



## F&V CONSUMPTION AMONG ADOLESCENTS

## Editorial

A healthful diet helps to reduce risk for common health problems among adolescents and young adults such as hypertension and obesity. Further, consuming a nutrient-dense diet is critical to support the rapid physical growth that characterizes adolescence. Eating behaviors established during these early years often influence diet later in adulthood, and thus may have an impact on long-term health.

Despite the importance of good nutrition, surveillance data indicate most youth do not achieve dietary recommendations. There is a great need for nutrition interventions to address the gaps between current behaviors and recommendations. This issue describes three examples of research conducted to inform such interventions:

- Adams and Bahr examined fruit and vegetable intake in college students and describe the demographic characteristics and other health behaviors of students with poor intake.
- Dart and Couch evaluated an intervention designed to improve intakes of fruit, vegetables, and low-fat dairy foods in adolescents with hypertension.
- Kasperek followed nearly 200 students for six months and examined the influence of diet and other lifestyle behaviors on weight change during the transition to college.

The importance of intervening early to promote healthy lifestyle behaviors in youth is evident. These three studies illustrate the various types of research that must be completed to better understand what groups are in greatest need of interventions and what strategies may be most successful.

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# Fruit and vegetable intake among college students

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Fruits and vegetables have been shown to produce health benefits by numerous research studies. However, there continues to be substantial gaps between recommended and actual fruit and vegetable consumption among the majority of individuals living in the United States<sup>(1,2,3)</sup>. Interestingly, for individuals ranging in age from 18-24, the percentage who reach appropriate fruit and vegetable consumption is approximately 3 percentage points lower than the population as a whole<sup>(4)</sup>.

Previous research has demonstrated that as young adults progress through their college years, several health behaviors, including fruit and vegetable intake, can be negatively affected (5). This situation is critical due to the fact that poor health behaviors during young adulthood can increase the risk of several chronic diseases in older adulthood<sup>(6)</sup>. This suggests that the college years are a critical time period to teach young adults how to develop and maintain healthy behaviors<sup>(5,6)</sup>.

Although the need to educate young adults regarding healthy behaviors is clear, there are few published studies reporting the effectiveness of dietary and health interventions among this population. Therefore, the purpose of our study was to investigate the association between fruit and vegetable intake and both behavioral and demographic variables to better enable health professionals to effectively design interventions that target multiple risk factors.

Data for this study was gathered from approximately 40,000 U.S. college students between the ages of 18-25 at 28 colleges and universities during 2002 and 2003. Participants in this study completed the American College Health Association, National College Health Assessment, which assesses both behavioral and demographic variables.

The results of our study demonstrated that full-time students were more likely to have higher fruit and vegetables consumption when compared with part-time students. In addition, students who were separated, widowed, or divorced reported higher fruit and vegetable intake than students who were single or in a committed relationship. Black students demonstrated significantly lower fruit and vegetable

consumption than white or Asian students. Furthermore, both Black and Hispanic students consumed fewer fruits and vegetables than both multi-racial and “other” racial ethnic groups. Interestingly, students who lived in residence halls, fraternities, and sororities reported greater fruit and vegetable intake than those living in other campus housing, off-campus, or with parents.

Fruit and vegetable intake was also found to be positively associated with greater seat belt and helmet usage, vigorous physical activity, perceived health, strength training activity, use of sunscreen, likelihood of condom usage, and grade point average. Fruit and vegetable intake was also inversely associated with cigarette smoking, alcohol use, risk of high blood pressure among women.

Our findings seem to suggest that fruit and vegetable intake is associated with other health behaviors among 18-25 year old college students in the U.S. Although the findings are cross-sectional in nature, the associations suggest that current programming on health topics available at colleges and universities could be enriched. For example, programming on topics such as smoking, alcohol use, physical activity, sleep, and mental health could be supplemented by adding brief messages about fruit and vegetable intake.

The few studies that have investigated fruit and vegetable intake among college students have consistently indicated that very few meet the fruit and vegetable intake recommendations and even fewer receive information from their institution regarding this issue<sup>(7)</sup>. Indications to increase intake among this population and the population as a whole are outlined in Health People 2010. Because the avoidable disease burden among this population is large, efforts should be made to increase intake.

Although the body of literature regarding fruit and vegetable intake among college students is small, the possibility to make a difference in their lives is large. The identification of several predictors of fruit and vegetable intake in our study may be helpful to health professionals when planning interventions to improve the health of college students.

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# A diet high in F&V and low fat dairy foods to lower blood pressure in adolescents

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Hypertension (high blood pressure) affects more than 65 million Americans<sup>(1)</sup> and is a factor in 67% of heart attacks, 77% of strokes, and 18% of all-cause mortality in the U.S.<sup>(2)</sup>. Thus, the public health burden of this disease is enormous. Among youth, hypertension is no longer a rare disease, affecting 7 million children and adolescents<sup>(3)</sup>. Numbers are expected to grow with the evolving pediatric obesity epidemic in the U.S.<sup>(4)</sup>.

Dietary modification is recommended as a first-line approach for children and teenagers with high blood pressure; however, evidence for the effectiveness of dietary intervention to lower blood pressure in youth is limited<sup>(5)</sup>. Promising research in adults showed that a dietary pattern emphasizing fruits, vegetables, low fat dairy that is also low in fat and sodium (the DASH diet) dramatically lowered blood pressure compared to other dietary approaches<sup>(6)</sup>. While the DASH diet is being advocated by leading health experts to manage hypertension in children and teenagers<sup>(5)</sup>, the effectiveness of this dietary pattern on lowering blood pressure in this age group has not been tested clinically.

Toward this purpose, our research group evaluated the effectiveness of a 3-month clinic-based behavioral nutrition intervention emphasizing a diet high in fruits, vegetables, and low fat dairy foods that was also low in fat and sodium (the DASH intervention) versus routine outpatient hospital-based nutrition care on changing diet and blood pressure in adolescents with elevated blood pressure<sup>(7)</sup>. Fifty-seven adolescents with a clinical diagnosis of hypertension, newly enrolled in a pediatric outpatient treatment center, were randomly assigned to the DASH intervention or routine care. The teenagers in the DASH intervention received a single, 60 minute counseling session with the dietitian focused on the DASH diet and strategies to include fruits, vegetables and low fat dairy foods into the diet while lowering fat and sodium. The counseling session was followed by 10 weekly phone calls by a trained nutrition interventionist and 4 mailings focused on behavior change strategies to promote adoption of the DASH diet (i.e., food tracking, goal setting, action planning, and handling high risk situations). A 10-module

illustrated manual, provided to each participant in the DASH group was designed to help adolescents acquire more detailed knowledge about the DASH diet. Participants were encouraged to make gradual dietary changes to achieve 8 servings per day of fruits and vegetables, 3 servings per day of low fat dairy foods and less than 2 servings per day of high fat and high sodium foods (i.e., foods that had >3 grams of fat and/or >480 mg sodium per serving). Parents were included in the initial DASH counseling session and were mailed 4 fact sheets related to creating a home food environment supportive of the DASH diet.

The routine care intervention did not vary from the diet treatment that is routinely provided in the treatment center and included a single 60 minute counseling session with a dietitian on dietary guidelines consistent with the National High Blood Pressure Education Program's pediatric dietary recommendations. These included reducing dietary sodium and controlling weight by limiting high fat foods, reducing portion sizes and eating nutrient dense forms of foods. A pamphlet summarizing these recommendations was provided to participants<sup>(8)</sup>.

Our findings showed that the DASH group doubled their intake of fruits and vegetables, and increased their intake of potassium and magnesium by 42 and 36 percent, respectively. Moreover, the teens decreased high fat and high sodium foods by ~ 1 serving per day, and decreased total fat by 12 percent over 3 months. Notably, these positive changes in diet were accompanied by significant reductions in blood pressure compared to the routine care group who showed no or lesser changes in diet and blood pressure.

Findings from our study suggest that our 3-month clinic-based behavioral nutrition intervention emphasizing the DASH diet is effective, in the short-term, for improving dietary quality and blood pressure in adolescents with hypertension. A larger study with longer follow-up is needed to provide a more comprehensive evaluation of the DASH intervention for hypertensive adolescents over the long term.



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# Selected health behaviors that influence college freshman weight change

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Freshmen gain an average of 4.2 pounds, a rate gain that is an alarming 11 times greater than the average.

Therefore, the effect of physical activity (PA), fruit and vegetable intake, and alcohol use on 6-month weight change was investigated in 193 college freshmen to help identify the causes of an increased weight gain for this population.

All first-year freshmen aged between 17 and 19 years at Winthrop University were eligible to participate in the study. During the third week of fall 2002 classes, and last full month of classes in spring, an e-mail was sent that explained the study and contained the survey Web address. The online survey became available after the student checked the informed-consent box at the site.

Baseline survey respondents reported demographic information on age, race, sex, residency, and meal-plan status. Two questions were added to the follow-up survey:

1. How much do you think your weight changed? and
2. Did you complete the fall survey on freshman weight gain?

Respondents' self-reported weight and height were collected to calculate body mass index (BMI) scores (in kg/m<sup>2</sup>). Respondents were categorized according to initial BMI values; BMI values <25 were desirable and values ≥25 were overweight. There were not enough students with BMIs >30 to justify a separate analysis.

The 3 CDC-YRBS questions was used to assess physical activity frequency.

1. How many times in the past week did you participate in activities for 20 minutes that made you sweat?
2. How many times in the past week did you participate in activities for 30 minutes that did not make you sweat?
3. How many times in the past week did you participate in strength-training activities?

Response choices ranged from 0 (no activity sessions per week) to 7 (activity every day of the week).

The 1995 American College of Sports Medicine recommendation for vigorous physical activity — 20 minutes or more at least 3 days a week to provide substantial health benefits — to was used determine categorization for total activity. Total activity scores were created by summing the frequency of response to create 3 categories: 0–1 activity sessions per week (low), 2–3 sessions per week (moderate), and >4 sessions per week (high). For alcohol measures, 2 questions were adapted from the CDC-YRBS: (1) on how many days have you had at least 1 drink of alcohol? and (2) in past 30 days, on how many days did you

have at least one drink of alcohol? The definition of one drink was not given, but it was stated that “this includes drinking beer, wine coolers, and liquor such as rum, gin, vodka, or whiskey. For these questions, drinking alcohol does not include drinking a few sips of wine for religious purposes. To determine the number of fruit and vegetable servings consumed per week, the Block Reduced Food Frequency Questionnaire (RFFQ) was used. The RFFQ provides a quick estimate of frequency of intake but does not account for portion size. To tally fruit and vegetable intake, the frequency of consumption of fruit juice, fresh or canned fruit, green salads, potatoes, soups with vegetables, and any kind of vegetable was summed. Fruit and vegetable intake was described as adequate, ≥11 servings/wk, or low, <11/wk.

Results showed an overall average weight gain of 2.5 lbs ( $p < .05$ ), although only 57% reported weight gain ( $M = 7.1$  lbs). Fruit and vegetable intake decreased ( $p = .034$ ), alcohol use increased ( $p > .05$ ), and PA was unchanged. Weight gain for students with  $BMI \geq 25$  kg/m<sup>2</sup> was nearly twice that of students with  $BMI < 25$  ( $p < .05$ ). Students with low-frequency baseline PA were twice as likely to be overweight. Follow-up data showed that students reporting high frequency of low-intensity PA were twice as likely to have healthy BMIs as students engaging in low- and moderate-frequency PA. Initial BMI score was the measure most highly associated with weight gain. Overweight students ( $BMI > 25$ ) gained nearly twice as much weight during the 6-month interval as did students with desirable BMI scores. Individuals with higher initial BMIs experienced an average increase of 6.99% in body weight, whereas students with desirable initial BMIs experienced an average 5.21% weight gain. These findings justify the need for immediate and appropriate interventions to prevent weight gain, especially among students with overweight BMI scores.

One limitation is that fruits and vegetables tallies included potatoes, thus, students likely did not meet actual criteria for adequate fruit and vegetable intake.



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