

Relationship between Adolescents' and Their Friends' Eating Behaviors: Breakfast, Fruit, Vegetable, Whole-Grain, and Dairy Intake

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ARTICLE INFORMATION

Article history:

Accepted 29 June 2012

Keywords:

Adolescents
Friends
Breakfast
Fruits and vegetables

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2212-2672/\$36.00
doi: 10.1016/j.jand.2012.07.008

ABSTRACT

We examined associations between adolescents' and their friends' healthy eating behaviors, specifically breakfast, fruit, vegetable, whole-grain, and dairy food intake as reported by both adolescents and their friends. Data for this study were drawn from EAT-2010 (Eating and Activity among Teens), a population-based study examining multilevel factors of eating, physical activity, and weight-related outcomes among adolescents (80% racial/ethnic minority) in Minneapolis/St Paul, MN, during the 2009-2010 academic year. In-class surveys were completed by 2,043 adolescents in 20 schools. Adolescents identified friends from a class roster; friends' survey data were then linked to each participant. Generalized estimating equation linear regression models were used to examine associations between adolescents' healthy eating behaviors and these behaviors from their friends (friend group and best friends), adjusting for sociodemographic characteristics. Significant positive associations were found for breakfast eating between adolescents and their friend groups and best friends (friend groups $\beta=.26$, $P<0.001$; best friends $\beta=.19$, $P=0.004$), as well as for whole-grain intake (friend groups $\beta=.14$, $P<0.001$; best friends $\beta=.13$, $P=0.003$) and dairy food intake (friend groups $\beta=.08$, $P=0.014$; best friends $\beta=.09$, $P=0.002$). Adolescents' and their best friends' vegetable intake were also significantly related ($\beta=.09$, $P=0.038$). No associations were seen among friends for fruit intake. Findings from our study suggest that adolescent friends exhibit similarities in healthy eating patterns. Registered dietitians and health professionals may consider developing strategies to engage friends to promote adolescents' healthy dietary behaviors.

J Acad Nutr Diet. 2012;112:1608-1613.

MEAL PATTERNS AND DIETARY INTAKE DURING adolescence are of critical importance for growth and development, a healthy body weight, and short- and long-term health.^{1,2} Factors associated with healthy eating behaviors during adolescence include healthy food at school,³ parental modeling,^{4,5} and taste preferences.⁶ Although the foundation for eating behaviors begins during childhood,^{1,2} these behaviors continue to evolve as individuals broaden their social networks and assume greater independence. However, little research has examined whether adolescents' healthy eating behaviors are associated with similar behaviors in their friends. Given the importance of friends during adolescence,⁷ researchers may be missing an opportunity to learn more about factors related to young people's eating patterns. Understanding similarities and differences between friends with regard to their eating behaviors can help inform the design of nutrition interventions for this group.

Most research to date relies on participants' self-reports of their friends' behaviors.^{8,9} Studies have suggested that adolescents' perceptions about their friends' weight-related atti-

tudes and behaviors predict body dissatisfaction, dieting onset, chronic dieting, unhealthy weight control behaviors, and eating disorder symptoms.¹⁰⁻¹² Perceptions of friends' behavior may not reflect the friends' actual behavior because these perceptions may be altered by an individual's own attitudes and beliefs.¹³ Studies with direct measures have generally focused on the negative influence that friends have on adolescent eating patterns¹⁴; very little has been done to investigate the positive effect that friends might exert during adolescence, particularly on healthy eating behaviors. To our knowledge, measures of friends' healthy eating behaviors have been examined in just one study, which had null findings.¹⁵ Specifically, Ali and colleagues¹⁵ found that over time, friends' sports, exercise, and fast-food eating behaviors were linked to adolescent behaviors, but not to healthy eating outcomes such as breakfast, fruit, and vegetable consumption. These findings have not been replicated.

Several well-established healthy eating behaviors include regular breakfast, fruit, vegetable, and whole-grain and dairy food consumption. Despite the known benefits of consuming these foods, few adolescents consume recommended lev-

els.¹⁶⁻¹⁹ There is substantial national agreement on improving frequency/intake of breakfast, fruits, vegetables, whole grains, and low-fat dairy among youth.²⁰⁻²² A better understanding of factors related to these healthy eating behaviors is needed to help guide intervention development to decrease risk of chronic disease and obesity. To help understand the role that friends have on adolescents' healthy eating behaviors, we sought to examine associations between adolescents' and friends' healthy intake among a large, diverse sample using direct measures of friends' behaviors.

METHODS

Study Design

Data for this study were drawn from EAT-2010 (Eating and Activity among Teens), which examined eating behaviors, physical activity patterns, and weight-related outcomes among 2,793 adolescents.²³ Adolescents (mean age 14.4 ± 2.0 years) from 20 Minneapolis/St Paul, MN, middle schools and high schools completed in-class nutrition and nominated friend surveys. Trained staff measured height and weight and administered surveys in required health or physical education classes during two to three visits. Parental consent was received by each student younger than age 18 years at least 10 days before data collection. During data collection, participating students provided assent and received a \$10 gift card. The University of Minnesota's Institutional Review Board Human Subjects Committee and the school districts' research boards approved all study protocols.

EAT-2010 Student Survey. The student survey was a 253-item self-report instrument assessing a range of factors of potential relevance to weight status and weight-related behaviors among adolescents. Survey development was initially guided by a review of previous Project EAT surveys²³⁻²⁵ to identify the most salient items, and a theoretical framework that integrates an ecologic perspective²⁶ with Social Cognitive Theory.²⁷

Young Adult Food Frequency Questionnaire (YAQ). Dietary intake was assessed with the 152-item youth version of the Willett food frequency questionnaire, the YAQ, which has undergone extensive testing for validation and reproducibility in adolescents.^{28,29} This instrument was used successfully in previous waves of Project EAT,³⁰ and offers the most suitable mechanism for examining dietary intake in a large, diverse population of adolescents.

Friend Nomination. An assessment of friends through the collection of friendship nominations was included as a survey instrument, as has been done in previous studies.³¹⁻³³ Lists of all students in each grade were obtained in advance of data collection from each school. Rosters were compiled for each school and study staff created a unique 4-digit network identification (ID) number for each enrolled student in the school. Adolescent participants were provided with the rosters containing the names and corresponding IDs of all other students in their school, alphabetized and separated by grade level. Participants identified, recorded, and ranked the IDs of their three closest female friends and three closest male friends from the roster, in order of closeness. Students were permit-

ted to nominate fewer than six friends and indicate whether they had close friends who did not attend their school. Nominated friends not attending surveyed schools or within classrooms that were surveyed were not included in the sample design. Participants nominated an average of 5.2 ± 1.3 (out of six) friends and an average of 2.1 ± 1.7 of those friends provided data through the EAT-2010 study design. Overall, 77% of the original sample of adolescents had at least one friend in the dataset ($n=2,126$). In addition, some students were absent or were unable to complete the YAQ and/or reported biologically implausible energy intake ($n=83$); thus, the analytic sample for this study is slightly smaller ($N=2,043$).

Measures

Healthy Eating Behaviors. Five variables assessed healthy food intake among adolescents and their friends. Breakfast eating was assessed on the EAT-2010 student survey: "During the past week, how many days did you eat breakfast?" (response options: "Never," "1-2 days," "3-4 days," "5-6 days," and "Every day") (test-retest $r=0.76$)²⁵ and was recoded as days per week. Adolescents self-reported their fruit, vegetable, whole-grain food, and dairy food intake on the YAQ by responding to the question, "Think about your usual eating habits over the past year. About how often do you eat each of the following foods and beverages?" Fruit intake (excluding juice) was assessed with 11 items such as grapes, bananas, and strawberries. Vegetable intake, excluding french fries, included 20 types of vegetables such as string beans, mixed vegetables, and sweet potatoes. Whole-grain intake was estimated by summing the reported frequency of consuming five items, including dark bread, popcorn, and breakfast cereal.¹⁸ Intake of dairy foods included 16 milk-based items such as milk, yogurt, pudding, cheese, and ice cream. Fruits, vegetables, whole grains, and dairy foods were summed separately and data were recoded as daily servings.

Friends. Eating behaviors of each nominated friend were linked by ID number to individual students, allowing for the creation of friends predictors unique to each participant. Independent variables were created using the same healthy eating behaviors reported by nominated friends described above. The friend group measure encompasses the mean of each healthy eating behavior examined (eg, days of breakfast eating and servings of fruits, vegetables, whole grains, and dairy) from all friends nominated by adolescents and who provided data. The best friends measure was the mean reported intake from those friends adolescents ranked first in either sex category. The sample size for analyses with best friends was smaller given that not all participants had a male or female best friend with data ($n=1,371$). To account for varying numbers of friends for each adolescent, a covariate was included consisting of number of friends that was a simple sum of the number of friends in the EAT-2010 dataset.

Sociodemographic Characteristics. School level, sex, race/ethnicity, US-born status, and socioeconomic status (SES) were all based on self-report from the EAT-2010 student survey. To create the school-level variable, 7th and 8th graders were classified as being in middle school and 9th

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