



Original article

Behaviors Related to Physical Activity and Nutrition Among U.S. High School Students

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A B S T R A C T

Purpose: National data related to physical activity (PA) and nutrition among adolescents are needed to help develop effective obesity prevention programs. The 2010 National Youth Physical Activity and Nutrition Study (NYPANS) was conducted to provide nationally representative data on behaviors and behavioral correlates related to healthy eating and PA.

Methods: NYPANS used a three-stage cluster sample design to obtain data representative of public- and private-school students in grades 9 through 12 in the United States ($n = 11,429$). Students completed an anonymous, self-administered questionnaire in their classrooms during a regular class period. Trained data collectors directly measured the students' height and weight at school using a standard protocol.

Results: Analyses revealed that 19.0% of students were obese and 17.8% were overweight. Students participated in a range of physical activities during the 12 months before the survey; prevalence ranged from 5.0% for ice hockey to 83.9% for walking. In addition, 52.5% of students enjoyed the physical education classes they took at school. During the 7 days before the survey, 74.8% of students ate at least one meal or snack from a fast food restaurant, with black students more likely than white and Hispanic students to have done so. Forty-one percent of students always or most of the time have a TV on while eating dinner at home.

Conclusions: These and other NYPANS results can be used to develop obesity prevention programs that address specific behaviors and behavioral correlates, and target subgroups in which behaviors and behavioral correlates related to obesity are most prevalent.

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IMPLICATIONS AND
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NYPANS provides current nationally representative data on physical activity and healthy eating among high school students. Results can be used to develop obesity prevention programs that address specific behaviors and behavioral correlates, and target subgroups in which behaviors and behavioral correlates related to obesity are most prevalent.

The prevalence of obesity among children and adolescents has tripled since 1980, and in 2009–2010, 18% of 12–19-year-olds in the United States were obese [1]. Obesity among adolescents has immediate effects on health and well-being, and also increases the risk of developing health problems in adulthood [2]. Healthy

eating and physical activity (PA) can lower the risk of becoming obese [2]. To effectively promote and influence healthy eating and PA behaviors among adolescents, it is critical to determine the prevalence of these behaviors in this population, as well as the prevalence of attitudes and environmental factors that research has shown to be correlated with these behaviors.

Several studies have examined behaviors related to nutrition and PA among nationally representative samples of adolescents [3–6]. These studies, however, generally assess multiple categories of health behaviors, such as substance use and behaviors

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related to violence, and therefore are limited in their ability to provide data on a large number of specific behaviors related to PA and nutrition. Other studies have assessed a larger number of behaviors related to nutrition and/or PA, but these have been conducted among national convenience samples [7], girls only [8], or adolescents in particular states or local areas [9,10], and do not always provide data on both behaviors and behavioral correlates. Studies that have examined both behaviors and behavioral correlates have focused on either healthy eating [9] or PA [10–13] but not on both. Only one of these studies used a nationally representative sample [11].

To address the need for nationally representative data on behaviors and behavioral correlates related to both healthy eating and PA, the Centers for Disease Control and Prevention (CDC) conducted the National Youth Physical Activity and Nutrition Study (NYPANS) in 2010. To determine which behaviors and behavioral correlates were most critical to assess, CDC conducted extensive literature reviews and consulted with nutrition, PA, and obesity experts from CDC, other federal agencies, and academic institutions. This consultation included a 2-day expert panel meeting and multiple reviews of draft questionnaires. This report is one of several publications reporting NYPANS results. Although other manuscripts describe the relationships between the behaviors, their correlates, and body mass index (BMI) [14,15], this report gives an overview of NYPANS data by providing national prevalence estimates for both healthy eating and PA behaviors not reported elsewhere [5,16–18]. This report also includes prevalence estimates for correlates of these behaviors. Because previous studies have demonstrated subgroup differences in these behaviors and behavioral correlates, this report presents results for students overall and by sex and racial/ethnic subgroups.

Methods

The data reported here are derived from (1) a survey assessing behaviors and behavioral correlates related to PA and nutrition among a nationally representative sample of high school students; and (2) direct measurements of height and weight using a standard protocol among students participating in the survey. An institutional review board at the study contractor approved the study protocol.

Survey

A three-stage cluster sample design that oversampled African-American/black and Hispanic/Latino students was used to obtain a nationally representative sample of public- and private-school students in grades 9 through 12. In each participating school, one or two classrooms in each grade from either a required subject (e.g., English) or a required period (e.g., second period) were randomly selected. All students in selected classes were eligible to participate. The school response rate was 82%, the student response rate was 89%, and the overall response rate was 73%. Data from 11,429 students were available for analysis. A weighting factor was applied to each student record to adjust for nonresponse and oversampling of black and Hispanic students.

Following local procedures, parental permission was obtained before survey administration. Participation in the survey was voluntary. Trained data collectors visited each selected classroom, where students completed an anonymous, self-administered questionnaire during a regular class period during the spring

of 2010. Students recorded responses directly on computer-scannable booklets.

The questionnaire contained 120 items. Those developed specifically for this study were subjected to cognitive testing, which resulted in the revision or deletion of problematic questions. The NYPANS questionnaire is available at http://www.cdc.gov/healthyYouth/yrbs/pdf/nypans/2010nypans_questionnaire.pdf

Height/weight measurement

Data collectors were trained to use a standard protocol to weigh and directly measure the students' standing height and weight. Before measurements were taken, students were asked to remove outer clothing (e.g., coats), purses, shoes, hats, and any removable hair accessories, and to remove personal items from their pockets. The data collectors measured height to the nearest inch using a weighted measuring tape attached to the wall. Students placed their backs and heels against the wall, and the data collectors then placed a measuring triangle on the student's head to form a right angle with the wall. The height measurement was taken from the lower edge of the triangle. Data collectors measured students' weight to the nearest pound using an electronic scale (Tanita, Arlington Heights, IL) placed on an uncarpeted floor. The scale was zero balanced before each student was weighed. Data collectors entered height and weight measurements on a computer-scannable form that was linked to the survey questionnaire by a unique identification number.

The student response rate for the height and weight measurements was 80%. Height and weight data were set to missing if they exceeded plausible values for age and sex subgroups (see www.cdc.gov/healthyYouth/yrbs/pdf/nypans/nypans_data_users_manual.pdf). After editing, height and weight data from 10,007 forms (88% of the analytic sample from the survey) were available for analysis.

Data analysis

Students were classified as obese or overweight based on their BMI (kg/m^2), which was calculated from the directly measured height and weight. BMI values were compared with sex- and age-specific reference data from the 2000 CDC growth charts [19]. Obese was defined as a BMI of ≥ 95 th percentile for age and sex. Overweight was defined as a BMI of ≥ 85 th percentile and < 95 th percentile for age and sex.

Variables were dichotomized to measure the presence versus absence of each behavior, or by using cutoffs used in previous surveys [5]. Statistical analyses for all variables were conducted on weighted data using SUDAAN software (RTI International, Research Triangle Park, NC), which accounted for the complex sampling design. Prevalence estimates and 95% confidence intervals were computed for all variables, and *t*-tests were used to determine pairwise differences between sex and racial/ethnic subpopulations. Differences between prevalence estimates were considered statistically significant if the *t*-test *p* value was $< .05$. Prevalence estimates by race/ethnicity are presented only for non-Hispanic black, non-Hispanic white, and Hispanic students (who might be of any race); the numbers of students from other racial/ethnic groups were too small for meaningful analysis.

Results

Approximately half of students (49.4%) were female, 57.7% were white, 14.9% were black, 18.9% Hispanic, and 8.5% other.

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