

Short Communication

College cafeteria snack food purchases become less healthy with each passing week of the semester

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Abstract

Objective: Snacks, stress and parties all contribute to the weight gain – the elusive ‘Freshman 15’ – that some college-goers unfortunately experience. The present study examines how à la carte snack choice changes on a university campus during each progressing week of the academic calendar.

Design: How à la carte snack choices change on a university campus with each progressing week of the academic calendar was examined.

Setting: The data were collected from three large cafeterias (or dining halls) on Cornell University’s campus during four semesters (Fall 2006, Spring 2007, Fall 2007 and Spring 2008), for 18 weeks in each semester.

Subjects: After the à la carte snack items were divided into healthy snacks and unhealthy snacks, the percentage share for each food category was calculated.

Results: Within each semester, the unhealthy snack food choices increased consistently by 0.4% per week ($\beta = 0.00418$, $P < 0.01$). Furthermore, a sharp (8%) increase occurred in the final two weeks of the semester. In contrast, healthy snack food choices decreased by almost 4% ($\beta = -0.0408$, $P < 0.01$) in the final two weeks during the fall semester.

Conclusions: These results demonstrate an increased demand for hedonic, or unhealthy, snack foods as the college semester progresses and in particular at the very end of the semester. To counter this tendency towards unhealthy snacking, cafeterias and stores should make extra effort to promote healthy alternatives during the later weeks of the semester.

Keywords
Food purchases
Snack choice
Stress
Food choice
College cafeterias

For each year’s 2.6 million first-year college students or freshmen, the new school year holds many promises. One of these is that they will gain weight^(1,2). Consider the apocryphal referral to the ‘Freshman 15’ – the number of pounds a freshman is believed to gain. Although this particular number has been empirically elusive, studies have always shown it to be high. Contributing to this weight gain is the increased availability of snacks, buffets, parties⁽³⁾ and stress such as academic examinations⁽⁴⁾. One key measure of intake change that is consistent across time and can be isolated to college students is the purchases of à la carte food choices on campus. The present study examines how healthy *v.* unhealthy snack choices change in university campus cafeterias with each progressing week of the academic calendar.

As one’s prior habits or one’s summertime resolve fades, it is not clear how the healthfulness of one’s eating – the purchases of à la carte snacks – would evolve over the school year. One of many indicators of this might be what

occurs as one is placed under increasing levels of stress, which might increase with the progression of the semester. The majority of research suggests that stress is associated with a hyperphagic response^(1–8) and could contribute to weight gain^(1,2). In fact, Oaten and Cheng found that students who were taking academic examinations reported a decrease in healthy eating (eating more ‘junk food’) compared with students who did not have examinations⁽⁴⁾. Because students are more stressed during the final weeks in which several major exams and papers must be completed, this effect could become even more exaggerated during these final weeks.

The purpose of the present study was to examine what happens to dietary choices – as measured by à la carte snack purchases in college cafeterias – over the weekly progression of fall and spring semesters. While changes in choice or purchases could be influenced by many factors – including the rhythmic change of stress – the objective is not to isolate the cause, but to importantly

Table 1 Prices and nutritional values for the top three most purchased healthy snack food items, unhealthy snack food items, sandwiches and other food items; Cornell University campus (Ithaca, NY, USA), during four semesters (Fall 2006, Spring 2007, Fall 2007 and Spring 2008)

	Price (\$US)	Energy (kJ)	Energy (kcal)	Total fat (g)	Cholesterol (mg)	Na (mg)
Top three healthy snack food items						
Yoghurt*	1.49	669	160	1.5	10	110
Fresh fruit cup	2.29	293	70	0	0	15
Granola bar	1.95	586	140	4	0	95
Top three unhealthy snack food items						
Potato chipst	2.31	3527	843	46	7	1384
Curly fries	1.59	1406	336	18	0	788
Chicken fingers	5.39	2678	640	38	70	1590
Top three sandwiches						
Slice pizza†	2.49	1590	380	14	30	1040
Bacon cheeseburger	4.59	820	196	1.4	60	546
Grilled chicken sandwich	4.29	1757	420	10	70	1190
Top three other food items						
Cookies§	3.02	975	233	12	12	188
Jumbo muffins	1.59	1590	380	19	70	380
Soup	1.89	314	75	2.8	10	945

*There are six flavours of yoghurt: Blueberry, Cherry, Lemon, Raspberry, Strawberry, Strawberry/Banana.

†There are five flavours of chips: Kettle, Ranch, Regular, Salt and Vinegar, Sour Cream and Onion.

‡There are three types of pizza: Cheese, Pepperoni and Plain.

§There are twenty-eight types of cookie such as Chocolate Chips Cookie and Ginger Snaps Cookie.

||There are seven types of soup: Chicken, Chicken Noodle, Chicken and Vegetables, Mushroom, Potato, Tomato, Vegetables.

determine whether there is a systematic difference over the semester and whether this persists over both fall and spring semesters. Understanding such trends could lead to useful healthier promotion strategies for responsible food service directors; for instance, food service directors could identify when they should especially encourage college cafeteria patrons to purchase healthy over unhealthy snack foods.

Methods

The data were collected from the three largest cafeterias (or dining halls) on Cornell University's campus during four semesters (Fall 2006, Spring 2007, Fall 2007 and Spring 2008) for 18 weeks in each semester. The cafeterias are run by Cornell University Dining Services and their electronic transaction system provides receipts for each item sold.

To begin coding the voluminous sales data, the total amount sold for each single item was recorded in these cafeterias. Based on agreement with two independent registered dietitians, the à la carte food items were divided into four groups: (i) healthy snacks; (ii) unhealthy snacks; (iii) sandwiches; and (iv) others. We defined snacks that contain low amounts of fat, cholesterol and Na as healthy snacks, whereas snacks that contain high amounts of fat, cholesterol and Na as unhealthy snacks. More specifically, healthy snack foods consisted of items such as yoghurt, fruit and salad such as chicken salad and tossed salad. Unhealthy snack foods consisted of items such as potato chips, chicken fingers, candy and ice cream. Sandwiches and others consisted of items that

many students consume as main dishes such as cheeseburger, slice pizza, soup and muffin. Prices and nutritional values for the three most purchased food items in each category are indicated in Table 1. Percentage share for each food category was calculated as the ratio between the number of servings sold for the group and the total number of servings sold for all the items. Simple panel regressions for healthy and unhealthy snack food purchases were conducted. The explanatory variables used were two dummies, 'first weeks' sales' and 'last weeks' sales', indicating the first two weeks and the last two weeks for the semester, respectively. The time trend variable 'week' was also included to capture the within-semester change in purchases. The Cornell University Institutional Review Board approved all study procedures.

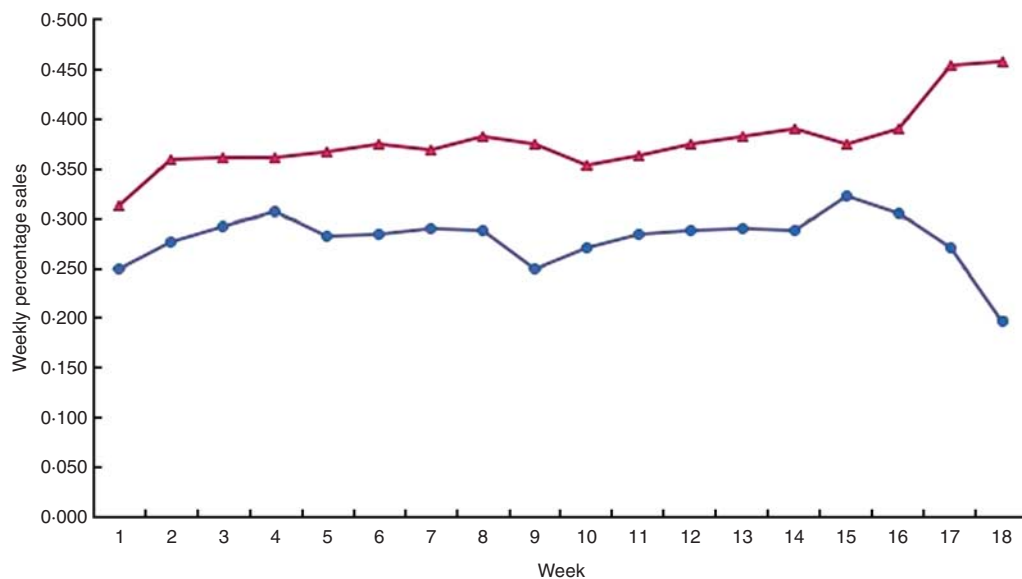
Results

As each semester proceeded, people bought more and more healthy snack foods (increase of 32.04 items each week) and unhealthy snack foods (increase of 73.69 items each week). More importantly, however, purchases of healthy snacks represented 22% of the entire purchases in each time period (21% in fall and 22% in spring). Unhealthy snacks, on the other hand, represented 44% of purchases (43% in fall and 45.5% in spring). The average purchases of sandwiches and other miscellaneous items were stable at 18% and 16%, respectively.

Results of a panel regression (shown in the top part of Table 2) indicated that within semesters, the purchases of healthy snacks decreased over the course of the

Table 2 Panel regression of percentage sales of healthy and less healthy food; Cornell University campus (Ithaca, NY, USA), during four semesters (Fall 2006, Spring 2007, Fall 2007 and Spring 2008)

	Both semesters			Fall semester			Spring semester		
	β	t	P	β	t	P	β	t	P
Healthy food									
Constant	0.21	27.12	<0.001	0.23	27.63	<0.001	0.19	25.35	<0.001
Week	0.0002	0.35	0.73	-0.002	-2.38	0.002	0.003	4.04	<0.001
First weeks' sales	-0.01	-0.98	0.33	-0.03	-1.91	0.07	0.009	0.72	0.48
Last weeks' sales	-0.04	-4.3	<0.001	-0.04	-3.52	<0.001	-0.04	-4.19	<0.001
Observations	72			36			36		
R^2	0.40			0.56			0.56		
Unhealthy food									
Constant	0.39	42.11	<0.001	0.37	30.91	<0.001	0.46	51.57	<0.001
Week	0.004	5.41	<0.001	0.006	5.40	<0.001	0.002	1.98	0.06
First weeks' sales	0.02	1.28	0.20	0.04	1.85	0.07	-0.006	-0.37	0.71
Last weeks' sales	0.08	6.85	<0.001	0.05	3.14	<0.001	0.10	8.25	<0.001
Observations	72			36			36		
R^2	0.78			0.73			0.86		

**Fig. 1** (colour online) Weekly percentage shares of healthy (—●—) and unhealthy food (—▲—) for both semesters; data collected from sales receipts in three large cafeterias/dining halls, Cornell University campus (Ithaca, NY, USA), during four semesters (Fall 2006, Spring 2007, Fall 2007 and Spring 2008), for 18 weeks in each semester

fall semester, but increased over the course of the spring semester ($P = 0.002$ and $P < 0.01$, respectively). However, a much more substantial change occurred in the final two weeks, when the purchases decreased by almost 4% ($\beta = -0.0408$, $P < 0.001$) compared with earlier weeks. This suggests that higher stress during the end of the semester potentially drove the dietary choice further from healthy food. Regressions for the fall semesters (column 2) and spring semesters (column 3) suggest that the effect was stronger in the spring semesters. However, given the potential for seasonal confounds, these results must be interpreted with care.

In contrast, unhealthy snack food purchases (shown in the bottom part of Table 2) suggested just the opposite

trend. Within semesters, the unhealthy snack food choices increased significantly about 0.4% week by week ($\beta = 0.00418$, $P < 0.001$). Furthermore, a sharp (8%) increase occurred in the final two weeks of the semester. In addition, significant increases were observed in the last two weeks of both spring and fall semesters. Weekly average percentage purchases of healthy and unhealthy foods for all four semesters are depicted in Fig. 1.

Discussion

The objective of the present research was to document how the purchases of healthy foods and unhealthy foods

changed across the rhythm of the semester. The results demonstrated an increased demand for unhealthy snacks as the college semester progressed. This was particularly strong during the very end of the semester, which is often associated with exams and deadlines for term papers. Moreover, in addition to purchasing more unhealthy snack foods, college students also purchased less of the healthier snack foods during the final weeks of the semester.

Although we were not able to measure any potential factors that caused those changes, it might be possible that college students made more unhealthy snack food choices because of the stress associated with several major exams and paper dues. Namely, as Oaten and Cheng⁽⁴⁾ found, the patrons at college cafeterias exhibited the hyperphagic response under stressful weeks. It is worth noting that these results are consistent with the dual-process model in behavioural economics and social/cognitive psychology^(9,10) which assumes that human behaviour is understood as the product of two interacting and competing processes: the deliberative system focused on broader goals and the affective system focused on emotions. In this dual-process model, the affective system has control by default, but the deliberative system can influence behaviour through the exertion of will-power when cognitive resources are available. Thus, given that unhealthy food eating is driven by the affective system⁽¹¹⁾, people are able to engage in healthy eating only when the deliberative system is available. Thus, if there is stress that taxes cognitive resources, it reduces the capacity to exert will-power. Added stress thus drives control of behaviour further from the deliberative system, resulting in less healthy eating behaviours.

Consistent with this interpretation, there was a spike in the sales of unhealthy snack foods and a drop in healthy snack foods in week 15, which was immediately before the exam weeks (weeks 16–18). In addition, although we did not observe a spike of unhealthy snack foods sales, there was a drop in healthy snack foods sales in week 9. For most students, this week was characterized with many exams because it was immediately before the fall or spring breaks. Nevertheless, while these significant decreases in one's healthy snack choice could be attributed to stress, it is only one of many potential explanations. Future research should measure any potential factors that caused these changes in food choice throughout the semester. For instance, general weather and temperature could influence food choices – poor families spend less for food during cold weather due to increased fuel expenditures⁽¹²⁾. However, because we observed the effect across both fall and spring semesters, weather and temperature changes cannot easily explain our results. In addition, although the price of healthy snack foods was more expensive than unhealthy snack foods, the effects were observed only for unhealthy snacks. Namely, students spent more money for unhealthy

snacks while they did not change the purchase of healthy snacks, which suggests that they did not make healthier food choice (to save money) because of weather and temperature.

Given that eating approximately 1464 more kilojoules (350 more calories) per week can result in a weight increase of 2.27 kg (5 lb) per year⁽¹³⁾, these results suggest two key implications. First, those who interact with college students – such as health professionals or resident assistants – are able to advise students about the possible tendency they may have to eat worse and worse as the semester progresses. This could be a useful inoculation for them. This could be mentioned in orientations, on health-related handouts or raised in visits to the infirmary, when appropriate. Second, for responsible food service managers, these results suggest extra effort could be made as the semester progresses to promote healthy, but still profitable snack alternatives. If convenience is also part of what is driving the unhealthy food choices, the last part of the semester might be a time when healthy, and very convenient, snacks (such as cut fruit, vegetables or nuts) are specially ordered.

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