Influence of parents and friends on children’s and adolescents’ food intake and food selection

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ABSTRACT

Background: The influence of parents versus friends on youths’ eating behavior has not been directly compared, and little is known about the developmental effects of social influences on their eating behavior.

Objective: The objective was to compare the effects of mothers and friends on children’s and adolescents’ energy intake from sandwiches and from healthy and unhealthy snacks and dessert foods.

Design: Twenty-three children (ages 5–7 y) and 27 adolescents (ages 13–15 y) ate a meal with their mother on one occasion and with a same-sex friend on another occasion.

Results: Male and female children consumed less energy from unhealthy snacks when they were with their friends than when with their mothers. Conversely, female adolescents consumed less energy from unhealthy snacks and more energy from healthy snacks when they were with their friends than when with their mothers.

Conclusions: Food selection is differentially influenced by the source of social influence and the age and sex of the child. Parents may act as an inhibitory influence on unhealthy eating for younger children. Adolescent girls may try to convey a good impression of healthy eating when eating with same-sex friends, but the eating habits of teenage boys are not as influenced by the social context. This trial is registered at clinicaltrials.gov as NCT00875576. Am J Clin Nutr 2011;93:87–92.

INTRODUCTION

Parents and friends provide 2 of the most important social influences on youths’ eating behavior (1, 2). However, research on the influences of parents has developed in isolation from research on the influences of friends on youths’ eating behavior. This lack of direct comparison is surprising considering that the type of influence exerted on youth from friends is of a different nature from that of parents and considering the emphasis placed on peers and friends as agents of change during childhood and adolescence (3–5). The current study addressed this important research gap by comparing the influence of mothers and friends on children’s (ages 5–7 y) and adolescents’ (ages 13–15 y) energy intake from sandwich components and from healthy and unhealthy snacks and dessert foods.

As a primary source of socialization, parents influence youths’ eating behavior. Family meals may be an opportunity for parents to make certain foods available, model and reinforce eating habits, and implement certain feeding practices (6–11). Parents may also encourage children to reduce their intake of foods that are low in nutritional value and to increase their consumption of healthier food options. Klesges et al (12) and others (8, 13, 14) have found that both the threat of parental monitoring and actual parental presence decreases children’s intake of nonnutritious foods. Accordingly, we hypothesized that children aged 5–7 y would consume fewer unhealthy snacks and more healthy snacks in the presence of their mother than in the company of their friends.

Recently, there has been an increased interest in peers’ and friends’ influence on youths’ eating behavior and health trajectories (15–18). Peers and friends may be more influential during adolescence than during childhood as social networks become increasingly important to motivations and behaviors and seem to exert a stronger influence than parental norms (19–21). Adolescence is also a period during which sex differences in terms of body image and dieting concerns are likely to appear (22–24). Female adolescents’ weight control behaviors are also more strongly influenced by the behavior of their friends and peers (25, 26). Because dietary concerns are often associated with an increased desire to be popular and accepted, female adolescents may be more inclined to use impression management and self-presentation strategies and adjust their intake to convey an image of healthy eating in front of their peers and friends (27–30). Accordingly, we hypothesized that adolescent girls (but not boys) would eat fewer unhealthy snacks and more healthy snacks in the presence of their friends than in the company of their mothers.

Foods typically associated with meals might be less influenced by social factors than the intake of snacks and dessert foods (31, 32). Accordingly, we hypothesized that children’s and adolescents’ energy intake of sandwich components (meal foods) would be similar in the presence of a friend and in the presence of their mother.
SUBJECTS AND METHODS

Overview and design

Children and adolescents (ie, the target participants) ate a 20-min buffet-style meal in the laboratory on 2 occasions: once with their mother and once with their friend. The participants and their mother or friend were served an identical assortment of sandwich components and healthy and unhealthy snack and dessert alternatives (Table 1). The order of the social condition (mother first compared with friend first) was counterbalanced. The dependent variables of interest included the target participants’ kilocalories consumed from sandwich components and from healthy and unhealthy snacks and desserts.

Participants

Families (n = 52) were recruited from the laboratory’s database of families and from flyers distributed around the community. The parent of the recruited participant was asked to give the research team’s contact information to the parents of their child’s friend to provide consent and schedule the experimental session. While scheduling participants, parents were told that their child and his or her partner (mother or friend) had to abstain from eating 2 h before the experimental session and that the sessions would be videotaped to ensure accuracy of the data collection.

Participants were eligible for recruitment if they reported not having any of the following: food allergies or intolerances to the experimental foods, upper respiratory distress that would affect their sense of smell or taste, or any diagnosed psychological disorder. Participants were also required to like or to be willing to try at ≥15 of the 19 study foods. Finally, because the target participants were required to complete both study conditions (ie, having a meal with their mother and with their friend), only children and adolescents who were able to come to the laboratory with their mother and with a same-sex friend (± 1 y of age of child) were eligible. Ninety-eight potential participants were initially contacted, and 52 children (ages 5–7 y) and adolescents (ages 13–15 y) met the above criteria and participated in this study. Two participants were excluded from the analyses. One child did not consume any food during one session, and the other child brought a friend of the opposite sex to their session. In total, data from 23 children and 27 adolescents were analyzed. Characteristics of the study population are presented in Table 2.

The Children & Youth Institutional Review Board of the University at Buffalo approved all procedures used in this study and all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during this research.

Procedures

On arrival at the laboratory, the participants completed a same-day food recall to ensure that target participants and their partners abstained from eating 2 h before the study session. Target participants and their friends provided assent to participate; mothers provided written consent for their child’s and for their own participation. All participants were given a cereal bar preload to standardize food intake before the experimental session.

The mother and friend conditions were completed at the same time of day (ie, afternoon or evening depending on participant’s age).

### TABLE 1

Experimental foods used in the study

<table>
<thead>
<tr>
<th>Food items</th>
<th>Serving size</th>
<th>Energy per serving</th>
<th>Energy density</th>
<th>Protein</th>
<th>Carbohydrate</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meal foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td>2.00</td>
<td>55.00</td>
<td>1.07</td>
<td>10.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Ham</td>
<td>2.00</td>
<td>70.00</td>
<td>1.24</td>
<td>10.50</td>
<td>3.00</td>
<td>1.75</td>
</tr>
<tr>
<td>Pepperoni</td>
<td>1.00</td>
<td>135.00</td>
<td>4.80</td>
<td>5.50</td>
<td>1.00</td>
<td>12.50</td>
</tr>
<tr>
<td>Provolone cheese</td>
<td>1.00</td>
<td>90.00</td>
<td>3.32</td>
<td>6.00</td>
<td>0.75</td>
<td>7.00</td>
</tr>
<tr>
<td>American cheese</td>
<td>1.00</td>
<td>85.00</td>
<td>1.77</td>
<td>4.50</td>
<td>1.50</td>
<td>7.00</td>
</tr>
<tr>
<td>Whole-wheat bread</td>
<td>2.00</td>
<td>130.00</td>
<td>2.33</td>
<td>4.50</td>
<td>1.50</td>
<td>7.00</td>
</tr>
<tr>
<td>White bread</td>
<td>0.90</td>
<td>65.00</td>
<td>2.40</td>
<td>2.00</td>
<td>13.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Mayonnaise</td>
<td>0.50</td>
<td>95.00</td>
<td>7.04</td>
<td>0.00</td>
<td>0.00</td>
<td>10.50</td>
</tr>
<tr>
<td>Mustard</td>
<td>0.20</td>
<td>1.50</td>
<td>0.27</td>
<td>0.10</td>
<td>0.40</td>
<td>0.10</td>
</tr>
<tr>
<td>Healthy snacks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>3.70</td>
<td>55.00</td>
<td>0.52</td>
<td>0.3</td>
<td>14.6</td>
<td>0.2</td>
</tr>
<tr>
<td>Vanilla yogurt</td>
<td>6.00</td>
<td>70.00</td>
<td>0.47</td>
<td>5.0</td>
<td>12.50</td>
<td>0.0</td>
</tr>
<tr>
<td>Baby carrots</td>
<td>3.00</td>
<td>32.50</td>
<td>0.41</td>
<td>0.75</td>
<td>7.50</td>
<td>0.05</td>
</tr>
<tr>
<td>Unhealthy snacks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chips</td>
<td>1.00</td>
<td>145.00</td>
<td>5.42</td>
<td>2.00</td>
<td>17.00</td>
<td>8.00</td>
</tr>
<tr>
<td>Cupcakes</td>
<td>1.80</td>
<td>175.00</td>
<td>3.60</td>
<td>1.00</td>
<td>30.00</td>
<td>6.00</td>
</tr>
<tr>
<td>Cookies</td>
<td>1.00</td>
<td>151.00</td>
<td>4.85</td>
<td>1.90</td>
<td>20.30</td>
<td>7.55</td>
</tr>
</tbody>
</table>

1 One ounce is equivalent to 30 mL.
2 Wegmans Food Markets Inc, Rochester, NY.
3 Oscar Mayer; Kraft Foods Global Inc, Northfield, IL.
4 Hostess; Interstate Brands Corporation, Kansas City, MO.
5 Hellmann’s; Unilever Bestfoods, Englewood Cliffs, NJ.
6 The Dannon Company, White Plains, NY.
7 Doritos; Frito-lay, Plano, TX.
BMI was calculated from height (in m) and weight (in kg) measurements, and heights, IL), respectively. Body mass index (BMI) was calculated by a trained staff member with a stadiometer (SECA, Birmingham, United Kingdom) and a digital scale (Tanita, Arlington Heights, IL). Anthropometric measures included weight (in kg), height (in cm), and age (in years). Non-Hispanic white, Black, and Missing were categorized as race. Race was included as a covariate in the MRMs because weight is likely to influence youths’ food consumption. The equation below illustrates the MRMs models:

\[ \text{Unhealthy/healthy food in take (kcal)} = \beta_0 + \beta_1 \text{ (social condition)} + \beta_2 (z\text{BMI}) + \text{ error} \]  

To test hypotheses 1 and 2, we stratified our analyses by sex and age group and ran 4 MRMs to test whether energy intake from healthy and unhealthy snacks differed as a function of social conditions for each sex and age group (eg, male children). zBMI was included as a covariate in the MRMs because weight is likely to influence youths’ food consumption. The equation below illustrates the MRMs models:

\[ \text{Unhealthy/healthy food in take (kcal)} = \beta_0 + \beta_1 \text{ (social condition)} + \beta_2 (z\text{BMI}) + \text{ error} \]  

To address our third hypothesis, a separate MRM compared the effects of the presence of mothers and friends on children’s and adolescents’ energy intake from sandwich components.

**TABLE 2**

<table>
<thead>
<tr>
<th></th>
<th>Children (n = 23)</th>
<th>Adolescents (n = 27)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males (n = 8)</td>
<td>Females (n = 15)</td>
</tr>
<tr>
<td>Age (y)</td>
<td>6.29 ± 0.74^1</td>
<td>6.63 ± 1.96</td>
</tr>
<tr>
<td>BMI z score</td>
<td>0.49 ± 1.17</td>
<td>0.64 ± 0.61</td>
</tr>
<tr>
<td>Race [n (%)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>7 (87.50)</td>
<td>11 (73.33)</td>
</tr>
<tr>
<td>Black</td>
<td>0 (0.00)</td>
<td>1 (6.67)</td>
</tr>
<tr>
<td>Missing</td>
<td>1 (12.50)</td>
<td>3 (20.00)</td>
</tr>
</tbody>
</table>

^1 Mean ± SD (all such values).
All MRMs used random intercepts and fixed effects of social condition and food intake. Least squares means (±SE) are presented for significant main effects of the MRMs. All analyses were performed by using Statistical Analysis Software version 9.2 (35).

Power analyses were performed using PASS 2008 (NCSS, Kaysville, UT). Based on an α of 0.05 and power of 0.80 or more, it was determined before the study that ≥10 subjects per social condition were needed to observe a relation between food intake and social condition. Post hoc power analyses indicated that we had ≥80% power to detect our primary hypotheses.

RESULTS

Descriptive statistics for age, zBMI, and race are reported in Table 2. Means and SDs computed for age and zBMI and percentages for ethnicity and race are reported in Table 2.

Hypothesis 1: Children aged 5–7 y would consume fewer unhealthy snacks and more healthy snacks in the presence of their mothers than in the company of their friends

Unhealthy snack intake was greater in the presence of friends (mean ± SE: 277.12 ± 30.25) than in the presence of mothers (158.30 ± 27.27), β = 188.82 (SE: 33.02; 95% CI: 50.14, 187.50), (P = 0.002). Children consumed similar amounts of healthy snacks (P = 0.153) with their friends and with their mothers.

Hypothesis 2: Adolescent girls (but not boys) would eat fewer unhealthy snacks and more healthy snacks in the presence of their friends than in the company of their mothers

Adolescent females consumed more healthy foods in the presence of their friends than in the company of their mothers (Figure 1) (β = 31.51; SE: 14.40; 95% CI: 0.14, 62.88; P = 0.049), whereas this was not the case for male adolescents (P = 0.472).

Conversely, female adolescents consumed less energy from unhealthy snacks in the presence of their friends than in the presence of their mothers (β = −105.55; SE: 47.86; 95% CI: −209.84, −1.27; P = 0.048) (Figure 2). Male adolescents consumed similar amounts of unhealthy snacks with their friends and with their moms (P = 0.457).

Hypothesis 3: Children’s and adolescents’ intake of sandwich components would be similar in the presence of a friend and in the presence of their mothers

Children and adolescents consumed similar amounts of sandwich components with their friends and with their mothers (all P > 0.3).

DISCUSSION

This study compared the effects of the presence of mothers and friends on children’s and adolescents’ energy intake from sandwich components, healthy snacks, and unhealthy snacks. Consistent with Klesges et al.’s (12) findings and other studies on parental influences on children’s eating (14, 36–38), younger children consumed fewer unhealthy snacks with their mothers than in the presence of their friends. However, it is unclear whether younger participants overate in the company of friends or whether they suppressed their intake of unhealthy snacks in the presence of their mothers or both because we did not include an “eat-alone” condition. Conceivably, in the absence of inhibitory forces (ie, parental constraints), children might be motivated to maximize their intake of highly palatable foods.

Friends’ intake of high-energy-dense snacks and desserts may operate as a “permission giver” and increase the limit of acceptable consumption of these otherwise forbidden food items (39–41). Also consistent with Klesges’ results, we observed that parental presence during the meal was not associated with increased intake of healthy food options. Thus, it appears that mothers are associated with reduced intake of nonnutritious foods rather than with increasing healthier food selection.

Our findings also indicated that adolescent girls consumed more healthy foods and fewer unhealthy snacks with their female friends than with their mothers; whereas this was not the case for adolescent boys. Again, in the absence of an alone condition, the direction of the effects of social influences on adolescent girls’ intake is unclear. It is possible that adolescent girls increased their consumption of unhealthy snacks and decreased their intake of healthy foods when they were in company of their mothers compared with when they were with friends. Although we cannot rule out this possibility, this alternative seems counterintuitive at

FIGURE 1. A: Mean (±SEM) healthy snack intake (in kcal) by social condition in male children (age 5–7 y; n = 8) and adolescents (age 13–15 y; n = 12). B: Mean (±SEM) healthy snack intake (in kcal) by social condition in female children (age 5–7 y; n = 15) and adolescents (age 13–15 y; n = 15). Mixed regression models indicated that adolescent females consumed more healthy snacks in the presence of friends than in the presence of mothers (P < 0.05).
best. The concurrent greater consumption of healthy snacks and the lower intake of unhealthy snacks in the presence of their friends seem to indicate that teenage girls displayed self-presentation motives or were attempting to convey a good impression of healthy eating in front of their friends. Female friends tend to influence each other’s eating-related attitudes and behaviors (3–5, 42, 43), and some degree of impression management through eating, without necessarily adhering to stringent dietary goals of losing weight, may be normative among adolescent females (27). This said, participants’ perceptions of the healthiness of foods served in the study were not assessed. Such assessment would have provided further support for our hypotheses that participants adjusted their food intake as a function of their eating companion based on the healthiness of the food.

As expected, energy intake of sandwiches did not differ by social condition. Previous research has shown that energy intake from foods more associated with meals is less influenced by social factors than is that from snacks (31, 32). Perhaps meal food intake is determined by an individual’s usual daily consumption of meal foods, and some individuals may perceive that a single entity (ie, one sandwich) is the appropriate amount to consume in the context of a meal (44). Consumption of snacks, however, might be less strongly associated with a defined amount and more subject to norms set by others (32).

This study is not without limitations. The same-day food recall was not administered using a multipass method or detailed recall but was used only to ensure adherence to the 2-h postprandial eating requirement. Therefore, we were not able to assess whether the participants’ energy intake on the day of the study session influenced their intake during the experimental meal. Also, as mentioned earlier, the study did not include an “eat-alone” session, so it was not possible to determine how participants’ food intake in the presence of their mothers and friends compares to their food intake when eating alone. However, as we were designing the study, we deemed that a third session might have been burdensome and influenced participants’ food intake as a result of repeated exposure to the experimental foods. We also believe that the vast majority of youths’ meals are consumed in the presence of others (ie, family, friends, and peers) and thus eating alone might have caused undue anxiety in younger children and led to atypical food intake. Similarly, meals were consumed in our laboratory, an unfamiliar environment, which is likely to have influenced participants’ behavior. However, there is some evidence that individuals do consume a similar amount of food at home compared with in the laboratory (45). Furthermore, the fact that we replicated Klesges et al’s (12) results (obtained in the participants’ homes) seems to indicate that, at least for younger children, the laboratory environment did not drastically influence their eating behavior in the presence of their mothers.

Another limitation relates to the experimental foods selected for the meal items. Conceivably, younger children may have experienced difficulty making a sandwich, and as a result, they may have opted for prepackaged snacks simply because they were easier to consume. However, children involved in this study did not seem to encounter any difficulty in assembling sandwiches, and all children selected and ate some portion of a sandwich. Furthermore, the absence of significant results in both children and adolescents suggests that developmental skills in preparing foods were not the only factor accounting for our results.

Finally, the vast majority of our sample were non-Hispanic white, which might limit the generalizability of our findings to other racial and ethnic groups. There is evidence of ethnic differences in body-image concerns and pressure to be thin (46), and a more ethnically representative sample might have uncovered ethnic or racial differences in terms of social eating. Also, the cross-sectional design of this study limits our conclusions with regard to developmental differences in the effects of social influences on eating behavior. Longitudinal data are needed to assess the emergence of the observed differences.

Despite these limitations, the present study increases our understanding of how social influences of mothers and of friends affect children’s and adolescents’ food intake. There is evidence that behaviors, such as smoking and drinking alcohol, in youth are influenced by others’ behaviors (ie, family, friends, peers (47–49)); and we contend that eating, an important form of socialization and recreation, is also largely influenced by others. Future research should address differences in social influences as a function of weight status. Such information would be useful in determining targets for intervention for youth at both ends of the weight status spectrum. On the basis of the present study, it
appears that, during adolescence, differences in social influences emerge between boys and girls. The authors’ responsibilities were as follows—S-JS: was the principal investigator on this study and conceptualized and designed the study, conducted all data analyses, and wrote the manuscript; AE: scheduled and conducted experimental sessions, collected all data, and assisted in writing the manuscript; LAN: conducted experimental sessions, prepared the data set for statistical analyses, and assisted in writing the manuscript; MAK: scheduled and conducted experimental sessions, collected all data, helped with statistical analyses, and assisted in writing the manuscript; and INR: assisted in designing the study and writing the manuscript. All authors stated that they had no financial interests to disclose nor any conflicts of interest.

REFERENCES


