

Campus-Based Snack Food Vending Consumption

Michelle L. Caruso, MPH, RD¹; Elizabeth G. Klein, PhD, MPH²;
Gail Kaye, PhD, RD, LD, LPCC²

ABSTRACT

Objective: To evaluate the purchases of university vending machine clientele and to understand what consumers purchase, purchase motivations, and purchase frequency after implementation of a vending policy designed to promote access to healthier snack options.

Methods: Cross-sectional data collection from consumers at 8 campus vending machines purposefully selected from a list of highest-grossing machines. Vending machines were stocked with 28.5% green (choose most often), 43% yellow (occasionally), and 28.5% red (least often) food items.

Results: Consumers were predominately students (86%) and persons aged 18–24 years (71%). Red vending choices were overwhelmingly selected over healthier vending options (59%). Vended snack food selections were most influenced by hunger (42%) and convenience (41%). Most consumers (51%) frequented vending machines at least 1 time per week.

Conclusions and Implications: Despite decreased access to less healthful red snack food choices, consumers chose these snacks more frequently than healthier options in campus vending machines.

Key Words: nutrition, food policy, snacking, food choices, vending machines (*J Nutr Educ Behav.* 2014;46:401–405.)

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INTRODUCTION

Over two thirds of American adults are currently overweight or obese (69%).^{1–3} Although many factors are associated with the development of obesity, many consider energy imbalance—insufficient physical activity and excess energy consumption—to be the key contributor.⁴ Snacking has been implicated as a factor in overall energy imbalance.^{5–10} Increased snacking rates have been shown to increase overall energy intake, irrespective of physical activity.⁵ People who are obese snack more often and associate snacks with sweet, fatty foods more often than normal weight adults.⁵ In addition, snacks have been shown to exert only a weak satiety effect, regardless of macronutrient composition or timing.⁶ Also, energy consumed from snacks is not well compensated for at

meals, which leads to increased overall consumption.⁶

Snack foods are traditionally associated with fatty, salty, and sweet food choices, such as chips and cookies. These foods typically contain solid fats and added sugars, which make up one third of all calories in the average American diet.⁴ Many snack food products contain solid fats and added sugars, which makes them energy-dense, nutrient-poor choices. Evidence has shown that long-term consumption of energy-dense snack foods decreases sensory-specific and metabolic satiety signals.¹¹ Also, strong and consistent data indicate that low-energy, nutrient-dense dietary patterns improve weight loss and weight maintenance among adults.¹² Therefore, overall improvement of the food environment, especially availability of low-energy and nutrient-dense food options, is strongly recommended for

improved eating behaviors and healthy weight status.⁴

Food policy change is one way to affect the food environment and promote access to healthy food items. Vending machines are known to be a source of mostly unhealthy food choices.¹³ More recent attention has been paid to the measurement and regulation of vending to promote positive changes to the nutrition environment.¹⁴ Vending machine policy is a medium for change that has been shown to positively affect healthy snacking behaviors in many settings. In the workplace, healthy vending machine initiatives that include changes to the product availability and/or pricing have been shown to significantly decrease energy consumed from vended snacks.^{15–18}

Although vending machine policy has been effective in changing snack behaviors in a wide variety of settings, there is currently no published research investigating the vending snack behaviors of a university campus community. The Ohio State University adopted a snack vending policy designed to promote access to healthier snack options in 2008. The university used a nutrition rating program called Snackwise (Nationwide Children's Hospital, Columbus, OH) to calculate and categorize the vended snack items.

¹School of Public Health, University of Texas, Houston, TX

²Department of Health Behavior and Health Promotion, College of Public Health, Ohio State University, Columbus, OH

Address for correspondence: Michelle L. Caruso, MPH, RD, Houston Department of Health and Human Services, 8000 N. Stadium Drive, 8th Floor, Houston, TX 77054; Phone: (513) 602-0664; Fax: (832) 393-5259; E-mail: michellearuso.43@gmail.com

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The rating system is designed to limit sodium and calories while emphasizing nutrient density. Calculations are based on 11 parameters from the nutrition facts label: calories, fat, saturated/trans fat, sodium, fiber, sugar, protein, vitamin A, vitamin C, calcium, and iron. Composite scores for each snack item are then grouped into easily understood categories: green items should be chosen most often, yellow items should be chosen occasionally, and red should be chosen least often.¹⁹ As specified in the contract, the university mandated specific proportions of green, yellow, and red items in each vending machine across campus, with 28.5% green, 43% yellow, and 28.5% red items in most snack machines. Items within the vending machine with insignificant caloric and nutritional value, such as mints and gum, were excluded from the rating system and were not included in the proportional mandate. Although the intent of this policy was to favorably affect healthy snack choices, no data had been collected on who uses vending machines, how frequently they do so, what they purchase, or why.

METHODS

The design for this pilot study was a cross-sectional survey of vending consumers in a stratified purposive sample of 8 campus vending machines. Vending consumers were observed and surveyed by 38 trained undergraduate student researchers over a 2-week period. The Institutional Review Board at the Ohio State University reviewed and approved the protocol. All data collectors were taught observation and survey techniques in a 1-hour training session, and all interviewers completed Collaborative Institutional Training Initiative training and conflict of interest documentation.

Vending Machine Description and Selection

The vending company stocked all machines with the contract-specified ratio of red (28.5%), yellow (43%), and green (28.5%) snack food items. Comparable items from each rating category were similarly priced and were interspersed throughout the vending machine, with items from each rating category sharing space at

eye level. There was no point-of-sale indicator to inform consumers of each item's color rating.

The convenience sample of 8 vending machines was drawn from a selection of the highest-grossing vending machines in 2 types of buildings on campus: residential and classroom. Four machines from each building category were selected, and a total of 4 machines were evaluated during each of 2 data collection periods. Two of the 4 machines were in residential buildings: 1 in a high-percentage freshman building and 1 in a low-percentage freshman building. The remaining 2 machines were in classroom buildings: 1 in a high classroom seating capacity building and 1 in a low classroom seating capacity building.

All 4 vending machines in residence halls were on the first floor and next to a beverage vending machine. For 3 of the 4 residence halls, the vending machine evaluated was the only machine in the building; for 1 of the residence halls, an additional machine was in the laundry room. For classroom buildings, all 4 vending machines were next to a beverage machine: 3 were in the basement and 1 was on the first floor. For 2 of the classroom buildings (1 during each data collection period), an additional vending machine was located within the same building.

Data were collected during 2 collection periods over a 2-week period in April, 2010. During each data collection period, machines were observed by trained interviewers on Tuesday and Wednesday for 12 hours, between 7 AM and 7 PM each day.

Instruments

A brief intercept survey and observational checklist was developed for this project, consisting of 4 interview questions; it took no longer than 1 minute for participants to complete. Each interviewer followed a script to obtain verbal participant consent, and no personal information was collected from vending consumers. The interviewers observed and recorded vending item purchase and gender for every vending machine consumer. After the sale was completed, consumers were asked to give voluntary verbal consent to participate in the survey.

Variables measured included the observed vending choice, self-reported reason for vending choice (categorized as hunger, convenience, cost, taste, and other), and self-reported frequency of vending purchases (3 times/wk, 1–3 times/wk, 2 times/mo, 1 time/mo, and < 1 time/mo). Also collected were select observed and self-reported demographic variables, including gender, age (categorized as 18–24, 25–34, 35–44, 45–54, and ≥ 55 years), and university affiliation (student, staff, faculty, and other).

Data Analysis

The researchers analyzed data using descriptive statistics for all variables. Means and percentages were calculated to describe purchasing behavior for gender, age, university affiliation, vending choice, reason for choice, and frequency of vending purchases. A two-sample *t* test was used to evaluate differences between week 1 and week 2 data. Chi-square tests with an alpha level for statistical significance set at .05 were used to test differences by gender and age group in expected frequencies of the color of item purchased, frequency of purchase, and reason for purchase.

RESULTS

A total of 478 college campus vending consumers' purchases were observed over a 2-week period; 356 consumers participated in the optional questionnaire, an overall response rate of 74.4%. There were no statistically significant differences in observed demographics between those who did or did not participate in the questionnaire (data not shown). Although data were collected for different buildings during weeks 1 and 2 of data collection, there were no significant differences in university affiliation between the 2 data collection weeks; therefore, data for both weeks were pooled into 1 sample.

The largest categories of vending consumers consisted of students (86%) and persons aged 18–24 years (77%). Overall, females represented 55% of consumers and 45% were male (Table 1). From the Snackwise color-based rating system previously described, observed consumers

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