An intervention to improve eating self-regulation in children increases knowledge and energy compensation

Nicole A. Reigh1, Laurie Alla2, Maria C. Cevallos1, Stephanie N. Williams1, Barbara J. Rolls1, Jennifer S. Savage1, Susan L. Johnson3, Barbara Lohse4, Heather Toomey Zimmerman1, Kathleen L. Keller PhD1

Background

• Teaching children to improve energy self-regulation may help to moderate excess energy intake
• We updated an existing intervention1 to teach children to respond to hunger and fullness signals and tested its effectiveness
• This new intervention incorporated a virtual reality game to teach children eating self-regulation

Objective

To test the effectiveness of a 4-week curriculum designed to improve energy self-regulation in 4-6 year olds on outcomes of knowledge and energy compensation behavior

Participants

Table 1. Participants (N = 25, ages 4-6-years-old)

<table>
<thead>
<tr>
<th>Boys N (%)</th>
<th>Girls N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16(64)</td>
<td>9(36)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boys (Mean ± SD)</th>
<th>Girls (Mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) 5.1 ± 0.8</td>
<td>5.0 ± 0.9</td>
</tr>
<tr>
<td>BMI % at baseline (week 1) 69.8 ± 22.9</td>
<td>64.1 ± 23.3</td>
</tr>
<tr>
<td>BMI % at follow-up (week 8) 72.9 ± 17.1</td>
<td>63.8 ± 22.8</td>
</tr>
</tbody>
</table>

Study Visits

Table 2. Timeline for study visits. Visits occurred one week apart.

<table>
<thead>
<tr>
<th>Visit 1</th>
<th>Visit 2</th>
<th>Visit 3</th>
<th>Visits 4-7</th>
<th>Visit 8</th>
<th>Visit 9</th>
<th>Visit 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height / Weight</td>
<td>COMPx</td>
<td>Preload (high or low kcal)</td>
<td>Knowledge questionnaire (Box 2 below)</td>
<td>Ad libitum test meal</td>
<td>Ad libitum test meal</td>
<td>Ad libitum test meal</td>
</tr>
<tr>
<td>Knowledge questionnaire</td>
<td>COMPx</td>
<td>Preload (high or low kcal)</td>
<td>Knowledge questionnaire (Box 2 below)</td>
<td>Ad libitum test meal</td>
<td>Ad libitum test meal</td>
<td>Ad libitum test meal</td>
</tr>
</tbody>
</table>

Compensation Protocol

150 kcal OR 3 kcal

Figure 5. Children received a high-kcal or low-kcal preload 20 min prior to consuming an ad libitum test meal

Figure 6. Foods served at ad libitum meals: macaroni and cheese, broccoli, carrots, grapes, graham crackers, cheese and milk

Knowledge Questionnaire

BOX 1 – Calculating Compensation Index (COMPx)

COMPx = Meal kcalhighED preload – Meal kcallowED preload

COMPx Values

100% = perfect compensation
Less than 100% = overeating
More than 100% = undertreating

Figure 1. From lesson “What parts of my body help me eat?”

Figure 2. From lesson “What happens if you eat too much?”

Figure 3. From lesson “Why do you eat?”

Figure 4. From lesson “Why do you stop eating?”

Conclusions

• Both energy compensation and knowledge improved from baseline to follow-up, although results varied by sex
• Sex differences in intake regulation may occur as early as the preschool years
• Improving energy self-regulation in girls and boys may require different strategies

References


This study is approved by Penn State’s Institutional Review Board: IRB #828
This study is funded by the Clinical and Translational Sciences Institute’s at Penn State