ABSTRACT
Objective To determine whether fast-food consumption is associated with adolescents' food group intakes and likelihood of meeting recommendations outlined in the MyPyramid Food Guidance System.
Design Data from two 24-hour recalls collected in What We Eat in America, National Health and Nutrition Examination Survey 2003-2004 were analyzed. Fast-food consumers were divided into tertiles based on the proportion of 2-day energy intake derived from fast food.
Subjects Adolescent boys and nonpregnant girls aged 12 to 19 years (n = 1,956).
Statistical analyses performed All statistical analyses included sample weights to account for the survey design. Regression analyses were used to detect associations between fast-food consumption and both food group intakes and percentages of individuals meeting MyPyramid recommendations, and to predict odds of meeting recommendations by fast-food consumption level.
Results Fast-food consumption was associated negatively with MyPyramid fruit and milk group intakes (boys and girls) and positively with discretionary energy and solid fats (girls only). Negative associations were also found between fast-food consumption and percentages of adolescents meeting recommendations for milk (boys), fruits (girls), and vegetables and discretionary energy (boys and girls). Compared with those consuming no fast food, adolescents in the highest tertile of energy from fast food were less likely to meet recommendations for vegetables (odds ratio [OR] = 0.16, 95% confidence interval [CI]: 0.05 to 0.52 for boys; OR = 0.18, 95% CI: 0.04 to 0.79 for girls) and discretionary energy (OR = 0.41, 95% CI: 0.22 to 0.77 for boys; OR = 0.04, 95% CI: 0.01 to 0.24 for girls). No relationships were found between fast-food consumption and grains, meat/beans, and oils.
Conclusions Adolescents' intakes, whether containing fast food or not, need improvement. Fast food is one factor that impacts adolescents' intake of MyPyramid groups and their likelihood of meeting recommendations. Awareness of fast-food's role in discrepancies between adolescent intakes and MyPyramid recommendations can aid professionals in designing effective strategies to improve adolescents' diets.


Adolescence is a crucial period for development of dietary behaviors that continue into adulthood and influence risk of chronic disease later in life (1-8). More immediate concerns—including not only the high nutrient requirements of this life stage, but also rising rates of obesity and diabetes among children and teenagers—also call for closer examination of the dietary intakes of this population and behaviors that may affect these outcomes (9-14).

One behavior that has come under scrutiny is the consumption of fast food. Between the late 1970s and the late 1990s, the proportion of US adolescents' energy intake that was provided by restaurants or fast-food places tripled from 6.5% to 19.3% (15). By 1994 to 1996, one third or more of adolescents in the United States were consuming some fast food on any given day (16). More recent estimates suggest that adolescent fast-food use continues to rise. In 2002 to 2004, nearly one half of the adolescents in a California survey reported some fast food the previous day (17), and 66% of the middle-school children in a Massachusetts study ate fast food at least once in the previous 7 days (18). For individuals followed from adolescence to young adulthood in the National Longitudinal Study of Adolescent Health, the mean frequency of consuming fast food increased from 2.2 days per week in 1996 to 2.5 days per week in 2001 to 2002 (19). Meanwhile, studies investigating associations between adolescents' fast-food consumption and nutrient intakes have found negative implications for diet quality (20-24).

Although such studies are valuable to food and nutrition professionals for understanding how fast food is related to nutrient intake, that information is not easily translated into nutrition guidance. For educational purposes, experts recommend focusing on the pattern of foods and beverages in the total diet (25-27). That ap-
proach is integral to the US Department of Agriculture’s (USDA’s) MyPyramid Food Guidance System, which replaces the Food Guide Pyramid (26,28). Because it is stated in terms of foods, MyPyramid is more user-friendly for consumers than is nutrient-based guidance. In addition, MyPyramid is consistent with other recommendations designed to prevent nutrient deficiency and lower the risk of chronic disease (27). To date, no study has been conducted using nationwide dietary data to assess the relationship between fast-food intake and the degree to which adolescent intakes meet MyPyramid recommendations.

One factor to consider when assessing associations between fast food and intake is how the level of consumption is measured. Levels of fast-food consumption have been defined in terms of any use of fast food on either recall day (6,22), the weekly frequency of eating fast food reported by the individual (21,23,24), or the number of recall days (1 or 2) with any food from a fast-food place (29). All of these approaches lack quantification of the proportional contribution of fast food to overall energy intake, because each instance (or day) of consuming fast food is given equal weight, even though the amount of fast food consumed may range from a noncalorie soft drink to multiple meals. Little is known about whether adolescent dietary intake is different when fast food provides a larger proportion of total energy intake.

To address these shortfalls in the current knowledge, the goals of the present study are to determine whether adolescents’ fast-food consumption level (defined by the percent of total calories contributed by fast food) is associated with both mean intake of MyPyramid food groups and percent of individuals meeting MyPyramid recommendations and to assess the predictive relationship between fast-food consumption and the likelihood of meeting MyPyramid recommendations.

METHODS
Sample
Estimates are based on data from What We Eat in America, the dietary intake component of the National Health and Nutrition Examination Survey (NHANES), collected in 2003 to 2004 (30). This data set was the most recent nationwide dietary intake data available online (37).

Conversion of Food Intake to MyPyramid Food Group Amounts
The MyPyramid Food Guidance System recommends amounts to eat from six food groups/components (ie, grains, fruits, vegetables, milk, meat/beans, and oils) and indicates limits on discretionary calories from solid fats, added sugars, and alcohol (39,40). Two issues necessitate converting What We Eat in America food-intake data into a form that can be compared to these MyPyramid recommendations. The first issue is the level to which foods and their ingredients are disaggregated. What We Eat in America food intake is reported and coded as consumed, but most foods are mixtures to some degree and contribute to multiple MyPyramid groups. Even a simple food like whole milk, for example, contributes to two MyPyramid food groups/components (ie, milk group and solid fats). More complex foods may contribute to several food groups/components. The second issue concerns units of measure. The unit of measure used for What We Eat in America food amounts is grams, but the units of measure
Assignment of MyPyramid Dietary Pattern

MyPyramid defines 12 dietary patterns (at energy levels ranging from 1,000 to 3,200 kcal) from which the appropriate pattern for an individual can be selected (39). Assignment of an individual’s MyPyramid calorie level is based on the individual’s sex, age, and activity level (42). The three activity levels specified in MyPyramid are based on the number of minutes of physical activity performed on most days: sedentary (<30 minutes/day), moderately active (30 to 60 minutes/day), and active (>60 minutes/day) (42). According to MyPyramid, these minutes are “in addition to daily activities” (42). The highest level (active) corresponds to the Dietary Guidelines for Americans recommendation for children and adolescents to engage in at least 60 minutes of physical activity on most, preferably all, days of the week (25).

In this study, activity level was based on data from the NHANES 2003-2004 Physical Activity Individual Activities File component (43). Survey participants were asked what vigorous and moderate activities they performed during the past 30 days, as well as how often and how long they engaged in each activity (43-45). Minutes from all moderate and vigorous activities were combined to derive the total minutes of physical activity per week.

In this analysis, “most days” was interpreted as 5 or more days per week, as has been done by others (46,47). Accordingly, adolescents with <150 minutes of moderate/vigorous activity per week were considered sedentary (31% of boys and 48% of girls); those with 150 to 300 minutes were considered moderately active (17% of boys and 19% of girls); and those with >300 minutes were considered active (52% of boys and 33% of girls).

Statistical Analyses

Analyses were carried out using SAS release 9.1.3 (2003, SAS Institute, Cary, NC) and SUDAAN release 9.0 (2003, Research Triangle Institute, Research Triangle Park, NC). SUDAAN was used to adjust for survey design effects resulting from NHANES’ complex, multistage, probability sampling (48-50). All analyses used sample weights to produce nationally representative estimates.

Descriptive analyses were conducted to examine the relationship between fast-food consumption level and adolescent demographics. χ² tests of independence were used to test for significant associations between fast-food consumption level and race/ethnicity, poverty level, and weight status. Linear regression was used to test for an association between fast-food consumption level and age.

Linear regression was used to estimate mean daily intake of MyPyramid food groups/components by fast-food consumption level, while adjusting for the variables examined in the descriptive analyses. Energy intake was also controlled, as it is strongly correlated with food intake. Sex-specific analyses were performed because preliminary analyses found considerable differences in food group intake for boys and girls. To test whether a linear relationship existed between fast-food consumption level and intake of each food group, separate regressions were conducted, treating percent of total energy from fast food as an explanatory variable. The significance of the independent contribution of fast-food energy to prediction of intake of the food group was assessed by means of a t test of each β-coefficient.

Similarly, logistic regression was used to estimate the percent of adolescents meeting and the relative likelihood of meeting MyPyramid recommendations by fast-food consumption level, with adjustment for the same variables accounted for in the linear regression analyses. Adolescents in the first, second, and third tertiles of energy intake from fast food were compared via odds ratios to adolescents who reported no fast food on either intake day. Separate logistic regression analyses were then conducted in which percent of total energy from fast food was included as a predictive variable in the models. The resulting β-coefficients were evaluated using t tests to determine if there was a linear association between fast-food consumption and the likelihood of meeting MyPyramid recommendations.

All p values presented are two-sided, and a P<0.05 was considered statistically significant.

RESULTS

The majority of adolescents consumed some fast food (Table 1). Fifty-nine percent of 12- to 19-year-olds reported at least one fast food item on at least 1 of the 2 days of intake. Overall, fast food provided a mean of 17% of total energy intake for boys and 16% for girls (data not shown). Fast food contributed about one tenth of total energy in the first tertile of energy from fast food, and about one half in the third tertile.

Various associations between fast-food consumption and descriptive variables were seen among boys, but there were no significant differences among girls at the P<0.05 level. For boys, there was a positive association between age and obtaining more energy from fast food. A greater proportion of non-Hispanic black boys than non-Hispanic white and Mexican-American boys were fast-food consumers. More boys in the lowest and highest income groups consumed fast food than those in the middle group. Weight status was not significantly associated with fast food category for adolescents (P=0.66 for boys and P=0.06 for girls).

Intake of MyPyramid Food Groups

Adjusted mean intakes of MyPyramid food groups/components are presented for boys and girls in Table 2. A significant linear relationship between fast-food intake and the intake of a component is indicated by a value <0.05 in the “P for trend” column. Associations were found between fast-food consumption and mean intakes of fruits, milk, discretionary calories, and solid fats, but not grains, vegetables, meat/
Table 1. Characteristics of adolescents 12 to 19 years of age, by fast-food intake status—What We Eat in America, National Health and Nutrition Examination Survey 2003-2004

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No fast food</th>
<th>1st Tertile</th>
<th>2nd Tertile</th>
<th>3rd Tertile</th>
<th>P value&lt;sup&gt;d&lt;/sup&gt;</th>
<th>No fast food</th>
<th>1st Tertile</th>
<th>2nd Tertile</th>
<th>3rd Tertile</th>
<th>P value&lt;sup&gt;d&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (%)</td>
<td>41.4</td>
<td>19.4</td>
<td>19.6</td>
<td>19.6</td>
<td></td>
<td>40.8</td>
<td>19.4</td>
<td>19.5</td>
<td>20.3</td>
<td></td>
</tr>
<tr>
<td>Mean % of energy from fast food</td>
<td>0.0</td>
<td>11.5</td>
<td>25.1</td>
<td>51.0</td>
<td>&lt;0.01</td>
<td>0.0</td>
<td>9.3</td>
<td>21.0</td>
<td>48.4</td>
<td>0.06</td>
</tr>
<tr>
<td>Age (y)</td>
<td>14.9</td>
<td>15.4</td>
<td>15.9</td>
<td>15.8</td>
<td>&lt;0.05</td>
<td>15.1</td>
<td>15.5</td>
<td>16.1</td>
<td>15.7</td>
<td>0.18</td>
</tr>
<tr>
<td>Race/ethnicity&lt;sup&gt;a&lt;/sup&gt; (%)</td>
<td>Non-Hispanic white</td>
<td>41.6</td>
<td>18.2</td>
<td>19.4</td>
<td>20.8</td>
<td>42.5</td>
<td>19.2</td>
<td>20.2</td>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Hispanic black</td>
<td>33.2</td>
<td>29.3</td>
<td>15.1</td>
<td>22.3</td>
<td>34.1</td>
<td>15.1</td>
<td>24.5</td>
<td>26.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mexican American</td>
<td>39.9</td>
<td>17.5</td>
<td>22.9</td>
<td>19.7</td>
<td>43.1</td>
<td>18.3</td>
<td>16.7</td>
<td>21.8</td>
<td></td>
</tr>
<tr>
<td>Family income (PIR)&lt;sup&gt;b&lt;/sup&gt; (%)</td>
<td>≤185</td>
<td>35.7</td>
<td>24.2</td>
<td>21.6</td>
<td>18.6</td>
<td>42.3</td>
<td>16.3</td>
<td>21.6</td>
<td>19.8</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>186-350</td>
<td>52.2</td>
<td>16.5</td>
<td>13.8</td>
<td>17.5</td>
<td>34.6</td>
<td>22.7</td>
<td>16.4</td>
<td>26.3</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td>&gt;350</td>
<td>41.3</td>
<td>16.8</td>
<td>19.1</td>
<td>22.8</td>
<td>43.2</td>
<td>19.4</td>
<td>21.2</td>
<td>16.2</td>
<td></td>
</tr>
<tr>
<td>Weight status&lt;sup&gt;c&lt;/sup&gt; (%)</td>
<td>Underweight or healthy weight</td>
<td>42.2</td>
<td>19.2</td>
<td>18.0</td>
<td>20.6</td>
<td>40.3</td>
<td>21.8</td>
<td>18.8</td>
<td>19.1</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>At risk or overweight</td>
<td>40.1</td>
<td>19.7</td>
<td>22.7</td>
<td>17.5</td>
<td>42.4</td>
<td>13.9</td>
<td>20.4</td>
<td>23.3</td>
<td>0.06</td>
</tr>
</tbody>
</table>

<sup>a</sup>Includes only individuals with 2 complete days of dietary intake. Excludes pregnant females (n=55).

<sup>b</sup>For boys age 12-19 years, the cut-points for the proportion of total energy contributed by fast food were ≤18.98% in the first tertile, 18.99%-33.45% in the second tertile, and ≥33.46% in the third tertile.

<sup>c</sup>For girls age 12-19 years, the cut-points for the proportion of total energy contributed by fast food were ≤14.50% in the first tertile, 14.51%-29.86% in the second tertile, and ≥29.87% in the third tertile.

<sup>d</sup>Determined by linear regression for age and by χ² test of independence for race/ethnicity, income, and weight status.

<sup>e</sup>Small sample sizes precluded reporting other race/ethnicity categories.

<sup>f</sup>PRI—poverty income ratio. Income is expressed as percent of poverty threshold. Thresholds are set for specific family sizes and are defined by the US Census Bureau (51). A PIR of <1 suggests that income is below the poverty level. Cutoff values shown are used for Federal food assistance programs.

<sup>g</sup>Body mass index-for-age weight status categories assigned according to Centers for Disease Control and Prevention guidelines (52); <5th percentile=underweight; ≥5th and <85th percentile=healthy weight; ≥85th and <95th percentile=at risk of overweight; ≥95th percentile=overweight.

Beans, oils, or added sugars. For boys and girls, intakes of fruits and milk were negatively associated with the percentage of calories from fast food. Mean intake of fruits by girls in the third tertile of energy from fast food was only 0.6 cups, although recommendations for this age/sex group range from 1.5 to 2 cups/day (39).

For all groups of boys and girls, including those who reported no fast food on either intake day, adjusted mean discretionary calorie intake was higher than the allowance in the highest MyPyramid calorie level (648 kcal). In fact, nearly all teens consumed between one-third and one-half of their total energy intake as discretionary calories (data not shown; intakes adjusted for demographic variables but not energy). Among girls, positive associations were found between the proportion of energy from fast food and intakes of discretionary calories and solid fats. The other major contributor to adolescents’ discretionary energy intake—added sugars—was not associated with the proportion of total energy from fast food.

Meeting MyPyramid Recommendations

Adjusted percentages of adolescent boys and girls whose intakes met their MyPyramid recommendations are presented in Table 3. The existence of a significant linear relationship between fast food intake and the intake of a component is indicated by a value <0.05 in the “P” for trend” column.

In all categories of energy intake from fast food, including those reporting no fast food, the percentage of adolescents whose mean intakes met recommendations was low for nearly all MyPyramid groups/components. Regardless of fast-food status, <10% of adolescents met their recommendation for vegetables or remained under their limit for discretionary calories. Percentages meeting recommendations for fruits and oils were slightly higher, ranging from 6% to 21%. The percentage meeting MyPyramid recommendations was highest for the grains group; even so, only 38% to 59% of adolescents met this recommendation. It is in this context—relatively few individuals...
having dietary intakes that met recommendations—that associations between the proportion of total energy from fast food and meeting MyPyramid recommendations must be considered.

Notable trends in the percent of individuals meeting recommendations were found for several MyPyramid food groups/components. In all cases, associations between the percentage of individuals meeting MyPyramid recommendations and the proportion of total energy from fast food were negative. For both boys and girls, negative associations were seen between the percentage of total energy provided by fast food and the percentage of individuals whose intakes of vegetables and discretionary calories met their recommendations. These findings have little practical meaning, however, because such a small percentage of adolescents met their recommendations for either of these MyPyramid components, regardless of fast-food status. In addition, energy intake from fast food was negatively related to the percentage of girls meeting their recommendations for the fruits group and the percentage of boys meeting their recommendations for the milk group. No relationships were seen between fast-food consumption and meeting MyPyramid recommendations for grains, meat/beans, or oils.

Substantial differences in the odds of meeting MyPyramid recommendations were found for the same food groups/components. Compared to adolescents reporting no fast food, adolescents in the third tertile of energy from fast food were about one-fifth as likely to meet their vegetable recommendations. Meeting fruit recommendations was also less likely for boys (odds ratio=0.33; 95% confidence interval: 0.11 to 0.96) and girls (odds ratio=0.53; 95% confidence interval: 0.29 to 0.96) in the second tertile of energy from fast food. The lower mean intake of milk by boys is reflected in a 66% lower likelihood of meeting milk recommendations for those in the third tertile of energy intake from fast food compared to those reporting no fast food. Adolescents of both sexes in the third tertile of energy from fast food were also less likely to meet their discretionary calorie recommendation (ie, more likely to exceed their allowance) than those reporting no fast food. However, as noted earlier, nearly all adolescents surpassed their discretionary calorie limits.

DISCUSSION

In this study, we grouped adolescents according to the 2-day caloric contribution of fast food to their overall intakes, calculated their intakes of MyPyramid food groups/components, and assessed how well they met their MyPyramid recommendations. To our knowledge, this is the first study to evaluate associations between fast-food consumption and adolescents’ intakes using the MyPyramid Food Guidance System.

This study has a number of strengths. First, the use of What We Eat in America/NHANES data, based on a nationally representative sample, makes results generalizable to the United States population of adolescents. Another advantage is the capability of calculating MyPyramid food group intakes because of the disaggregation of foods into their component ingredients. Lastly, unlike other studies that have defined fast-food level by the frequency of visits to fast-food restaurants in the past week, our analysis took into account the proportional contribution of fast food to overall energy intake.

Age, race/ethnicity, and income were associated with food group intake in boys. Previous studies found similar associations in both adolescent boys and girls (17,21,53). In addition, we found that the proportion of girls eating fast food is as large as that of boys. This stands in con-
<table>
<thead>
<tr>
<th>MyPyramid food group/component</th>
<th>Category of Energy Intake from Fast Food</th>
<th>P value for trend</th>
<th>Category of Energy Intake from Fast Food</th>
<th>P value for trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Met recommendation&lt;sup&gt;a&lt;/sup&gt;</td>
<td>All</td>
<td>No fast food</td>
<td>1st Tertile</td>
<td>2nd Tertile</td>
</tr>
<tr>
<td><strong>Grains</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of individuals</td>
<td>46±3.5</td>
<td>41±6.4</td>
<td>45±6.0</td>
<td>54±7.1</td>
</tr>
<tr>
<td>Odds ratio (95% CI)</td>
<td>1.00</td>
<td>1.17 (0.59-2.31)</td>
<td>1.67 (0.69-4.07)</td>
<td>1.49 (0.58-3.83)</td>
</tr>
<tr>
<td><strong>Vegetables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of individuals</td>
<td>2±0.9</td>
<td>4±1.1</td>
<td>2±1.3</td>
<td>2±2.0</td>
</tr>
<tr>
<td>Odds ratio (95% CI)</td>
<td>1.00</td>
<td>0.57 (0.16-2.08)</td>
<td>0.69 (0.13-3.54)</td>
<td>0.16 (0.05-0.52)</td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of individuals</td>
<td>13±1.8</td>
<td>15±3.1</td>
<td>20±4.8</td>
<td>6±1.8</td>
</tr>
<tr>
<td>Odds ratio (95% CI)</td>
<td>1.00</td>
<td>1.37 (0.65-2.90)</td>
<td>0.33 (0.11-0.96)</td>
<td>0.54 (0.19-1.50)</td>
</tr>
<tr>
<td><strong>Milk</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of individuals</td>
<td>25±2.2</td>
<td>27±4.9</td>
<td>21±3.8</td>
<td>38±6.8</td>
</tr>
<tr>
<td>Odds ratio (95% CI)</td>
<td>1.00</td>
<td>0.71 (0.34-1.52)</td>
<td>0.34 (0.17-0.70)</td>
<td>0.54 (0.19-1.50)</td>
</tr>
<tr>
<td><strong>Meat/beans</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of individuals</td>
<td>28±1.8</td>
<td>25±3.8</td>
<td>26±2.4</td>
<td>27±3.8</td>
</tr>
<tr>
<td>Odds ratio (95% CI)</td>
<td>1.00</td>
<td>1.01 (0.67-1.51)</td>
<td>1.10 (0.56-2.13)</td>
<td>1.59 (0.77-3.28)</td>
</tr>
<tr>
<td><strong>Oils</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of individuals</td>
<td>11±1.9</td>
<td>11±3.2</td>
<td>10±3.3</td>
<td>6±1.7</td>
</tr>
<tr>
<td>Odds ratio (95% CI)</td>
<td>1.00</td>
<td>0.89 (0.51-1.56)</td>
<td>0.50 (0.19-1.34)</td>
<td>1.51 (0.49-4.60)</td>
</tr>
<tr>
<td><strong>Discretionary calories</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of individuals</td>
<td>1±0.6</td>
<td>1±0.4</td>
<td>3±2.3</td>
<td>&lt;1±0.2</td>
</tr>
<tr>
<td>Odds ratio (95% CI)</td>
<td>1.00</td>
<td>4.65 (1.59-13.65)</td>
<td>0.49 (0.22-1.13)</td>
<td>0.41 (0.22-0.77)</td>
</tr>
</tbody>
</table>

<sup>a</sup>Estimates presented have been adjusted for energy, age, race/ethnicity, income status, and weight status through logistic regression modeling.
<sup>b</sup>Includes only individuals with two complete days of dietary intake. Excludes pregnant females (n=55).
<sup>c</sup>For boys age 12-19 years, the cut-points for the proportion of total energy contributed by fast food were ≥33.46% in the first tertile, 18.99%-33.45% in the second tertile, and ≥33.46% in the third tertile.
<sup>d</sup>For girls age 12-19 years, the cut-points for the proportion of total energy contributed by fast food were ≥13.45% in the first tertile, 14.51%-29.86% in the second tertile, and ≥29.87% in the third tertile.
<sup>e</sup>Determined by t test that β-coefficient of fast-food level (treated as a continuous variable) is not equal to zero.
<sup>f</sup>Met recommendation—intake met or exceeded the daily amount of fruits, vegetables, grains, meat/beans, milk, or oils in the individual’s assigned MyPyramid food intake pattern; intake did not exceed the discretionary calorie allowance (39). Food intake patterns correspond to a calorie level assigned to the individual based on age, sex, and activity level (42).
<sup>g</sup>Proportions are presented as %±standard error.
<sup>h</sup>CI—confidence interval.
<sup>i</sup>No individuals in this group met the recommendation, so it was not possible to calculate an odds ratio.
Healthy People 2010 recommendations are for those food groups (25). Likewise, discrepancies between current consumption and recommendations to encourage overeating (69), fast-food restaurants and vegetable recommendations for those patterns range from 2 to 4 cups (39). Fewer than 10% of adolescents met their recommendations, indicating that consumption of vegetables from all sources needs to increase.

Coupled with low intakes of fruits, vegetables, and milk is overconsumption of discretionary energy. Allowances for discretionary calories in MyPyramid plans are approximately 10% to 15% of energy overall. In contrast to those recommendations, we found that nearly all teens are consuming between one-third and one-half of their total intake as discretionary calories. Intakes of discretionary energy and solid fats by girls were positively associated with fast-food consumption, a finding noted previously by Cusatis and Shannon (24). Interestingly, added sugars did not vary with fast-food consumption level. Adolescents appear just as likely to obtain foods containing added sugars from other sources as from fast-food establishments.

Fast food is not the sole culprit for poor adolescent dietary intakes, so approaches to bring their intakes closer to MyPyramid recommendations must take into account all sources of food. Findings from this study indicate that adolescents should choose fewer foods and beverages that are high in fats and/or sugars but provide few other nutrients; increase intakes of vegetables and fruits; either consume more non- or low-fat dairy products or include nondairy sources of calcium; and shift from solid fats to oils. The following guidelines ( paraphrased from a Team Nutrition publication) may help adolescents make better choices from any source, but especially when ordering fast food: Choose nutrient-dense beverages rather than soft drinks, avoid fried foods and added fat, and pay attention to portion size (78). Additional resources for improving MyPyramid intakes are available (79).

There are a few limitations to this study. First, because of self-reporting of dietary intake (including the source of food) and physical activity, the data contain measurement errors. It is possible that some foods and beverages may have been assigned incorrect values for the source of food variable. Also, some individuals may have been misclassified into an inappropriate fast-food consumption level, activity level, or dietary pattern (80). Secondly, underreporting of dietary intakes is a recognized problem. To address that issue, the Automated Multiple-Pass Method used in collecting What We Eat in America data has undergone extensive methodological testing to enhance food recall and thus minimize forgotten food items (35). It yields very accurate, unbiased estimates for highly motivated subjects (34), but reporting bias is still possible among less-motivated respondents. The degree to which the special concerns of adolescence may attenuate the Automated Multiple-Pass Method’s performance in this age group is unknown. A few examples of such concerns are high energy intakes (81), body weight or body image (81,82), uncooperative attitudes toward au-
thority (81,82), and social desirability or undesirability (83). Most documented reporting error among adolescents is in the form of underreporting (81,84). Finally, comparison of the results of this analysis to those of other studies is not straightforward because of differences in the way the level of fast-food consumption was defined.

CONCLUSIONS

The pervasiveness of fast-food consumption among US adolescents makes it an important factor to consider when attempting to improve teens’ dietary intakes. An enhanced understanding of associations between fast-food consumption, overall food intakes, and the likelihood of meeting MyPyramid recommendations can aid professionals in designing effective intervention strategies. However, the extremely low percentages of teens whose diets meet MyPyramid recommendations regardless of fast food use means that any intervention must take into account foods and beverages from all sources.

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