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Life of a vegetarian college student: Health, lifestyle, and environmental perceptions

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Abstract

Objective: To examine health behavior and environmental perception differences among vegetarian and nonvegetarian students.

Participants: First-year university students (n=1078) from eight United States universities.

Methods: Data were obtained from base 2015 and followup 2016 assessments. Vegetarians and nonvegetarians were compared for anthropometrics, lifestyle behaviors, and campus environmental perceptions (CEPS).

Results: Vegetarians had smaller waist circumference, lower systolic blood pressure, higher fruit and vegetable consumption, lower percentage of energy obtained from fat, and higher perceived stress. Vegetarians expressed a lower rating of perceptions of health policies on campus.

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Ethics approval and consent to participate

The multi-state umbrella Institutional Review Board (IRB) at University of Tennessee, Knoxville approved all recruitment strategies of the study for University of Tennessee, West Virginia University, and Kansas State University (IRB approval #UTK IRB-14-09366 B-XP). The study was conducted in accordance with the Declaration of Helsinki and all participants provided written consent to participate by signing an IRB approved informed consent form. Verbal consent was received from each participant.

Availability of data and material

The datasets generated and/or analyzed in the current study are not publicly available but are available from the corresponding author on reasonable request.

Trial Registration

This study was retrospectively registered on October 21, 2016 on clinicaltrials.gov, NCT02941497.

Conflict of interest

The authors have no competing interests to declare.

Conclusion: A clear difference in indicators of physical health does not appear, however, vegetarian students show positive dietary patterns which can promote positive health outcomes. Further, vegetarians had lower perceptions of health policies on campus. Results can be used by administrators to ensure policies are in place to support health of students as currently vegetarian students see limitations in the environmental health policies.

Keywords

Behavior; college; perceptions; vegetarian

Introduction

The vegetarian diet, commonly defined as a diet that excludes intake of meat (fowl, seafood, etc.) and meat-based products, continues to grow in popularity in the United States.¹ Estimates show that approximately 4% of the American population identifies as vegetarian.² Further, certain demographics, such as college students, are more commonly switching to a vegetarian diet with 6% of young adults stating they follow the vegetarian diet.^{1,3} Factors leading to the choice of following a vegetarian diet are vast and include health benefits, animal and ethical issues, religion, social media and popular trends, and peer/environmental influence.^{4,5}

In regards to health, research has suggested that vegetarian diets have the potential to be anti-obesogenic relative to diets that include some amount of meat or fish.⁶ A study of groups with differing dietary patterns found that groups whose diets entirely excluded meat (vegans and vegetarians) had lower body mass index (BMI) than groups of pescatarians, semi-vegetarians (restricting meat intake), and nonvegetarians.⁷ BMI was also observed to increase simultaneously with greater inclusion of meat and/or fish in the diet.⁷ Likewise, several studies have shown that vegetarianism is associated with beneficial effects among cardiovascular health indicators, including lower BMI (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), total cholesterol, LDL-cholesterol, glucose levels, and incidence of and mortality from ischemic heart disease.^{8,9} Therefore, following a vegetarian diet may be preventative for chronic disease development.

Further, as may be expected, previous studies have observed that vegetarians on average consume greater quantities of fruits and vegetables daily than nonvegetarians.⁸ Specifically for college populations, vegetarian students have been found to be more likely to meet the Healthy People 2010 dietary guidelines in comparison to their nonvegetarian counterparts, which may be preventative of future health problems.⁸ However, other research indicates that college aged vegetarians may be at an increased risk for unhealthy eating behaviors such as binge eating and overall lead to the development of disordered eating behaviors.^{10–13} Further, in some young populations, vegetarians have reported higher levels of anxiety and depression although research is limited.¹⁴ As college students are already susceptible to higher levels of stress, this additional layer of restrictive eating could be problematic.¹⁵ Therefore, the impact of a vegetarian diet on the behaviors and lifestyle of young adults needs further investigation.

Additionally, adherence to a vegetarian diet on a college campus may be difficult due to the environment. Growing data suggest that conditions and features of the campus environment influence diet choices, physical activity levels, and indirectly, the risk of developing obesity and/or related lifestyle diseases. On college campuses, the quality and perception of the dining food are often poor, with students often perceiving little to no healthy options are available.^{16,17} Though the current body of psychological research makes it clear that perceptions can have a significant impact on individuals' behavior, one aspect of the relationship between environment and obesity has rarely been explored: whether an individual must actually live in an objectively-assessed obesogenic environment in order to be at risk for the associated negative health outcomes, or whether it is sufficient that he or she perceives the environment to be not conducive to a healthful lifestyle. One of the few studies related to this topic found that positive perceptions of the local environment, including perceived access to dining amenities and recreation facilities, were associated with increased physical activity, higher levels of self-reported health, and lower rates of obesity.¹⁸ This suggests that perceptions of the local environment may have a significant impact on health behavior and outcomes. Another analysis showed that individuals' perceptions of their food environment may not be an accurate representation of the true, objectively-measured environment, and that factors such as low socioeconomic status (SES) are associated with underestimation of the quality of the local food environment.¹⁹ The addition of "health promoting" amenities to an obesogenic environment may not be sufficient to reverse trends of obesity and poor health outcomes if community members' perceptions of their environment do not change accordingly. Thus, examination of the relationship between environmental perceptions and health behaviors and choices, including adherence to a vegetarian diet, could lead to valuable insights for future health policy development.

Although campuses are often termed "obesogenic environments,"^{9,20} with student populations become more diverse and popularity of vegetarian diets continue to rise, many colleges and universities have sought to implement modifications to their campus environments in order to promote more healthful lifestyles and reduce the prevalence of overweight and obesity among their students. Multi-campus evaluation of campus dining options shows 80% of campuses providing vegetarian options.²¹ Some institutions have also made efforts to improve students' health by promoting vegetarian/semi-vegetarian diets through initiatives such as the "Meatless Monday" campaign.²² Few studies have investigated whether the indications of superior physical health observed in other vegetarian populations are also present in vegetarian college students. Additionally, though some studies have investigated the environmental conditions associated with unhealthful diets and negative health outcomes among college students, few studies have examined the conditions associated with unusually healthful diets.²³ Thus, there were two major aims for this paper: one, to examine the health and lifestyle characteristics of vegetarians in comparison to nonvegetarians, and two, to explore the environmental perceptions associated with adherence to vegetarian and nonvegetarian diets.

Materials and methods

Study design

Data for this secondary analysis were obtained from the Get Fruved study, a program aimed at promoting healthier lifestyles among young adults.²⁴ As part of Get Fruved, at-risk freshman students (n = 1155) from eight regionally spread universities in the United States completed a baseline survey that included questions about a variety of demographic, health and lifestyle behaviors and perceptions, and environmental characteristics. Baseline data were collected in 2015 and follow-up in 2016, thus two timepoints of comparison are available. At-risk criteria were defined as having less than optimal fruit and vegetable intake and at least one additional risk factor (first-generation college students, racial/ ethnic minority, low affluence, having overweight/obese parent, or personal overweight Body Mass Index). All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki. The protocol was reviewed and approved from each university's Internal Review Board: [Content removed for blinded review]. Informed consent was collected from each participant prior to enrollment. The Get Fruved study was retrospectively registered on October 21, 2016 on clinicaltrials.gov [Content removed for blind review].

Survey measures

For this current study, variables related to health, lifestyle behaviors, and campus environment were selected from the overall Get Fruved survey.

Health measures—Physical health variables were collected from the Get Fruved anthropometric data (BMI, waist circumference, systolic blood pressure (SBP), and diastolic blood pressure (DBP)) which were measured in person by trained study personnel. Height was measured by stadiometer (Heightonic digital stadiometer; Issaquah, WA) with the participant standing, facing forward without shoes, including height. Weight was taken without shoes and with light clothing via digital scale (Electronic Tanita scale; Arlington Heights, IL). Waist, hip, and neck circumferences were taken while the participant was minimally clothed via Gulick meter (North Coast Medical Gulick tape measure; Gilroy, CA). Waist measurement was taken at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest; hip circumference was taken at the largest area of the hips. Blood pressures were taken in a seated resting position with an automated cuff (Omron HEM 907 XL Intellisense Prof. Digital BP monitor; Kyoto, Japan) that measured twice and averaged the two measurements. All measures were taken twice and averaged. Repeated measures were taken a third time if initial measures had a range larger than 0.2 kilo-grams for weight, 0.2 centimeters for height, and 1.0 centimeters for waist, hip, and neck circumference. All measurements were identical at each intervention site. To ensure data reliability all researchers completed inter-rater reliability to greater than 80% before data collection.

Lifestyle and behavioral measures—All other data used in this analysis were self-reported and collected via Qualtrics survey platform. Several previously validated instruments were included in the survey to assess respondents' physical and mental health.

Vegetarian variable.: Vegetarian status was assessed using a single multiple-choice survey question that asked students “Do you consider yourself to be a vegetarian?”. Response options were yes, no, don’t know, and choose not to answer.

Stress variable.: Stress scores were calculated using the validated 14-Item Perceived Stress Scale (PSS-14).²⁵ The PSS scores perceived stress on a scale of 0–56 with scores between 0–13 being low stress, 14–26 being moderate stress, and 27–40 representing high stress. Items include questions regarding stress in the past month (i.e., “in the last month, how often have you felt nervous or stressed?”).

Physical activity variable.: Physical activity was measured by the shortened version of the International Physical Activity Quotient (IPAQ) with higher scores indicated more weekly physical activity.^{26,27} The short-form IPAQ is a validated questionnaire to score physical activity metabolic equivalency tasks in minutes/week (METs). The tool is comprised of six self-reported items of type (light, moderate or vigorous), frequency in days, and duration in minutes of physical activity performed (i.e., “During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?”, “How much time did you usually spend doing vigorous physical activities on one of those days?”).

Eating disorder variable.: The Eating Attitudes Test (EAT-26)²⁸ is a validated measure that was used to determine eating disorder risk scores range from 0 to 78. Questions cover topics such as dieting (i.e., “I think about burning calories when I exercise”), oral control (i.e., “I feel like others would prefer if I ate more”) and food preoccupation (i.e., “I find myself preoccupied with food”). A score of higher than 20 points indicates disordered eating behaviors.

Sleep variable.: The Pittsburgh Sleep Quality Index (PSQI) was used to measure sleep quality with higher scores indicating worse sleep quality.²⁹ The PSQI asks about sleep in the last month, with continuous scoring ranging between 0 and 21 with scores above 5 indicating poor sleep quality.

Dietary intake variable.: Daily fruit/vegetable consumption and percentage of energy obtained from fat were measured by the National Cancer Institute Fruit and Vegetable Screener (NCI FV)³⁰ and Percentage Energy from Fat Screener (NCI Fat), respectively. The validated NCI FV screener tool has students complete 19 self-reported questions on daily fruit and vegetable intake (servings/day). Questions asked about type and amount of fruit and vegetable consumption during the past month (i.e., “Each time you ate lettuce salad, how much did you usually eat?”). Higher NCI scores indicated a larger percentage of intake.

Environmental perception measure—Respondents’ provided perceptions of their campus environment at the follow-up assessment that used the College Environment Perceptions Survey (CEPS),³¹ a 28-item survey using a five-point Likert scale for responses. This developed tool examined participants’ perceptions toward seven over-arching themes of their campus: (1) water quality, (2) healthy foods, (3) campus policies, (4) stress, (5) sleep, (6) exercise and sports facilities, and (7) vending machines.³¹ CEPS total score was out of

100 points with questions being placed into the seven categories. Maximum scores for each subscale are as follows: healthy food = 20 points, water = 12 points, physical activity = 24 points, sleep = 6 points, stress = 6 points, policy = 20 points, vending = 12 points.

Statistical analysis—All statistical analysis was done with JMP Pro 13.0.0 (JMP®, Version Pro 13, SAS Institute Inc. Cary, NC, Copyright ©2013). Respondents were separated into a binary vegetarian or nonvegetarian variable with those who responded “Yes” to the vegetarian question categorized as vegetarians, while respondents who answered “No” were categorized as nonvegetarians. Respondents who selected “Choose not to answer” or “Don’t Know” were not included in further analyses ($n = 15$). Additionally, students who began baseline as a vegetarian and switched to nonvegetarian at follow-up, or vice versa, were excluded from analysis ($n = 26$).

Pearson’s chi-square test was performed to test for differences in the number of males and females, number of students identifying as racial minorities, weight loss intentions, and weight loss attempts in the past year between the vegetarian and nonvegetarian groups. Non-parametric Wilcoxon-Mann-Whitney test was used to assess differences between vegetarians and nonvegetarians in BMI, SBP, DBP, waist circumference, sleep quality, eating disorder risk, physical activity, daily fruit/vegetable consumption, percentage of energy obtained from fat, and perceptions of the campus environment due to lack of normal distribution of continuous variables. Alpha was set at 0.05.

Results

Demographics

From the initial sample, 1078 students were identified as either vegetarian or nonvegetarian at both baseline and follow-up, consistently. This constituted 93.3% of the original sample. Within this group, 61 students were identified as vegetarian and 1028 students as nonvegetarian. The majority of both vegetarians and nonvegetarians were female (85.3% vs. 64.8%; $p < .01$), eighteen years old (80.3% vs. 87.0%; $p = .14$). No significant difference was identified in the proportion of vegetarian and nonvegetarian students who identified as members of a racial minority group ($p = 0.50$). There was no difference in living arrangements between vegetarians and nonvegetarians, with the majority of students in both groups reporting living in campus residence halls (82.0% vs. 87.1%, $p = 0.25$).

Health, lifestyle, and environment perceptions

In Table 1, at baseline compared to nonvegetarians, vegetarian students had significantly lower SBP ($p < .01$), smaller hip circumference ($p = .04$), higher daily cup serving consumption of fruits and vegetables ($p < .0001$), lower percentage of energy obtained from fat ($p = .0032$), and higher PSS-14 scores ($p = .0325$) at baseline. There were no differences between vegetarians and nonvegetarians in BMI, waist circumference, DBP, IPAQ, EAT-26, PSQI scores, or weight intentions ($p > .05$).

Among follow-up assessments, there were similar findings of significant differences among the two groups with vegetarians having a lower BMI ($p < .01$), smaller hip circumference ($p < .05$), lower SBP ($p < .01$), higher NCI FV ($p < .01$), and lower NCI Fat ($p < .05$). Changes

in findings occurred with. A lack of significance among BMI ($p = .07$), waist circumference ($p = .23$), hip circumference ($p = .08$), DBP ($p = .10$), PSS-14 ($p = 0.17$), IPAQ ($p = .68$), and EAT-26 ($p = 0.32$).

As shown in Table 2, no significant differences were found between groups in campus environmental perceptions (CEPS), except for policy with vegetarians having a lower rating of perception of health policies on campus compared to non-vegetarians ($p = .044$).

Discussion

The prevalence of vegetarianism in our sample was 6.2% of 1115 individuals, which is comparable to the prevalence of vegetarianism reported within an earlier study examining early and middle adolescent vegetarians.⁸ A study from Perry et al study suggests that the prevalence of vegetarianism may remain constant throughout adolescence.⁸ These adolescent vegetarians were found to be significantly more likely to be female than nonvegetarians, a pattern that has been observed previously.³² Likewise, these results were recognized in our population.

The current body of evidence regarding mental health and vegetarianism reveals a complex and even contradictory set of relationships. In this study, two variables pertaining to students' mental health were included: stress levels, as measured by the PSS-14, and disordered eating behaviors, as measured by the EAT-26. Among PSS-14, vegetarians had significantly higher stress than their nonvegetarian counterparts. Many previous studies have observed an association between vegetarianism and poor mental health. Few studies have examined stress levels in this population, but vegetarians have been observed to contemplate and attempt suicide at higher rates than nonvegetarians and have a higher prevalence of depression, anxiety, eating disorders, and seasonal affective disorder.^{8,33–37} Oppositely, some randomized controlled trials have shown improvements in mood and stress levels in individuals who adopt a vegetarian diet, compared to those maintaining an omnivorous diet.^{38,39} Features of the vegetarian diet, such as nutrient content and level of consumption of certain fatty acids, have been suggested as contributing factors to the mental health of this population.^{35,39} It is also possible that certain personality factors predispose individuals to both mental health disorders and vegetarianism.

Regarding EAT-26 scores, there were no significant differences in scores between groups at baseline or follow-up assessment. Klopp et al. observed that college women had a significantly higher proportion of vegetarian women scored above 30 on the EAT, indicating eating disorder risk, in comparison to nonvegetarian women.⁴⁰ A study by Bardone-Cone et al found that women with a history of disordered eating were significantly more likely to have ever been or currently be vegetarian compared to women without a history of eating disorders.⁴¹ Adolescent and young adult vegetarians have been found to be more likely to be diagnosed with an eating disorder by a physician and to report disordered eating behaviors such as binge eating with loss of control, intentional vomiting, and laxative abuse.^{8,11,42} Similar relationships between vegetarianism and eating disorders have been observed cross-culturally.^{34,43–45} However, in opposition and along with our findings, a few studies have failed to identify any association between vegetarianism and disordered eating.

In a previous study of young adults, there was no difference between vegetarians, vegans, semi-vegetarians, and omnivores in EAT-26 scores, but other differences in eating behavior were observed. For instance, vegetarians had lower levels of external eating and were more willing to have and resist cravings than omnivores.¹³

A prospective justification for differing results among previous research is the heterogeneity of motivation for vegetarianism. Former studies have shown that individuals may adhere to a vegetarian diet due to various factors such as ethical reasons, personal health, desire to lose weight, environmental explanations, and/or religious beliefs.⁴⁶ The association between vegetarianism and disordered eating may only encompass the reasoning for a subset of vegetarians who maintain this diet for health or weight-related reasons. Some evidence suggests that individuals who have or are prone to eating disorders use the vegetarian diet as a mask for generalized diet restriction and disordered behaviors.⁴⁵ In this study, as in previous studies on vegetarianism and disordered eating, participants' motivations for adhering to a vegetarian diet were not explored. It is possible, however, that further examination of our population of vegetarians may find similar reasoning for adhering to this diet.

Albeit previous studies have reported an association between vegetarianism and higher levels of physical activity, vegetarians were found to participate in physical activity at the same rate as nonvegetarians when examining IPAQ scores.³⁶ In opposition to previously conducted studies, vegetarians were found to have a similar mean BMI as nonvegetarians. As no difference in physical activity levels was observed between vegetarians and nonvegetarians, the potential similarity of BMI could be related. However, it was observed that vegetarians consumed significantly more servings of fruits and/or vegetables per day and obtained a lower percentage of their daily caloric intake from fats than nonvegetarians. Additional cardiovascular benefits could be deduced from these findings with significantly lower SBP observed among vegetarian students in comparison to their nonvegetarian counterparts. Interestingly, this was the case despite the fact that vegetarian students did not appear to differ from nonvegetarians in regard to all measured non-dietary contributors to cardiovascular health, such as sleep quality and physical activity levels. The consumption of lower fat and higher fruit and vegetables may potentially explain the protective cardiovascular effects within the vegetarian group.

In our population, no significant differences were observed between vegetarians and nonvegetarians in any CEPS subscores other than policy with nonvegetarians expressing higher ratings of health policies on campus. These results are not especially surprising for the exercise section, given that no differences in physical activity levels were noted between vegetarian and nonvegetarian respondents. However, it is notable that no difference was observed between the two groups' mean food scores despite the reported differences in diet content. This suggests that the differences in dietary content are likely not due to differences in perceptions of their food environment. Among policy it may be deduced that vegetarians may expect or pay more attention to health policies on campus and are hyperaware of what they believe should be the amount.

In the present study, respondents were surveyed in the fall and spring of their first year of college, with the vast majority of students reported living in on-campus residence halls or dormitories. Universities often require students who select this type of housing to enroll in a prepaid meal plan, which allows the students to access dining halls and other selected food establishments across campus. As all students enrolled in a meal plan have access to the same variety of dining hall foods, some of the constraints that may influence vegetarianism in other populations, such as the ability to purchase produce and meat alternatives, may not apply in this setting. Both vegetarian and nonvegetarian students would also be expected to have approximately equal access to campus amenities, such as recreation centers, counseling services, and water fountains. This may be an explanation for the homogeneity of environment perceptions among vegetarians and nonvegetarians in this sample.

Although small differences in vegetarian and nonvegetarian health were shown the highlight of vegetarian students showing positive dietary patterns, which can be preventative against negative health outcomes, is ideal and should be of interest to campus administration. The promotion of vegetarian diets on campus can help to align college student diets with that of the Dietary Guidelines for Americans.⁴⁷ Historically, it is known the college students fail to adhere to these guidelines, specifically failing to meet the recommended intake of 5 servings a day of fruit and vegetables.^{48–50} Therefore, following a vegetarian diet on campus may help students to improve their diet and having campus support for such diets is essential. Further, as students in this study identified a greater need to campus policies to promote health, campus administrators can look to reevaluate health policies to make students more aware and the environment more in line with the health needs of students as currently vegetarian students see limitations in the environmental policies supporting health needs of students.

Limitations and future studies

As this study is not without limitations, we recognize that our vegetarian screening question did not provide a definition of vegetarianism and that students were not asked any additional questions about their vegetarian status beyond the initial screening question. Additional questions should ask the duration of dietary patterns. As such, the current questionnaire tools utilized to capture all data in this population took participants 45–60 minutes to complete, and consequently a registered dietitian 24-hour recall or validated recall tool to ensure vegetarianism was not given to reduce participant burden. Further, the NCI screeners may fail to capture certain vegetarian food items or lack reliability to capture true vegetarianism. Because of this, it is not known whether any semi-vegetarian students, such as those who restricted meat intake or were pescatarians, were included in the vegetarian group. Additionally, the percentages of different vegetarian subgroups (e.g. lacto-vegetarians, lacto-ovo-vegetarians) and vegans present within the vegetarian group are not known. It is possible that this lack of information may have some bearing on the results obtained from these data, as some vegetarian subgroups have previously been found to be significantly different from the general vegetarian population.⁷ There may also be differences among vegetarians based on the source of motivation to adhere to a vegetarian diet (e.g. health, religion, ethics). Thus, further studies are warranted to explore health outcomes in various

vegetarian subgroups as compared to the general population. Moving forward, it may be valuable to conduct a similar study focusing on students who primarily live off-campus, as such a sample would be expected to have more variation in environmental conditions. Environmental audit data would also be a useful addition to future analyses, as its inclusion would allow for comparison of the objective and perceived environment.

Conclusions

Vegetarian college students who responded to the Get Fruved baseline survey in fall 2015 appear to have heightened indicators of physical health, particularly in risk factors for cardiovascular disease than their nonvegetarian peers. Specifically, vegetarian students show positive dietary patterns that can promote positive health outcomes. Further, while vegetarian and nonvegetarian students had similar campus environmental perceptions, vegetarians highlight the need for policies on campus to promote health. However, the observed health differences are unlikely to be due to differences in perception of environmental conditions between vegetarians and nonvegetarians although more testing is needed.

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Table 1.

Selected demographic, health, and lifestyle characteristics of vegetarian and nonvegetarian students.

Variable	Nonvegetarians	Vegetarians
<i>Demographics</i>		
Female Sex	666 (64.8%)	52 (85.3%) [^]
18 years of age	894 (87.0%)	49 (80.3%)
Racial minority	424 (45.4%)	29 (50.0%)
Live on campus	890 (87.1%)	50 (82.0%)
<i>Baseline anthropometrics and behaviors</i>		
BMI (kg/m ²)	24.51 ± 4.93	23.08 ± 3.16
Waist circumference (cm)	79.42 ± 11.56	75.99 ± 8.15
Hip circumference (cm)	100.65 ± 10.49	97.49 ± 6.73 [*]
SBP (mmHg)	109.65 ± 12.83	104.64 ± 9.18 ^{**}
DBP (mmHg)	68.30 ± 8.83	66.56 ± 7.39
NCI FV ^a (cup equivalents)	2.39 ± 2.17	3.53 ± 2.60 [^]
NCI Fat ^b (% of daily caloric intake)	29.60 ± 2.30	28.99 ± 1.49 ^{**}
PSS-14 ^c	26.29 ± 6.04	28.08 ± 5.85 [*]
IPAQ ^d	2747.69 ± 1988.68	2541.20 ± 1729.18
EAT-26	7.79 ± 7.92	9.74 ± 8.42
<i>Follow-up anthropometrics and behaviors</i>		
BMI (kg/m ²)	24.74 ± 4.83	23.33 ± 3.18
Waist circumference (cm)	79.57 ± 11.03	76.79 ± 9.19
Hip circumference (cm)	101.49 ± 9.93	98.74 ± 7.12
SBP (mmHg)	109.86 ± 12.94	104.76 ± 8.10 ^{**}
DBP (mmHg)	67.77 ± 8.71	65.54 ± 7.25
NCI FV ^a (cup equivalents)	2.14 ± 1.75	3.49 ± 2.56 [^]
NCI Fat ^b (% of daily caloric intake)	29.79 ± 2.05	29.21 ± 1.57 [*]
PSS-14 ^c	26.88 ± 5.91	28.20 ± 6.69

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Variable	Nonvegetarians	Vegetarians
IPAQ ^d	2698.86 ± 2125.72	2517.59 ± 1975.23
EAT-26	7.26± 7.19	9.86 ± 9.84

^aNational Cancer Institute's Fruit and Vegetable Screener.

^bNational Cancer Institute Fat Percentage Screener.

^cPerceived Stress Scale.

^dInternational Physical Activity Questionnaire.

* $p < .05$.

** $p < 0.01$

[^] $p < 0.001$.

Table 2.

Perceptions of campus environment among vegetarian and nonvegetarian students at post-intervention.

Variable ^a	Nonvegetarians	Vegetarians
Healthy Food	13.53 ± 4.17	12.56 ± 5.08
Water	7.32 ± 1.17	7.27 ± 1.02
Physical Activity	19.88 ± 2.92	19.34 ± 3.14
Sleep	2.70 ± 1.55	2.52 ± 1.35
Stress	1.84 ± 1.18	1.70 ± 1.20
Policy	10.42 ± 4.34	9.28 ± 4.05 *
Vending	5.82 ± 1.63	5.65 ± 1.56

^a Maximum scores for each subscale are as follows: healthy food = 20 points, water = 12 points, physical activity = 24 points, sleep = 6 points, stress = 6 points, policy = 20 points, vending = 12 point.

* $p < .05$.