

## Factors Related to the Number of Fast Food Meals Obtained by College Meal Plan Students

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### Abstract:

**Objectives:** This study tested whether days on campus, financial access through a meal plan, and health consciousness were associated with number of meals that college students obtained from fast food restaurants. **Participants and Methods:** In April 2013, all students currently enrolled in a meal plan were invited to participate in an online survey ( $N= 1,246$ ). Students were asked to report the total number of meals eaten in the past week and where they obtained them. **Results:** Negative binomial regression was used, and it was found that the number of meals obtained from fast food restaurants was positively associated with financial access and negatively associated with health consciousness. An association between days on campus and the number of meals obtained from fast food restaurants was not found. **Conclusions:** Increasing levels of health consciousness and reducing access to fast food restaurants through flex plans may reduce college students' consumption of fast food.

**Keywords:** college students | fast food | meal plans | obesity

### Article:

Compared with other adults, young adults (aged 20 to 39) consume the most fast food.<sup>1</sup> Young adults obtain about 15% of their calories from fast food meals, whereas adults between the ages of 40 and 59 obtain 10.5% of their calories from fast food meals, and those aged 60 and older only 6%.<sup>1</sup> (As per the literature,<sup>2-5</sup> throughout this article and in our study, we include pizza restaurants in the category of fast food.) Studies specific to college students, many of whom are in the 20 to 29 age group, show that most consume at least 1 fast food meal a week,<sup>6</sup> and some consume as many as 6 to 8.<sup>7</sup> In one Vermont study, college students ate fast food 70% more often than non-college-attending adults within the same community.<sup>8</sup>

High rates of fast food patronage can be problematic because the consumption of fast food meals has been associated with a diet that is high in calories, saturated fat, sugar, and sodium,<sup>9</sup> as well as body fatness, weight gain, and increased body mass index (BMI).<sup>5,10,11</sup> The link appears to be a lack of compensation for the high calories consumed from the restaurant meals. A typical fast food meal contains more than 800 calories,<sup>12</sup> which for most adults exceeds 30% of their daily calorie needs (ie, if a person ate 3 times a day and required 1800 to 2000 calories a day, they would consume 400 to 600 extra calories because they did not adjust their later intake).<sup>13</sup> For example, a study of adolescents found that when they ate fast food, they did not compensate for the excess calories later in the day and had a net increase in calories, saturated fat, and sugar compared with days that they did not eat fast food meals.<sup>14</sup> Gerend<sup>6</sup> found that both male and female college students ordered fast food meals that were in excess of 900 calories when they ordered from an online menu. It is possible that college-aged students will not make caloric compensations after eating fast food meals.

Although frequent consumption of fast food meals by college students appears to put them at risk for obesity, there are gaps in our knowledge of what predicts fast food consumption among college students. One body of research suggests that fast food availability as measured by proximity to the restaurants and geographical density of the restaurants is a main driver of fast food meal consumption.<sup>5,10,11</sup> Research on primary schools and children<sup>15</sup> and home environments and adults<sup>16</sup> helped to establish this link. It is highly plausible that the relationship or mechanism of effect exists for college students because of fast food restaurant availability while on campus, but empirical studies are lacking in this particular population.

Fast food availability in a home or school environment is an environmental factor that may contribute to fast food meal consumption and obesity. Bonne-Heinoen et al<sup>16</sup> found a positive relationship between the number of fast food restaurants within a 0.5 mile radius of a person's home and the number of times a person had eaten at a fast food restaurant in the past week, whereas others have found that nearness to 1 or more fast food restaurants is associated with weight gain, percent body fat,<sup>15</sup> and BMI.<sup>17,18</sup> Some researchers use fast food restaurant proximity and density as a measure of exposure and find that exposure to fast food restaurants at home and work increase the risk for obesity.<sup>18</sup>

Another factor that has been associated with the number of fast food meals consumed by people in general and college students specifically is the financial accessibility of fast foods. The affordability of foods is associated with meal choice and foods sold from fast food outlets tend to contain ingredients that are cheaply available such that meals sold there are also inexpensive.<sup>19</sup> However, fast food access through meal plans is a newer phenomenon.<sup>20</sup> Driskell et al<sup>7</sup> found that cost was one of the main factors influencing dining choice in a sample of college students, and college students interviewed by Nelson et al<sup>20</sup> noted that the low cost of meals as well as access through meal plans were reasons to dine at fast food restaurants. Nelson et al<sup>20</sup> did not quantitatively examine the use of meal plan dollars; however, a recent study regarding secondary schools found that students enrolled in school lunch programs that accept debit cards consumed higher calorie diets than those that do not accept debit cards.<sup>21</sup> College meal plans offer similar prepaid cards, which allow students to pay for a fast food meal with a swipe. These plans increase a cardholder's financial access to meals in 2 ways: first, there is no time of

purchase financial outlay, and second, the dollars on the card will go further when spent on cheaper meals.

“Flex dollars,” as the external meal allowances are sometimes called, marry 2 of the most prominent factors related to fast food consumption: cost and convenience,<sup>7,22</sup> and are available at many colleges. The campus where the current study was conducted provides access to 6 on-campus and 2 off-campus fast food restaurants and allows students to purchase meals from them with their meal plan flex dollars. This arrangement is similar to other large or mid-sized universities. These university meal plans typically include a fixed number of unlimited dining hall meals, per week or semester, and varying amounts of flex dollars. It is possible to purchase a meal plan that does not include any prepaid dining hall meals (ie, a plan with only flex dollars). Flex dollars can be spent in the dining hall or at participating restaurants on or near campus. Flex dollars are a means of financial access to fast food meals and may be a factor related to consumption of them for college students. To our knowledge, no studies have examined access to fast food specifically through university meal plans and the amount of flex dollars on university meal plans. We consider flex dollars as a proxy for financial access in our study.

A third factor that may be associated with the number of fast food meals that college students and other adults consume is individual level of health consciousness, or how much a person adheres to dietary guidance on limiting calories and other nutrients that may be harmful in excess (eg, saturated fat, added sugar).<sup>9</sup> Ellison et al<sup>23</sup> found that adults, including college students, who are health conscious (ie, limit fat and calories and regularly read food labels) are less likely to consume high amounts of calories at restaurants. It is possible that health conscious people would also limit their consumption of fast food meals, as a recent national survey found that 86% of adults thought food served at fast food restaurants was either “not too good for you,” or “not at all good for you.”<sup>24</sup>

The goal of our research was to test whether the number of fast food meals obtained within the last week was associated with (1) the number of days spent on campus in the last week (we chose this measure because each time a student is on campus he or she is in an environment with high fast food restaurant availability (6 restaurants within 0.33 square miles), (2) financial access (as indicated by the amount of flex dollars on a purchased meal plan), or (3) the students’ level of health consciousness.

We hypothesized that students who spent more time on campus and students with more financial access through flex dollars would obtain a greater total number of meals from fast food restaurants than other students. By contrast, we hypothesized that students with higher levels of health consciousness would obtain fewer meals from fast food restaurants than other students. With regard to days on campus and flex dollars, we expected these to be associated with fast food meals obtained from on-campus restaurants. We did not expect days on campus or flex dollars to influence fast food meals obtained off campus because we expected that both factors (ie, a cluster of restaurants and meal plan access) were unique to the campus environment. To test these hypotheses, we analyzed total fast food meals, on-campus fast food meals and off-campus fast food meals separately.

## **METHODS**

## **Subjects and Procedures**

This study took place on the campus of a large, southeastern public university with a 2012 enrollment of over 18,000 students. The majority of students on the campus are female (65%) and white (61%), with an additional 23% of students identifying as black and 16% as another race or ethnicity (Hispanic, American Indian, Asian, multiracial). Twenty-four percent of enrolled students live in campus housing.

The university provides access to several food venues that accept meal plan flex dollars. This includes 6 on-campus fast food restaurants, 2 off-campus fast food restaurants, 5 other on-campus venues (eg, the university dining hall, convenient stores, mini-market), and 1 off-campus sit down/table restaurant. Before beginning the study, the research team received approval for all study materials and methods from the university's Internal Review Board.

At the start of the second week of April 2013, we invited students currently enrolled in a university meal plan to complete a brief, Web-based survey ( $N = 5,441$ ). The survey was available for 3 weeks, and as an incentive students could enter a drawing for 1 of 5 \$100 gift cards. We received 1,246 surveys (24% response rate). The response rate by meal plan type was similar to rates of meal plan enrollment (eg, 32% of meal plan students were enrolled in the unlimited dining hall plan and 29% of the students who completed the survey had the unlimited meal plan). The main purpose of the survey was to identify where the students obtained the meals that they consumed the week before; therefore, we excluded 191 persons who did not provide any venue information about their meals. We included only cases where the student recorded at least 1 meal per day and no more than 10 meals per day (ie, a total of 7 to 70). This led to the removal of 82 additional cases. Our final sample size for analysis was 973. The majority of respondents were female (81%), self-identified as white (54%), black (31%), or Latino, Asian, and other (15%), were full time students (97%), and lived in campus housing (81%). The majority of students were 18 (15%), 19 (30%), 20 (25%), and 21 (16%) years old, with a range of 18 to 64.

## **Measures**

### **Dependent Variables**

We asked students to report the number of breakfast, lunch, dinner, and other meals they had eaten in the past 7 days, not including times when they only had a beverage. Students were then asked follow-up questions about how many of these meals came from each of 9 different venues. This study focused on 2 venues: “fast food place that serves mostly fried foods, burgers, or chicken,”<sup>3,16</sup> and “pizza restaurant with delivery or counter service.” We created 3 variables to indicate the number of fast food meals obtained in total, from on-campus venues and from off-campus venues.

### **Predictor Variables**

We hypothesized that days on campus (ie, fast food restaurant availability), flex dollars, and health consciousness would be associated with the number of meals obtained from fast food restaurants.

*Number of days on campus.* We asked students, “During the past 7 days, how many days did you spend time on campus (0 to 7 days)?” (We were unable to use multiple campuses with varying levels of fast food availability for this preliminary study; therefore, we varied dose by measuring the number of days a student was in this environment with close proximity to a number [6 within 0.33 square miles] of fast food restaurants. Our study is similar to others<sup>25,26</sup> in that it assumes that the sample was in fact exposed to the restaurants when they were in the particular environment.)

*Number of flex dollars on the meal plan.* We operationalized financial access as the number of flex dollars on a purchased meal plan, which ranged from \$100 to \$1,050 across 9 available meal plans. We rescaled this variable as hundreds of dollars (ie, each unit increase = \$100 not \$1).

*Health consciousness.* We operationalized (dietary) health consciousness using a modified version of Ellison et al's health consciousness scale.<sup>23</sup> The original scale contained 3 items. It asked respondents to rate how much each of 3 statements is like them (ie, “I try to monitor the number of calories I eat in a day,” “I try to avoid high levels of fat in my diet,” and “I spend time looking at nutritional labels when shopping for my food.”) Due to recommendations for Americans to specifically limit saturated fat intake,<sup>9</sup> we added 1 item, “I try to avoid high levels of saturated fat in my diet.” Responses ranged from 0 “not at all like me,” to 3 “exactly like me.” We averaged all 4 health consciousness items ( $\alpha = .88$ ).

## **Control Variables**

To examine financial access specific to the meal plan flex dollars, we controlled for income and asked students how many hours they worked each week for pay (“none,” “10 or less,” “11 to 20,” “21 to 32,” “more than 32”). We recoded work hours at the mean (ie, 0 = 0, 1 = 5, 2 = 15, 3 = 26) and capped it at 4 = 33, as only 2% of our sample chose this category. We used work hours as an interval variable. To examine the amount of flex dollars, separate from other factors that may be related to the meal plans, we included variables indicating the number of years a student had been enrolled at the university, the number of dining hall meals (nonflex) included on their meal plan (ie, meal allowance) and whether or not the student lived on campus. (We controlled for campus housing in order to partial out its association with days on campus. In a partial correlation analysis, the relationships between days on campus and on-campus fast food restaurant meal purchases and days on campus and off-campus fast food restaurant meal purchases were significant but attenuated when controlling for living in campus housing. The bivariate relationship between days on campus and total fast food restaurant meal purchases was not significant.) We asked students the number of years they had been enrolled (0 to 5+ years), to select their meal plan type, and to indicate their living arrangement. We created a meals per week variable that ranged from 0 to 24 meals per week (24 per week is 3.5 meals per day) and a dummy variable indicating whether the student lived in campus housing (campus housing = 1). Years of enrollment was included because as years increase, residential students receive more flexibility in which meal plan they can purchase, but all residential students must purchase a

meal plan. With time, students are able to purchase plans that have less dining hall meals and more flex dollars.

We controlled for stress because it has been associated with overeating and consuming calorically dense meals.<sup>25</sup> To measure stress, we used an item from the National College Health Association.<sup>26</sup> We asked, “In the *past 7 days*, how would you rate the overall level of stress you have experienced?” (0 = *no stress* to 4 = *tremendous stress*). We modified the question to ask about the past 7 days instead of the past year. Studies have also shown differences in fast food consumption by race<sup>27</sup> and sex.<sup>4</sup> We asked students to identify their sex (Female = 1). Lastly, we asked students with which race or ethnicity they identified (“black or African American,” “white or European American,” “Latino[a],” “Asian,” and “other”). We used white as the referent category in our regression models and grouped Latino(a), Asian, and other into the other category based on low percentages in each.

### Statistical Analysis

We completed analyses with the statistical software program IBM SPSS Statistics version 20 (IBM Corp., Armonk, New York). We provide descriptive statistics, including means (*SD*) and medians, for our main study variables, and bivariate correlations between our predictor and dependent variables.

The number of meals obtained from fast food restaurants was a count variable. The data were over dispersed (ie, the mean did not equal the variance), making them a better fit for a negative binomial distribution rather than the Poisson distribution.<sup>28</sup> The dependent variable was log transformed during the regression analysis. We exponentiated or back logged the betas for easier interpretation (eg, an  $\exp(b)$  of 1.15 indicates a 15% increase in the number of meals obtained for every unit increase in the related factor; the  $\exp(b)$  is the incident rate ratio).

### RESULTS

The median total number of meals obtained from fast food restaurants was 3 (range = 0 to 32). Table 1 displays additional information on the meals obtained as well as descriptives for our main study variables.

Meal characteristic	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Mdn</i>
Total meals recorded in 7 day recall	973	19.71	8.21	19
Fast food/pizza meals obtained total	973	4.38	4.70	3
Fast food/pizza meals obtained on campus	973	2.90	3.96	1
Fast food/pizza meals obtained off campus	973	1.48	2.82	0
Days spent on campus	969	6.13	1.28	7
Flex plan in \$100s	948	3.83	2.84	4
Health consciousness score	943	1.16	1.16	1

We present the bivariate correlations in Table 2. Days on campus was positively associated with fast food meals obtained on campus ( $r = .11, p < .001$ ) and negatively associated with those

obtained off campus ( $r = -.23, p < .001$ ). Given these opposite associations, there was no bivariate relationship between days on campus and total fast food meals obtained. The amount of flex dollars on a meal plan was positively associated with fast food meals obtained in all situations and health consciousness was negatively associated with number of fast food meals.

**TABLE 2. Correlation Matrix**

	Fast food/ pizza total	Fast food/ pizza on campus	Fast food/ pizza off campus	Days on campus	Flex plan in \$100s
Fast food/pizza total	—				
Fast food/pizza on campus	.78**	—			
Fast food/pizza off campus	.52**	-.06	—		
Days on campus	-.05	.11**	-.23**	—	
Flex plan in \$100s	.30**	.25**	.14**	-.01	—
Health consciousness	-.20**	-.15**	-.11**	-.04	-.72*

\*\*Correlation is significant at the .01 level (2-tailed).

\*Correlation is significant at the .05 level (2-tailed).

We tested whether days on campus, flex dollars, and health consciousness were associated with the number of meals that college students obtained from fast food restaurants with 3 negative binomial regression models. We used the following as covariates: race, sex, residential status (campus housing), stress level, hours worked for pay, meal allowance, years of enrollment, and total meals eaten in the past 7 days either on campus, off campus, or both. We present the exponentiated betas, *SEs*, and confidence intervals in Table 3.

**TABLE 3. Results of Negative Binomial Analysis on Fast Food and Pizza Consumption (N = 875)**

Variable	Model 1				Model 2				Model 3			
	Number of fast food meals obtained in total				Number of fast food meals obtained on campus				Number of fast food meals obtained off campus			
	<i>B</i>	<i>SE</i>	exp( <i>b</i> )	95% CI	<i>B</i>	<i>SE</i>	exp( <i>b</i> )	95% CI	<i>B</i>	<i>SE</i>	exp( <i>b</i> )	95% CI
Black	0.25**	0.08	1.29	1.10, 1.51	0.29**	0.10	1.33	1.09, 1.63	0.18	0.13	1.19	0.93, 1.53
Other	-0.02	0.11	0.979	0.80, 1.20	0.02	0.13	1.02	0.79, 1.32	-0.21	0.18	0.81	0.57, 1.15
Female	0.01	0.09	1.01	0.84, 1.20	0.05	0.12	1.05	0.84, 1.31	-0.15	0.15	0.86	0.65, 1.15
Campus housing	0.08	0.13	1.09	0.84, 1.14	0.17	0.17	1.19	0.86, 1.65	0.07	0.22	1.07	0.70, 1.65
Level of stress	0.04	0.04	1.04	0.96, 1.13	0.05	0.05	1.05	0.84, 1.31	0.06	0.06	1.07	0.94, 1.21
Hours worked	0.01*	0.00	1.01	1.00, 1.02	0.01	0.01	1.01	1.00, 1.02	0.02*	0.01	1.02	1.00, 1.03
Meal allowance	-0.08*	0.04	0.92	0.86, 0.99	-0.10*	0.04	0.90	0.83, 0.99	-0.05	0.06	0.96	0.85, 1.07
Years of enrollment	-0.01	0.04	0.99	0.92, 1.07	-0.02	0.05	0.98	0.88, 1.09	0.01	0.06	1.01	0.89, 1.14
Total meals <sup>a</sup>	0.04**	0.00	1.04	1.03, 1.05	0.07**	0.01	1.07	1.06, 1.08	0.13**	0.01	1.14	1.12, 1.16
Days on campus	-0.02	0.03	0.99	0.93, 1.05	0.04	0.04	1.04	0.96, 1.12	-0.07	0.05	0.93	0.85, 1.02
Flex plan in \$100s	0.05*	0.02	1.05	1.01, 1.09	0.05*	0.02	1.05	1.00, 1.11	0.06*	0.03	1.06	1.00, 1.13
Health consciousness	-0.26**	0.04	0.77	0.71, .084	-0.23**	0.05	0.80	0.72, 0.89	-0.36**	0.07	0.70	0.61, 0.80

Note. CI = confidence interval.

<sup>a</sup>Total meals on campus, off campus, and both as indicated.

\* $p < .05$ ; \*\* $p < .01$ .

## Days on Campus

We found no significant association between the number of days spent on campus and the outcome variables (ie, total fast food meals ( $\text{exp}(b)_{\text{days}} = .99, p = .63$ ), on-campus fast food meals ( $\text{exp}(b)_{\text{days}} = 1.04, p = .38$ ), off-campus fast food meals ( $\text{exp}(b)_{\text{days}} = .93, p = .13$ ).

## Flex Dollars

We found a positive association between the amount of flex dollars purchased on a meal plan and total meals obtained from fast food restaurants ( $\exp(b)_{\text{flex}\$} = 1.05, p = .01$ ). Total meals from fast food restaurants increased by 5% for every \$100 flex dollars. We also found a positive association between the amount of flex dollars on a meal plan and meals obtained from fast food restaurants on campus ( $\exp(b)_{\text{flex}\$} = 1.05, p = .01$ ) and off campus ( $\exp(b)_{\text{flex}\$} = 1.06, p = .05$ ).

## Health Consciousness

We found a negative association between health consciousness and total meals obtained from fast food restaurants ( $\exp(b)_{\text{health consciousness}} = .77, p < .001$ ). For every 1-point increase in the level of health consciousness, meals obtained from fast food restaurants decreased by 23%. We also found a negative association between health consciousness and meals obtained from fast food restaurants on campus ( $\exp(b)_{\text{health consciousness}} = .80, p < .001$ ) and off campus ( $\exp(b)_{\text{health consciousness}} = .70, p < .001$ ).

## Other Significant Findings

We found significant results for a few of our covariates as well. In our sample, black students obtained 29% more fast food meals than white students in total ( $\exp(b)_{\text{race}} = 1.29, p = .002$ ) and 33% more on campus ( $\exp(b)_{\text{race}} = 1.33, p = .004$ ). Hours worked was positively associated with fast food meals in total and off campus; however, the magnitude of the effect was small. For every additional hour worked, meals obtained from fast food restaurants increased 1% in total ( $\exp(b)_{\text{hours worked}} = 1.01, p = .005$ ) and 2% off campus ( $\exp(b)_{\text{hours worked}} = 1.02, p = .012$ ). Students who had higher meal allowances (ie, meals per week at the dining hall) obtained less meals from fast food restaurants, in total ( $\exp(b)_{\text{meal allowance}} = .92, p = .03$ ) and on campus ( $\exp(b)_{\text{meal allowance}} = .90, p = .02$ ). Lastly, students who consumed more total meals also consumed more fast food meals in total ( $\exp(b)_{\text{total meals}} = 1.04, p < .001$ ), on campus ( $\exp(b)_{\text{total meals}} = 1.07, p < .001$ ), and off campus ( $\exp(b)_{\text{total meals}} = 1.14, p < .001$ ).

## COMMENT

We did not find support for our hypothesis that the number of days spent on campus (ie, fast food restaurant availability) was associated with the number of meals obtained from fast food restaurants. In other words, spending more time on campus was associated with a higher number of meals, but the proportion of those meals from fast food restaurants did not increase. We did find evidence to support our hypotheses regarding financial access and health consciousness. Our study supports the finding of others in regards to fast food consumption and race,<sup>27</sup> but not sex.<sup>4</sup> In addition, we adjusted for income (hours worked) in order to isolate financial access through flex dollars, but hours worked was independently associated with fast food meals. This finding is supported in the literature.<sup>19</sup> It is possible that people who work have more discretionary income and less time to prepare meals. It also makes sense that the more meals a student receives at the dining hall (meal allowance), the less meals he or she would need to



obtain outside of the dining hall, and as the number of meals from all sources increases, so would the number from fast food restaurants.

Students in our sample may have had a higher than average rate of fast food meal consumption than similar-aged adults, putting them at risk for obesity. Students in our sample obtained about 23% of their meals from fast food restaurants (mean total fast food meals/mean total meals), which implies that 23% of their calories are in the form of fast food. This is higher than the amount noted in a Centers for Disease Control and Prevention study, which found that this age group receives 15% of their daily calories from fast food.<sup>1</sup> Half of the students in this sample reported obtaining 3 or more meals from fast food restaurants per week. Jeffrey et al<sup>29</sup> found higher BMIs in persons who dined at fast food restaurants as little as once a week, and Pereira et al<sup>30</sup> found that young adults who dined at fast food restaurants 3 or more times a week gained about 10 pounds more over 15 years than those who ate at fast food restaurants less than once a week.

Health consciousness (defined here as monitoring calories, limiting fats, and reading nutrition labels) may offer a protective effect against frequent fast food consumption. Our results only indicate that fast food meals and health consciousness are correlated. We do not know if one item, eg, monitoring calories, is more important than another, eg, reading nutrition labels, or if having a higher level of health consciousness causes someone to limit the number of meals from fast food restaurants. However, these results suggest that one avenue for intervention research could explore whether increasing health consciousness among college students reduces their fast food meal consumption. Health consciousness could also affect choices made at other restaurants. Emerging research suggests that meals obtained from quick service, fast food, pizza, fast casual, table service, and independent restaurants all provide excess calories, sodium, sugar, and fat.<sup>13,31</sup> In addition, menu labeling could be used to decrease the amount of calories consumed from restaurant foods. Research suggests that providing calorie information at the point of purchase leads some college students to make healthier (ie, less calories, fat, and sugar) choices.<sup>6</sup> There have also been several systematic reviews on menu labeling (see Kiszko and Abrams<sup>32</sup> for the most recent).

## **Limitations**

Our work has some limitations. Regarding fast food restaurant availability, there are several reasons why the number of days spent on campus may not have led to an increase in number of “on-campus” fast food meals obtained in our sample. First, we assumed that the high density of fast food restaurants was unique to the campus environment and that being on campus more often would equal more availability. It is possible, however, that this specific geographical area is itself dense with fast food restaurants and that time on campus does not actually increase availability of this type of restaurant; in other words, students have a high availability of fast food restaurants whether they are on campus or not. In addition, the limited range in number of days spent on campus and the nearness of most off-campus students to campus may have created an almost constant fast food restaurant availability for those participating in this study. The average number of days students reported spending on campus the week of our survey was 6 (out of 7), and 92% of the respondents lived on or within 2 miles of campus, indicating very little variance in our predictor of availability. Our findings may reflect the recent observation of Hoy

and Wansick<sup>33</sup> that 75% of meals are obtained from within 3 miles of a person's home. Nearly all of the students who took part in the survey lived within 2 miles of the campus. In the future, researchers could assess the impact of exposure to fast food restaurants by comparing college campuses with varying numbers of fast food restaurants.

Even if fast food restaurant availability was not different on and off campus, financial access through flex dollars was (6 outlets vs 2), and yet we found that the amount of flex dollars purchased at the start of the semester was positively associated with the number of fast food meals obtained in total and on and off campus. We did not expect flex dollars to be associated with an increase in fast food meals off campus. There are several possible explanations for this association. One plausible explanation for the off-campus relationship may be related to personal characteristics of students who purchase meal plans with high amounts of flex dollars. Although flex dollars can be used in the dining hall and mini-markets, it is possible that students who chose meal plans with higher amounts of flex dollars did so because they like to eat fast food (or their friends do, and they like to eat with their friends). It is also possible that students who purchase a higher number of flex dollars believe that fast food restaurants offer more economic value; therefore, they purchase a plan that provides them with greater access to these meals. It could be that these other factors are driving the association, not the flex dollars themselves. We are not able to rule out these other factors in the current study, but future studies should collect information on individual level factors such as personal and social preferences around eating.

Another issue with the flex dollar allowance is that it may not be a reliable measure of financial access. The range of flex dollars, \$100 to \$1,050, was the amount available at the start of the semester, but our study took place during the final 4 weeks when the level of the predictor was likely to be different. It is possible that a person who purchased a high flex allowance had less financial access (flex dollars) at the time of the study than a person who purchased a low flex allowance. In future studies, operationalizing financial access as the amount of flex dollars available at the time of the study would allow researchers to more reliably assess the association between financial access and fast food meals.

Some caution is suggested regarding generalizability and interpretation of results. First, our study occurred at 1 southeastern university and may not represent the behavior of students at other universities or students not on a meal plan. Second, we do not know if the 7 days of meals that students recalled were typical, nor if the students consumed excess calories, sugar, or saturated fats by eating at fast food restaurants (the link between consumption and weight gain). We asked students to provide only 7 days of information, which increases the reliability of their recall compared with a longer recall period. It is possible that some persons were having unusual weeks, but a 7-day time frame provided an adequate measure of group averages.<sup>34</sup> We asked students to tell us meal location, not content. We believe that this reduced error related to social desirability bias, suggesting that, mistakes and survey design flaws withstanding, the food source information is reliable. Twenty-three percent of student meals came from fast food restaurants, but we do not know if this is leading to excess overall or per meal calorie consumption in our sample. The research of others has found that the average fast food meal purchased by college students contains more than 900 calories.<sup>6</sup> Additional research is needed to assess this important outcome. A next step could be to conduct an intercept study at on-campus restaurants, as has been done for chain restaurants in New York City.<sup>35</sup> In an intercept study, researchers could

collect sales receipts in order to calculate the number of calories purchased per meal. We recommend that future research also include a more representative sample and compare meal plan versus non-meal plan students.

## **Conclusions and Recommendations**

Frequent consumption of fast food meals may lead to the overconsumption of calories, saturated fat, sugar, and sodium, weight gain, and obesity.<sup>5,10,11</sup> College students may be at increased risk for these adverse outcomes due to the availability of multiple quick service and fast food restaurants both on and off campus and the ability to access them with their student meal plans. In its Standards of Practice for Health Promotion in Higher Education,<sup>36</sup> the American College Health Association (ACHA) notes that an institution of higher learning is a community and a socioecological approach to influence health—including public policy—is appropriate. The ACHA also produces a brochure that offers advice on how to choose healthier meals at fast food restaurants, suggesting that this is already a concern of the ACHA. For this reason, we suggest that college departments consider several policies related to the food environment when planning for the success of their students (eg, type of restaurants located on campus, meal plan access to fast food restaurants, menu labeling on site at all eateries).

In our sample, level of health consciousness based on 4 specific dietary health behaviors was consistently associated with obtaining fewer meals from fast food restaurants and could be an important individual level factor. College administrators could promote and expand menu labeling for all campus eating venues (to increase awareness of caloric amounts), and student wellness staff could implement educational programs that raise health consciousness by focusing on the importance of consuming nutritious, calorie-appropriate foods and using nutrition labels to do so.

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## **CONFLICT OF INTEREST DISCLOSURE**

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements,

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