acknowledge Funding / Collaborators

• Illinois Council for Agriculture Research to Kristen Harrison (PI)
• University of Illinois Health and Wellness Initiative to Barbara Fiese and Sharon Donovan
• USDA (Hatch 793-328) to Barbara Fiese (PI)
• Univ. of Illinois Chicago Cancer Center to Marian Fitzgibbon (PI)
• USDA Fellowship Grant to Blake Jones (PI)

• STRONG Kids Team - Kristen Harrison, Kelly Bost, Sharon Donovan, Brent McBride, Diana Grigsby-Toussaint, Barbara Fiese, Janet Leichty, Angela Wiley, and Margarita Teran-Garcia
• Childcare centers throughout central-eastern Illinois for their support, and we truly appreciate the time that the STRONG Kids participants gave us.