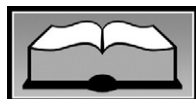


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Associations among Dietary Supplement Use and Dietary and Activity Behaviors by Sex and Race/Ethnicity in a Representative Multiethnic Sample of 11th-Grade Students in Texas

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ABSTRACT

Background and objective The purpose of this study was to examine associations among dietary supplement use and dietary/activity patterns in a representative sample of adolescents by sex and race/ethnicity, a research area where extant data is limited.

Design/participants Cross-sectional, multistage, probability-based sample of 11th graders in Texas during 2004-2005

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Manuscript accepted: October 5, 2010.

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0002-8223/\$36.00

doi: 10.1016/j.jada.2010.11.019

(n=6,422; 48.8% white/other, 37% Hispanic, and 14.2% African American; 50.6% boys; mean age 16.7 years).

Setting Classrooms.

Main variables assessed Dietary supplement use, dietary/activity patterns, and anthropometrics.

Statistical analyses performed Multiple logistic regression models (odds ratios [ORs] and 95% confidence intervals [CIs]).

Results Dietary supplement users reported healthy dietary and physical activity behaviors overall, yet sex- and race/ethnicity-specific differences were seen in associations among specific diet/activity behaviors and supplement use. In whites/others and Hispanics, but not African Americans, supplement use was associated with higher diet quality scores (OR 2.93, 95% CI 1.74 to 4.95 for whites/others; OR 3.93, 95% CI 2.26 to 6.83 for Hispanics), and regular consumption of breakfast (OR 2.27, 95% CI 1.40 to 3.66 for whites/others; OR 1.96, 95% CI 1.11 to 3.46 for Hispanics) and low-fat foods (OR 3.02, 95% CI 1.53 to 5.98 for whites/others; OR 3.59, 95% CI 1.11 to 11.6 for Hispanics). Supplement use was not associated with body mass index or with sedentary behaviors overall, but was associated with less television viewing only in whites/others (OR 0.53, 95% CI 0.33 to 0.84). For physical activity, boys and whites/others showed positive associations between supplement use and all indicators examined, but girls, Hispanics and African Americans showed mixed patterns of associations. Supplement use was associated with higher weight preference only in boys (OR 2.47, 95% CI 1.24 to 4.90), and vegetarian diets only in girls (OR 2.96, 95% CI 1.35 to 6.47).

Conclusions Dietary and activity patterns associated with dietary supplement use may vary by sex- and racial/ethnic subpopulation, especially amongst African American youth. These findings together with further research on psychosocial and attitudinal characteristics associated with adolescent supplement use can enhance the development of targeted and tailored health communications about supplement use in adolescent subpopulations.

J Am Diet Assoc. 2011;111:385-393.

Because approximately one in every four adolescents in the United States takes dietary vitamin/mineral supplements (1,2), research evaluating those who do or do not take supplements is essential as some may be taking too many vitamin/mineral supplements while others not enough (3,4). Previous studies in adolescents indicate that dietary vitamin/mineral supplement users have a number of positively associated characteristics, including lower body mass index (5,6), higher diet quality (1,7,8), greater physical activity (1,5,6), and less television viewing (1,5,6). However these studies, though important and seminal, have been conducted in predominantly white samples (>70% white) (1), or in children and adolescents combined (eg, age 0 to 18 years [5] and age 2 to 17 years [6]). Although studies show that dietary (9,10) and physical activity (11,12) patterns of adolescents vary by age, sex, and race/ethnicity, it is unclear whether associations among specific diet/activity indicators and supplement use vary by these same factors.

Dietary patterns, such as vegetarianism, breakfast skipping, daily meal frequency, and use of low-fat foods have never been reported in relation to supplement use in a representative and predominantly multiethnic sample of adolescents. Also, certain types of physical activity, such as muscle-strengthening exercises, outside-school sports teams, and participation in physical education (PE) classes have not been studied in association with supplement use among adolescents. Finally, attitudes associated with supplement use, such as desire for weight gain, and self-ratings of diet, have not been explored previously in adolescents. We wish to expand on Gilmore (13) in providing greater understanding of behaviors of adolescent dietary vitamin supplement users.

The main purpose of this study was to examine dietary patterns (eg, dietary/meal frequency/patterns) and types of activities (eg, muscle-strengthening activities, participation in sports teams, television viewing, and video game playing) associated with dietary vitamin/mineral supplement use in a representative multiethnic sample of 11th-grade adolescents, with results reported by sex and race/ethnicity, notably in whites/others, Hispanics, and African Americans. The analytical strategy for this research was consistent with that used by others to examine sex- and race-specific point estimates of associations between other diet- and activity-related variables (14,15), and brings attention to potential modifying effects of age, sex, and race/ethnicity (16).

METHODS

Study Design and Participants

Cross-sectional data were collected during the 2004-2005 school year in the School Physical Activity and Nutrition (SPAN) study (17). This study sample of 6,456 11th-grade students was selected using a three-stage probability-based sampling design, notably Stage 1 sampled at the Health Service Regions of Texas, and Stages 2 and 3 sampled at the school district and school levels (17). The sampling frame included all public schools in Texas, except special education/alternative and charter schools. Schools were selected from urban, suburban, and rural school districts from each Health Service Region of Texas (17,18).

Study protocols and questionnaires were approved by the

institutional review boards at the University of Texas Health Science Center at Houston and the Texas Department of State Health Services, and participating school districts and schools. Parents provided active or passive consent, and students completed assent forms before study participation.

School Physical Activity and Nutrition Questionnaire

Information on dietary vitamin/mineral supplement use; dietary patterns, including food choices and daily meal frequency; and activities was obtained using the SPAN questionnaire, based on the School Based Nutrition Monitoring questionnaire (19). The instrument was pilot-tested in focus groups that included high school students; its content validated by a panel of experts in nutrition, physical activity, and anthropometry; and it was evaluated for reproducibility of all items and validity of the food choice items in more than 200 multiethnic students from eight secondary schools in central Texas (19). Psychometrics of questionnaire items published in Hoelscher and colleagues (19) are discussed below. The readability of the questionnaire calculated using the Dale-Chall formula, was excellent for 11th graders (19). The time required for the self-administration of the instrument by students in the classroom was 20 to 45 minutes (19). The questionnaire was available in English or Spanish. Because the SPAN study included measurement of previous day food choices, and because food choices may vary between weekends/holidays and weekdays, all study measurement sessions were scheduled between Tuesdays and Fridays, and none followed a school holiday.

Assessment of Dietary Supplement Use

Dietary vitamin/mineral supplement use was assessed in terms of usual consumption of a "vitamin or mineral pill." "Vitamin or mineral pill" was used specifically to avoid confusion with other dietary supplements, including amino acid supplements. Clarity and interpretation of all SPAN questionnaire items, including the vitamin or mineral pill question, were confirmed using focus groups and cognitive interviewing procedures in a convenience sample of high school students during the development of the questionnaire (19). The Spearman's rank correlation for the supplement question was 0.82 and the percent agreement was 92% in a 2-week test-retest reproducibility study among 259 secondary level students in Texas (19). The terms *dietary supplement* and *supplement* in this article refer to dietary vitamin/mineral supplements and exclude other supplements, such as herbal (eg, echinacea and ginkgo biloba) or amino acid (eg, glutamine and carnitine) supplements. The rationale for the focus of this article on vitamin and mineral supplements was that vitamin and mineral supplements are the predominant dietary supplement taken by the US population, including young persons (2,20).

Assessment of Dietary Patterns

The SPAN instrument included questions regarding the previous day's consumption of 22 marker foods, identified as being in greatest need of epidemiologic surveillance (19). Healthful (eg, whole-wheat products, fruits, vegetables, and yogurt/cottage cheese) and unhealthful (eg,

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