HHS Public Access

Author manuscript

*Am J Health Promot*. Author manuscript; available in PMC 2024 March 18.

Published in final edited form as:

*Am J Health Promot*. 2018 January ; 32(1): 89–95. doi:10.1177/0890117116667348.

# Prevalence and correlates of missing meals among high school students—United States, 2010

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## Abstract

**Purpose.—**Determine the prevalence and correlates of missing meals among adolescents.

**Design.—**The 2010 National Youth Physical Activity and Nutrition Study, a cross-sectional study.

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Disclaimer:
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or the U.S. Public Health Service.

**Setting.—**School-based.

**Subjects.—**A nationally representative sample of 11,429 high school students.

**Measures.—**Breakfast, lunch, and dinner consumption; demographics; measured and perceived weight status; physical activity and sedentary behaviors; and fruit, vegetable, milk, sugar-sweetened beverage, and fast food intake.

**Analysis.—**Prevalence estimates for missing breakfast, lunch, or dinner on ≥1 day during the past 7 days were calculated. Associations between demographics and missing meals were tested. Associations of lifestyle and dietary behaviors with missing meals were examined using logistic regression controlling for sex, race/ethnicity, and grade.

**Results.—**In 2010, 63.1% of students missed breakfast, 38.2% missed lunch, and 23.3% missed dinner; prevalences were highest among female and non-Hispanic black students. Being overweight/obese, perceiving oneself to be overweight, and video game/computer use were associated with increased risk of missing meals. Physical activity behaviors were associated with reduced risk of missing meals. Students who missed breakfast were less likely to eat fruits and vegetables and more likely to consume sugar-sweetened beverages and fast food.

**Conclusion.—**Breakfast was the most frequently missed meal and missing breakfast was associated with the greatest number of less healthy dietary practices. Intervention and education efforts might prioritize breakfast consumption.

### Keywords

Adolescent; Demographics; Behavior; Diet; Meals; Breakfast

### Indexing Key Words:

Manuscript format: research; Research purpose: descriptive, modeling/relationship testing; Study design: non-experimental, quantitative; Outcome measure: behavioral; Setting: school, national; Health focus: nutrition; Strategy: education, behavior change; Target population age: adolescence; Target population circumstances: high school students

## INTRODUCTION

Adolescents who miss meals may be at risk for poor nutrition, unhealthy eating patterns, eating disorders, or other unhealthy weight control behaviors.[1–4] Most of the literature regarding missing meals looks at total meal intake, rather than specific meals individually, or focuses only on breakfast (morning meal). Research shows that breakfast consumption contributes to daily nutrient intake, helps adolescents meet dietary recommendations, is associated with more healthful food choices throughout the day and participation in physical activity, helps to maintain a healthy weight, and positively influences psychosocial functioning, cognitive functioning, mood, and academic performance.[5–9]

Two recently published manuscripts have reported the prevalence of skipping breakfast among national samples of US adolescents.[10,11] Only one published study using national-

level data has examined missing meals other than breakfast, and this study used data from 1989–1991.[12]

The purpose of this study was to provide nationally representative data on the proportions of high school students missing breakfast, lunch, and dinner and to determine demographic differences in missing each of these three meals. Additional objectives of this study were to identify 1) the associations between certain lifestyle factors related to obesity and missing meals and 2) the associations between missing individual meals and select dietary intake measures. Data on the prevalence of meal consumption is outdated. In addition, to more fully understand the potential relationship between meal consumption and obesity and related measures, researchers must investigate meals consumed throughout the day. Little research on lunch and dinner consumption is available in the literature, especially at the national level. This investigation aims to reduce the knowledge gap.

## METHODS

### Sample and Survey Administration

Data were obtained from the 2010 National Youth Physical Activity and Nutrition Study[13,14] a cross-sectional, school-based study conducted by the Centers for Disease Control and Prevention that included a survey to collect information on physical activity, dietary practices, and behavioral determinants related to nutrition and physical activity. The study also included directly measured height and weight completed by trained personnel using a standard protocol. The survey used a 3-stage cluster sample design based on selection at county groupings, school, and classroom levels to produce a nationally representative sample of students in grades 9–12 who attend regular public and private high schools in the 50 states and the District of Columbia. Student participation in the study was anonymous and voluntary, and parental permission was obtained following local procedures before survey administration. Students completed a 120-item self-administered questionnaire. During questionnaire development, extensive literature reviews were conducted and topic experts from various organizations were consulted. Questionnaire items developed specifically for this study were subjected to cognitive testing, which involved interviews with students to assess the questionnaire format, content, and face validity. This testing resulted in the revision or deletion of problematic questions. The school response rate was 82% and the student response rate was 88%, resulting in an overall response rate of 73%. Useable data was obtained from 11,429 students. The study protocol for NYPANS was approved by the study contractor's (ICF Macro) institutional review board.

### Missing Meals

In 3 separate questions, students were asked how many days during the past 7 days they ate (1) breakfast or a morning meal, (2) lunch, and (3) dinner or an evening meal. Response options ranged from 0 days to 7 days. Each of these variables was dichotomized into 7 days and <7 days groupings given that is recommended that adolescents do not skip meals.[15]

### Selected Health-risk Factors

Weight status was determined by body mass index (BMI) calculated from measured height and weight. Using BMI percentile based on sex- and age-specific reference data from the 2000 CDC growth charts,[16] students were classified as underweight (<5$^{th}$ percentile), normal weight (≥5$^{th}$ percentile to <85th percentile), overweight (≥85$^{th}$ percentile to <95$^{th}$ percentile), or obese (≥95$^{th}$ percentile). The NYPANS questionnaire also assessed students' perceived weight. Students were asked if they would describe their weight as very underweight, slightly underweight, about the right weight, slightly overweight, or very overweight. This variable was dichotomized and the outcome of interest was slightly or very overweight.

Two physical activity behaviors and two sedentary behaviors were included in this analysis. Students were asked "During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)" Based on national recommendations,[17] the response of interest was physical activity for at least 60 minutes/day, 7 days/week (daily physical activity). Sports participation was assessed with the question "During the past 12 months, on how many sports teams did you play? (Include any teams run by your school or community groups.)" Response options ranged from "0 teams" to "3 or more teams." The response of interest was participation on ≥1 sports team as there is no national recommendation for sports participation.

Sedentary behaviors were assessed with the following questions: "On an average school day, how many hours do you watch TV?" and "On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Include activities such as Nintendo, Game Boy, PlayStation, Xbox, computer games, and the Internet.)." Response options ranged from none to "5 or more hours per day." These variables were classified as ≤2 hours/day and >2 hours/day based on American Academy of Pediatrics recommendations.[18]

### Selected Dietary Intake Measures

The NYPANS questionnaire included six questions to determine students' fruit and vegetable intake during the 7 days before the survey; students were asked about their consumption of 100% fruit juices, fruit, green salad, carrots, potatoes (not counting French fries, fried potatoes, or potato chips), and other vegetables. Other dietary intake variables used in this analysis included intake of regular soda or pop, sports drinks, energy drinks, other sugar-sweetened beverages (SSBs), and milk. With the exception of milk, the response options for the dietary behavior questions were: none during the past 7 days, 1 to 3 times during the past 7 days, 4 to 6 times during the past 7 days, 1 time per day, 2 times per day, 3 times per day, and 4 or more times per day. The response options for milk used the word "glasses" instead of "times."

"Past 7 day" response option values were divided by 7 to determine daily intake. The number of times/day during the past 7 days a student drank 100% fruit juices and ate fruit were summed to represent total fruit intake. This was categorized into <2 and ≥2 times/day

as derived from Healthy People 2010 objectives.[19] The number of times/day during the past 7 days a student ate green salad, carrots, potatoes (not counting French fries, fried potatoes, or potato chips), and other vegetables were summed to represent total vegetable intake. This was categorized into <3 and ≥3 times/day as derived from Healthy People 2010 objectives.[19]

Responses to regular soda or pop, sports drinks, energy drinks, and other SSB questions were summed to represent total SSB intake and categorized into <3 times/day and ≥3 times/day. This cut point was based on a study of Americans aged 2 years and above which found that the estimated 90$^{th}$ percentile of energy intake from SSB on any given day was 450 kcal (equivalent to three 12-oz cans of soda).[20] The categorization for milk, <2 glasses/day and ≥2 glasses/day, is similar to previously published literature.[21]

Students were also asked “During the past 7 days, on how many days did you eat at least one meal or snack from a fast food restaurant such as McDonald’s, Taco Bell, or KFC?” Response options ranged from 0 days to 7 days. This was categorized into <1 day/week and ≥1 day/week since there are no current national recommendations regarding fast food intake.

### Demographic Characteristics

Demographic characteristics used in the analysis include sex (female, male), race/ethnicity (non-Hispanic black or African-American, non-Hispanic white, Hispanic, and other or multiple race), and grade in school (9th, 10th, 11th, or 12th).

### Statistical Analysis

In 2013, analyses were conducted on weighted data using SUDAAN, a software package that accounts for the complex sampling design. The percentage of students missing meals was calculated among students overall and by sex, race/ethnicity, and grade. Pairwise comparisons were used to test differences in percentage by demographic characteristics. This method allows for the one-to-one comparison of groups rather than providing an overall measure of difference, resulting in the determination of which groups differ from each other. A t-statistic p-value of <0.05 indicated a significant difference. Multivariable logistic regression models adjusted for sex, race/ethnicity, and grade were used to estimate adjusted prevalence ratios (PRs) and 95% confidence intervals (CI) for the associations between correlates and missing meals.

## RESULTS

The weighted demographic distribution of students in the NYPANS sample was 49.4% female; 57.7% non-Hispanic white, 14.9% non-Hispanic black, 18.9% Hispanic, and 8.5% of other race/ethnicity; 27.8% in 9$^{th}$ grade, 25.9% in 10$^{th}$ grade, 23.8% in 11$^{th}$ grade, and 22.5% in 12$^{th}$ grade.

Table 1 presents the distribution of high school students missing days of breakfast, lunch, or dinner during the 7 days before the survey. Among all students, 63.1% students missed ≥1 day of breakfast, 38.2% missed ≥1 day of lunch, and 23.2% missed ≥1 day of dinner.

The prevalence of missing meals by demographic characteristics is presented in Table 2. Male students were less likely than female students to miss each of the three meals. Both non-Hispanic black and Hispanic students were more likely than non-Hispanic white students to miss meals. Grade differences were observed for all three meals; students in 11th and 12th grade were more likely to miss meals than students in 9th and 10th grade, though the difference was not always significant.

Associations and cross-tabulations between health-risk factors and missing meals are shown in Table 3. Students who were underweight based on height and weight measurements were less likely than students of normal weight to miss breakfast; there were no differences between these groups for missing lunch or dinner. Students who were overweight or obese were both more likely to miss breakfast, lunch, or dinner as compared to normal weight students. Students who perceived themselves to be slightly or very overweight were more likely than students who did not perceive themselves to be overweight to miss meals. Daily physical activity and sports participation were associated with lower likelihood of missing meals. Video game/computer use was associated with higher likelihood of missing breakfast and lunch. Students who watched >2 hours/day of television were more likely to miss breakfast and less likely to miss dinner.

Table 4 displays associations and cross-tabulations between missing meals and dietary intake. Missing breakfast was associated with lower likelihood of consuming fruit ≥2 times/day (PR=0.76, 95% CI=0.70, 0.82), vegetables ≥3 times/day (PR=0.72, 95% CI=0.64, 0.81), and milk ≥2 glasses/day (PR=0.69, 95% CI= 0.62, 0.77) and higher likelihood of drinking SSBs ≥3 times/day (PR=1.39, 95% CI=1.22, 1.59) and eating fast food ≥1 day/week (PR=1.10, 95% CI=1.05, 1.15). Missing lunch was associated with lower milk intake (PR=0.83, 95% CI=0.75, 0.92). Missing dinner was associated with a lower likelihood of eating vegetables ≥3 times/day (PR=0.80, 95% CI=0.67, 0.97) and higher likelihood of eating fast food ≥1 day/week (PR=1.05, 95% CI=1.00, 1.11).

## DISCUSSION

Our finding that 63.1% of students missed breakfast is similar to results from a national study conducted in 2005–2006 that found only 43% of boys and 35% of girls aged 13–15 years in the US ate breakfast daily,[10] or, conversely, 57% of boys and 65% of girls missed breakfast ≥1 day. The most recent published national data regarding lunch and dinner consumption among adolescents is from 1989–1991. That study found that 17–18% of adolescents missed midday meals, and 8–9% missed evening meals on a given day.[12] The current data show prevalence estimates of missing these meals to be at least twice as high. However, unpublished data from a 1996 national study of adolescents in grades 7–12, 40.4% of adolescents had missed lunch ≥1 day and 23.7% missed dinner ≥1 day.[22] These estimates are similar to those found in our study.

Demographic differences in missing meals were observed in this study. Female students and non-Hispanic black students generally had the highest prevalence estimates for missing each meal, similar to findings from other studies. Specifically, Vereecken et al. reported that female adolescents were less likely to eat breakfast on a daily basis.[10] Deshmukh-Taskar et

al. found that non-Hispanic black students and students of other/mixed race were more likely than non-Hispanic white and Mexican-American/Hispanic students to skip breakfast.[11] Demographic differences in lunch and dinner consumption among US adolescents have not been previously reported.

Consistent with the findings in this study, research has shown that being overweight or obese and engaging in sedentary behaviors are associated with missing meals. Boutelle et al. found that nonoverweight adolescents were more likely to usually eat breakfast.[23] A study of daily breakfast consumption and health-related behaviors found a significant inverse association between television viewing and breakfast consumption in a US sample, consistent with our finding.[10] The findings presented in this manuscript also show that students who watched >2 hours of TV/day were less likely to miss dinner. An explanation could be that adolescents might eat dinner while watching television. A study found that 27.5% of Minnesota high school students watch television during family meals, approximately half of those students with regular family meals.[24] Physical activity and sports participation emerged as factors associated with a lower likelihood of missing meals. This is consistent with a previous study that found students who ate breakfast daily were more likely to be physically active.[10]

In our study, students who missed breakfast were less likely to eat healthful foods and more likely to eat less healthful foods. This is consistent with previous literature indicating that daily breakfast consumption is positively associated with daily consumption of fruit and vegetables and inversely associated with soft drinks.[10] Other studies also support the association between breakfast and/or meal consumption and fruit and vegetable intake.[25,26] More research on the impact of missing meals, particularly lunch and dinner, on dietary behaviors and nutrient intake could help guide future health promotion programs and messages.

The findings described in this manuscript are subject to at least four limitations. First, NYPANS data are self-reported with the exception of height and weight data, and behaviors might be under- or over-reported. Second, these associations are cross-sectional; therefore, the directionality of these associations cannot be determined. Given this study design, we cannot conclusively determine if the included health-risk factors lead to missing meals or if missing meals leads to poor dietary intake. Third, the survey questions do not provide detailed information about the missed meals. The data do not allow for the differentiation between meals missed intentionally (skipped meals) versus missed meals for other reasons, and information on which days meals were missed (weekday vs. weekend or if meals were missed on the same day) is not available. Fourth, the NYPANS questionnaire did not undergo full reliability and validity testing. However, questionnaire development did address content and face validity and multiple questions on the NYPANS questionnaire were obtained from the Youth Risk Behavior Surveillance System’s national questionnaire. Psychometric studies of this questionnaire have found that it generally has good test-retest reliability.[27] Lastly, these data apply only to adolescents who attend school and, therefore, are not representative of all persons in this age group. However, in 2009, less than 4% of youth between ages of 16 and 17 years in the US had not completed high school and were not currently enrolled in a high school program.[28]

NYPANS also has several strengths. It is a nationally representative study, therefore, we are able to produce national estimates for high school students attending regular, high schools. Further, NYPANS also used measured height and weight to calculate BMI. Specific to this analysis, the NYPANS dataset has produced the most current national-level data on lunch and dinner consumption in an adolescent population.

This study found that missing meals, especially breakfast, is common among high school students. Future research, to include longitudinal or other study designs, on the health impacts related to overall eating behaviors throughout the day may provide additional insight on how to effectively promote healthful dietary intake among adolescents. Groups especially at risk for missing meals included female, non-Hispanic black, overweight, and obese students. Given limited resources, it would be useful for interventions and messages to target these specific at-risk groups. Since breakfast was the most frequently missed meal and missing breakfast was associated with the greatest number of less healthy dietary practices, intervention and education efforts might prioritize breakfast consumption.

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## SO WHAT? Implications for Health Promotion Practitioners and Researchers

**What is already known on this topic?**

The literature indicates that regular meal consumption is an important contributor to health. In contrast, missing meals puts adolescents at risk for a number of unhealthy behaviors. The majority of previous studies have examined the prevalence of breakfast consumption and its associations with other behaviors; however, current national data on lunch and dinner consumption is unavailable.

**What does this article add?**

This manuscript provides the most current prevalence estimates on lunch and dinner consumption among US high school students. Further, it also reports nationally representative data on the associations between lifestyle factors and missing meals and missing individual meals and dietary intake.

**What are the implications for health promotion practice or research?**

Missing meals, especially breakfast, is common among high school students. Schools provide an ideal setting for supporting and promoting regular meal consumption among adolescents. Future research can incorporate other study designs and investigate eating behaviors throughout the day, results which may inform how to effectively promote healthful dietary intake among adolescents.

**Table 1**

The Percentage (95% Confidence Interval) Distribution of High School Students Missing Days of Breakfast, Lunch, or Dinner in the 7 days Before the Study — National Youth Physical Activity and Nutrition Study, United States, 2010

| | Breakfast | Lunch | Dinner |
|---|---|---|---|
| 0 days | 36.9 (34.9, 39.0) | 61.8 (59.3, 64.2) | 76.8 (74.6, 78.8) |
| 1 day | 6.2 (5.5, 7.0) | 7.6 (6.7, 8.6) | 8.0 (7.0, 9.1) |
| 2 days | 9.1 (7.9, 10.4) | 11.5 (10.5, 12.5) | 6.8 (6.1, 7.5) |
| 3 days | 6.9 (6.1, 7.8) | 5.8 (5.0, 6.8) | 3.3 (2.9, 3.8) |
| 4 days | 9.8 (9.0, 10.6) | 4.9 (3.9, 6.1) | 2.8 (2.1, 3.6) |
| 5 days | 11.4 (10.3, 12.6) | 3.7 (3.2, 4.3) | 1.3 (1.0, 1.7) |
| 6 days | 8.0 (7.0, 9.2) | 1.6 (1.2, 2.1) | 0.5 (0.4, 0.8) |
| 7 days | 11.8 (10.7, 12.9) | 3.2 (2.7, 3.8) | 0.5 (0.4, 0.8) |
| ≥1 day | 63.1 (61.0, 65.1) | 38.2 (35.8, 40.7) | 23.2 (21.2, 25.4) |

## Table 2

The Prevalence (95% Confidence Interval) of Missing Meals by Demographic Factors— National Youth Physical Activity and Nutrition Study, United States, 2010

| | Missed meal on ≥1 day during the past 7 days | | |
|---|---|---|---|
| | **Breakfast** | **Lunch** | **Dinner** |
| Females | 66.0 (62.9, 68.9)$^{x}$ | 43.1 (40.1, 46,1)$^{x}$ | 27.5 (25.0, 30.2)$^{x}$ |
| Males | 60.4 (58.4, 62.3)$^{y}$ | 33.5 (30.9, 36.2)$^{y}$ | 19.0 (17.0, 21.1)$^{y}$ |
| Non-Hispanic, white | 59.3 (56.7, 62.0)$^{x}$ | 33.9 (30.9, 37.0)$^{x}$ | 20.3 (17.9, 22.8)$^{x}$ |
| Non-Hispanic, black | 73.2 (69.5, 76.5)$^{y}$ | 48.3 (45.0, 51.6)$^{y}$ | 31.8 (28.9, 34.9)$^{y}$ |
| Hispanic | 67.4 (64.3, 70.4)$^{z}$ | 43.9 (40.7, 47.2)$^{yz}$ | 28.1 (24.5, 32.1)$^{y}$ |
| Other race | 63.0 (59.5, 66.4)$^{x}$ | 38.4 (32.8, 44.4) $^{xz}$ | 20.5 (16.1, 25.8)$^{x}$ |
| 9$^{th}$ grade | 60.7 (58.2, 63.1)$^{x}$ | 36.5 (33.1, 40.1)$^{x}$ | 19.9 (17.0, 23.2)$^{x}$ |
| 10$^{th}$ grade | 62.1 (59.0, 65.1)$^{x}$ | 36.7 (33.1, 40.4)$^{xy}$ | 21.3 (18.1, 24.8)$^{x}$ |
| 11$^{th}$ grade | 63.5 (60.6, 66.3)$^{xy}$ | 40.7 (37.5, 44.0)$^{y}$ | 26.9 (24.1, 29.9)$^{y}$ |
| 12$^{th}$ grade | 66.9 (63.6, 70.0)$^{y}$ | 39.7 (36.2, 43.4)$^{xy}$ | 25.3 (22.6, 28.2)$^{y}$ |

Note: For pairwise comparisons, subgroups labeled with a different superscript letter have significantly different prevalence estimates. The prevalence estimates of the subgroups with the same superscript letter label are not significantly different.

## Table 3

Association* Between Health-risk Factors and Missing Meals— National Youth Physical Activity and Nutrition Study, United States, 2010

| | Missed meal on ≥1 day during the past 7 days | | | | | |
|---|---|---|---|---|---|---|
| | Breakfast | | Lunch | | Dinner | |
| | % | PR (95% CI) | % | PR (95% CI) | % | PR (95% CI) |
| **Weight status** | | | | | | |
| Obese | 67.4 | 1.09 (1.01, 1.19) | 47.5 | 1.33 (1.17, 1.51) | 28.5 | 1.32 (1.15, 1.52) |
| Overweight | 68.2 | 1.11 (1.06, 1.17) | 41.8 | 1.22 (1.10, 1.35) | 25.7 | 1.21 (1.06, 1.40) |
| Normal weight | 60.9 | 1.00 (reference) | 34.2 | 1.00 (reference) | 20.7 | 1.00 (reference) |
| Underweight | 48.9 | 0.78 (0.63, 0.97) | 42.5 | 1.20 (0.97, 1.48) | 20.9 | 0.94 (0.68, 1.30) |
| **Perceived overweight** | | | | | | |
| Yes | 69.0 | 1.13 (1.08, 1.18) | 46.1 | 1.29 (1.19, 1.40) | 29.6 | 1.40 (1.23, 1.59) |
| No | 60.3 | 1.00 (reference) | 34.3 | 1.00 (reference) | 20.2 | 1.00 (reference) |
| **Daily physical activity** | | | | | | |
| Yes | 54.2 | 0.87 (0.82, 0.93) | 30.2 | 0.84 (0.75, 0.95) | 14.6 | 0.68 (0.55, 0.83) |
| No | 64.7 | 1.00 (reference) | 39.6 | 1.00 (reference) | 24.7 | 1.00 (reference) |
| **Sports participation** | | | | | | |
| Yes | 60.2 | 0.90 (0.87, 0.94) | 34.6 | 0.82 (0.75, 0.89) | 20.8 | 0.81 (0.75, 0.89) |
| No | 67.9 | 1.00 (reference) | 44.0 | 1.00 (reference) | 27.2 | 1.00 (reference) |
| **Video game/Computer use** | | | | | | |
| >2 hours/day | 69.0 | 1.12 (1.07, 1.17) | 41.1 | 1.10 (1.02, 1.18) | 22.9 | 0.98 (0.88, 1.09) |
| ≤2 hours/day | 61.3 | 1.00 (reference) | 37.4 | 1.00 (reference) | 23.3 | 1.00 (reference) |
| **TV watching** | | | | | | |
| >2 hours/day | 69.2 | 1.09 (1.04, 1.15) | 39.3 | 0.94 (0.87, 1.03) | 21.9 | 0.81 (0.70, 0.93) |
| ≤2 hours/day | 60.7 | 1.00 (reference) | 37.8 | 1.00 (reference) | 23.7 | 1.00 (reference) |

Abbreviations: PR= prevalence ratio, CI= confidence interval

* Prevalence ratios are adjusted for sex, race/ethnicity, and grade.

*Am J Health Promot*. Author manuscript; available in PMC 2024 March 18.

**Table 4**

Associations[*] Between Missing Meals[†] (as an Independent Variable) and Dietary Behaviors— National Youth Physical Activity and Nutrition Study, United States, 2010

| | Fruits ≥2 times/day | | Vegetables ≥3 times/day | | Milk ≥2 glasses/day | | SSBs ≥3 times/day | | Fast Food ≥1 day/week | |
|---|---|---|---|---|---|---|---|---|---|---|
| | % | PR (95% CI) | % | PR (95% CI) | % | PR (95% CI) | % | PR (95% CI) | % | PR (95% CI) |
| **Missed breakfast** | | | | | | | | | | |
| ≥1 day | 36.6 | 0.76 (0.70, 0.82) | 16.3 | 0.72 (0.64, 0.81) | 21.4 | 0.69 (0.62, 0.77) | 24.9 | 1.39 (1.22, 1.59) | 77.8 | 1.10 (1.05, 1.15) |
| 0 days | 48.4 | 1.00 (reference) | 22.1 | 1.00 (reference) | 33.2 | 1.00 (reference) | 17.4 | 1.00 (reference) | 69.9 | 1.00 (reference) |
| **Missed lunch** | | | | | | | | | | |
| ≥1 day | 39.6 | 0.95 (0.88, 1.03) | 19.0 | 1.04 (0.90, 1.21) | 21.7 | 0.83 (0.75, 0.92) | 23.5 | 1.09 (0.97, 1.23) | 75.1 | 1.00 (0.96, 1.04) |
| 0 days | 41.8 | 1.00 (reference) | 18.1 | 1.00 (reference) | 28.3 | 1.00 (reference) | 21.3 | 1.00 (reference) | 74.6 | 1.00 (reference) |
| **Missed dinner** | | | | | | | | | | |
| ≥1 day | 38.3 | 0.94 (0.85, 1.05) | 15.2 | 0.80 (0.67, 0.97) | 22.7 | 0.93 (0.83, 1.05) | 21.1 | 0.96 (0.85, 1.08) | 78.3 | 1.05 (1.00, 1.11) |
| 0 days | 41.6 | 1.00 (reference) | 18.8 | 1.00 (reference) | 27.2 | 1.00 (reference) | 21.9 | 1.00 (reference) | 73.9 | 1.00 (reference) |

Abbreviations: SSBs= sugar-sweetened beverages, PR= prevalence ratio, CI= confidence interval

[*] Prevalence ratios are adjusted for sex, race/ethnicity, and grade.

[†] During the past 7 days.