International Journal of Home Economics

College student snacking behaviour pilot study

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Abstract

This study examined the snacking behaviour of undergraduate college students using a comprehensive survey that included a Healthy Snacking Knowledge Test (HSKT), a Snack Frequency Questionnaire, a survey of psychosocial correlates related to snacking behaviour (Situational Self-Efficacy, Barriers to Healthy Eating, and Transtheoretical Model of Behavior Change), and demographic information. There were 105 student participants from two Midwestern universities. Results show 2.6 mean snacking occasions per day, and the snack food selections tended to be high in nutrient density. Upper classmen had more knowledge about healthful snack options than freshmen. These students were most confident about healthful snack choices in difficult or inconvenient settings. The main predictors of healthful snack consumption were the academic year, the higher level of stage of change, and the difficult/inconvenient subscale of snacking self-efficacy.

Introduction

In the last 30 years, the number of snacks consumed in one day by Americans has doubled and the percentage of adults who snack has increased from 59 to 90 percent (United States Department of Agriculture (USDA), 2010). Frequent snacking has been reported in adults 19 years and older (Piernas & Popkin, 2010a; Piernas & Popkin, 2010b). For the college student these snacks may be consumed in addition to meals or in place of meals. Each day snacks provide between 25-28% of the total calories consumed by college students (USDA, 2010). With a propensity for salty, high-fat, energy snacks and/or beverages, snacking has been identified as contributing to obesity (Guh *et al.*, 2009; Ogden & Carroll, 2010; Flegal, Carroll, Ogden, & Curtin, 2010). The American College Health Association (2005) reported that 30% of college students are either obese or overweight in the United States. Alternatively, snacking may increase the intake of food items such as fruits and whole grains which may be low or lacking in the diet of college students (Racette, Deusinger, Strube, Highstein, & Deusinger, 2008; Sebastian, Cleveland, & Goldman, 2008).

Few instruments exist to assess the snacking behaviour of college students. Knowledge of healthful snacks, stage of change, and environmental influences have been studied as influences on snacking (Cluskey & Grobe, 2009; Ha & Caine-Bish, 2009; Driskell, Young-Nam, & Goebel, 2005; Lloyd-Richardson, Bailey, Fava, & Wing, 2009; Racette *et al.*, 2008; Silliman, Rodas-Fortier, & Neyman, 2004). But one comprehensive investigation of the snacking knowledge, snacks consumed, eating episode frequency, associated psychosocial correlates, self-efficacy barriers, stages of change, and demographics of college students appears to be lacking and might prove helpful in predicting snacking behaviour. This information could guide initiatives to promote healthful snacking among college students.

Review of literature

Establishment and maintenance of a healthful diet is difficult for college students as they transition away from home for the first time (Cluskey & Grobe, 2009). Students have reported that campus cafeterias do not provide many healthful options, and students living off-campus have stated that eating healthful meals is more expensive and requires extra time (Cluskey & Grobe, 2009). Statistically significant weight gains and increases in BMI have been identified in college students (Racette *et al.*, 2008). As people become overweight or obese, mortality and morbidity risks and co-morbidity conditions increase (Guh *et al.*, 2009).

The daily energy intake was found to be associated with the number of eating occasions; eating more than three times per day was found to be associated with overweight and obesity. Half of all Americans eat 6.6 times per day (Popkin & Duffey, 2010). Environmental factors such as erratic class schedules have been reported to impact the number of times college students snack and the food items selected (Devine, 2005). According to the United States Department of Agriculture, over 50% of college students snack two to three times per day (USDA, 2010). In two studies, college students snacked on between one and four snacks each day (Driskell *et al.*, 2005; Greaney *et al.*, 2009). Results from studies indicated that knowledge of healthful foods did not necessarily result in healthful eating by college students (Cluskey & Grobe, 2009; Weijzen, deGraaf, & Dijksterhuis, 2008).

Other studies have focused upon the barriers and enablers of weight management and eating behaviours (Greaney *et al.*, 2009). The transtheoretical model (TTM) developed by Prochaska (1979) has been used to investigate fruit and vegetable intake decisions, self-efficacy, and stages of change in young adults (Horacek *et al.*, 2002). The TTM has been used in the investigation of healthful snacking correlates of the snacking behaviour exhibited by Midwestern women (Schunk, McArthur, & Maahs-Fladung, 2009). Another measure used in other studies is the snacking self-efficacy assessment (Huang *et al.*, 2003) which consists of three subscales: a negative/affective subscale indicating the emotional state of the participant; a positive social engagement subscale; and a difficulty with accessing healthful snacks subscale. This assessment is used to identify correlates or predictors of snacking behaviour.

The Body Mass Index (BMI) indicates body fatness and is used to screen people for weight categories such as overweight (25.0 and 29.9 kg/ m2) or obesity (BMI > 30.0 kg/m2). A higher daily energy intake was found to be associated with overweight or obesity BMI values (Howarth, Huan, Roberts, Lin, & McCrory, 2007).

Different aspects of eating and snacking by young adults have been investigated, but to our knowledge no one comprehensive snacking study of college students has been completed. This comprehensive study should incorporate a survey of psychosocial correlates, a snacking knowledge test, snacking consumption data, and demographic information. The results could provide a comprehensive view of college student snacking behaviours, identify predictors of healthful snacking, and guide the development of initiatives to encourage healthful eating.

Objectives

The objectives of this study are to investigate the relationship between knowledge of healthful snacks, snacking choices, actual snacking behaviour, and psychosocial correlates. A second objective is to identify predictors of healthful snack consumption by investigating the knowledge of healthful snacks; the types of snacks and snacking frequency; psychosocial correlates; stages of change; self-efficacy barriers; and demographic information to include academic year, gender, height, weight and BMI in college students.

Methodology

Participants and recruitment

In this cross-sectional study, 105 undergraduate students enrolled in family and consumer science programs at two Midwestern universities were recruited using convenience sampling. Faculty, not involved in this study, asked students in their classrooms to participate. All students who were willing to complete the surveys were included in our sample. Students completed each survey and immediately returned it to the researchers. The study was granted approval through the Committee on Human Subjects research at both universities, and all students gave written consent after presentation of the study objectives and methods.

Data collection

The measures of snacking behaviour were based upon a self-administered survey instrument developed by Schunk *et al.* (2009) that consists of four parts: a Healthy Snacking Knowledge Test (HSKT); a Snack Frequency Questionnaire (SFQ), from which a Snack Quality Index (SQI) is developed; psychosocial correlates related to snacking behaviour (Situational Self-Efficacy, Barriers to Healthy Snacking, Transtheoretical Model of Behavior Change) and demographic information.

Healthful snack knowledge test (HSKT)

The HSKT consisted of 14 items: the first 8 items ask respondents to check characteristics of healthy snacks (0 = no; 1 = yes) that include four healthful descriptors and four unhealthful descriptors (reverse scored). The second 6 items ask respondents to choose the healthiest from among three snacks, the one with the lowest or highest of certain characteristics (e.g., "Which snack has the lowest amount of salt?" and "Which snack has the highest amount of saturated fat?"); these were scored 1 = least correct to 3 = most correct. Thus, scores on this test could range from a 6 to a 26.

Snack frequency questionnaire (SFQ)

The SFQ is designed to assess the frequency of consumption of healthful and unhealthful snacks. Respondents are asked to indicate the frequency with which they consume 19 healthful (lower calorie, higher fibre and/or nutrient density) and 20 unhealthful (higher calorie, lower fibre and/or nutrient density) snacks with the following temporal categories: never, <1 day/ week, 1 day/ week, 3-4 days/ week, 5-6 days/week, once/day, 2/day and ≥3/day, scored from 1 = never to 8 = ≥3/day for healthful snacks and reverse scored for unhealthful snacks (8 = never to 1 = ≥3/week). We further created three consumption

categories: low frequency consumption (<1/week), moderate frequency consumption (1-4/week) and high frequency consumption (≥5/week). In order to scale unhealthful and healthful snacking the same and to use both in the creation of the Snack Quality Index (SQI; students are rewarded for healthful snacking and penalised for unhealthful snacking) we assigned "1" to the never category. Thus, when a participant "never" partook of an unhealthful snack, it was reverse-coded to an 8, or the highest possible score on the scale corresponding to the most healthful snacking pattern.

Snack quality index (SQI)

The SQI, derived from responses to the SFQ, assesses the healthfulness of snacking behaviour. The index is calculated by assigning scores to the frequency of healthful and unhealthful snack consumption: healthful snacks received a score of 5 = 1/day, 4 = 5-6/week, 3 = 3-4/week, 2 = 1-2/week, 1 = <1/week; unhealthful snacks were reverse scored (5 = <1/week to 5 = 1/day). This total score could range from 39-195 (19-95 for healthful snacks; 20-100 for unhealthful snacks).

Snacking self-efficacy (SSE)

The SSE is designed to assess respondents' situational self-efficacy (their confidence to consume healthful snacks under differing circumstances). Respondents were asked to rate how confident they were in their ability to consume healthful snacks in 17 different situations, with each item scaled from 1 = not at all confident to 5 = very confident. The questions were categorised into three subscales: a negative affective subscale (7 items, α = .89) that tapped situations associated with emotional stress, for example, "When I am depressed or down"; a positive social subscale (4 items, α = .86) that tapped situations associated with social celebrations, for example, "While having a good time with friends at a party"; and a difficult or inconvenient subscale (5 items, α = .79) that tapped situations challenging to the use of healthful snacks, for example, "When I have to prepare healthy snacks for myself".

Healthful snack barriers (HSB)

The instrument developed by Schunk *et al.* (2009) was adapted to assess barriers to healthful snacking as perceived by college student participants. Respondents were asked to rate the importance of 16 potential barriers, arranged in four subscales: taste barriers (3 items, α = .67) for example, "Don't enjoy the taste"; practical barriers (9 items, α = .83), for example, "Too expensive." In this study, 5 items were added to the practical barrier subscale that were unique to college students, for example, "Friends or roommates won't eat them"; internal cue barriers (2 items, α = .70), for example, "Don't give me the energy I need"; and barriers to the awareness of healthful snacks (2 items, α = .93), for example, "Don't know where to find healthy snacks." Responses were scored from 1 = not at all important to 5 = very important.

The Transtheoretical Model (TTM)

The TTM assesses participants' stage of change or readiness to change. Respondents were asked to select one phrase that best described their intention to eat healthful snacks. The first three phrases represent the pre-action stages (pre-contemplation, contemplation, preparation) and the last three phrases the action stages (action, maintenance, termination). Scores ranged from 1 = pre-contemplation to 6 = termination.

Demographic information

Respondents were asked to self-report their age, academic year, gender, race/ethnicity, and height and weight, used to calculate their BMI (kg/m^2). Weight was classified as underweight (BMI<18.5kg/m^2), normal weight (BMI = 18.5-24.5kg/m^2), overweight (BMI = 25-29.5kg/m2) and obese (BMI≥30kg/m2).

Statistical analysis

The SPSS (version 15.0, SPSS Inc., Chicago, IL) was used for statistical analysis, with a significance of $P < .05$. Descriptive statistics were used for mean and standard deviation and frequencies of responses. We conducted an ANOVA (controlling for BMI) to assess the influence of academic year (not including the nine freshmen students) on HSKT and SQI with post-hoc multiple comparisons with a Scheffé adjustment. Partial correlations were run controlling for academic year and BMI, to examine the relationship between the healthfulness of snacking behaviour (SQI) and psychosocial correlates. Finally, a hierarchical regression analysis was conducted to assess the predictive ability of each self-efficacy subscale and the stages of change variable on the outcome SQI, controlling for academic year and BMI. Because different results in the relationship between snacking and BMI have been reported by researchers and because only 4.9% (5 students) of this dietetic had a BMI > 30kg/m2, this investigation controlled for BMI.

Results (demo/HSKT/Quality of Snacking Behaviour/Psycho Correlates)

Frequencies of consumption were computed for each of the 19 lower calorie (healthful) and 20 higher calorie (unhealthful) snack choices in the snack frequency questionnaire. Table 1 displays these results according to lower frequency (students reported consuming the snack less than once per week), moderate frequency (students reported consuming the snack between one and four days per week), and higher frequency (students reported consuming the snack at least five days per week).

These choices were used to compute the SQI (Schunk *et al.*, 2009) for each participant. For the entire sample, the SQI ranged between 101 and 151; the median score was 128, the mean was 126.68, and the standard deviation was 8.45. Skew (-.22) and kurtosis (-.74) were well within limits for univariate normality.

Table 1 Consumption frequency of higher- and lower- calorie snacks by students

Type of snack	Lower frequency		Moderate frequency		Higher frequency	
	n	%	*n*	%	*n*	%
Popcorn, added fat*	100	95	5	5	0	0
Popcorn, low-fat	95	91	9	9	1	1
Chips, regular*	79	75	21	20	3	3
Chips, low-fat	68	65	33	31	2	2
Fruit canned in light/heavy syrup*	88	84	15	14	2	2
Fruit, fresh	6	6	40	38	56	53
Yogurt, regular*	78	74	22	21	4	4
Yogurt, low-fat	51	49	39	37	15	14
Cookies, regular*	82	78	20	19	2	2
Cookies, low-fat/low-sugar	94	90	10	10	0	0
Ice cream, regular*	89	85	14	13	1	1
Ice cream, low-fat/low-sugar	90	86	14	13	0	0
Fruit drinks/ades*	78	74	21	20	6	6
Real fruit juice	47	45	36	34	21	20
Cheese, regular*	24	23	56	53	24	23
Cheese, low-fat	53	51	44	42	7	7
Milk, whole*	98	93	5	5	2	2
Milk, low-fat/fat-free	21	20	24	23	58	55
Coffee with cream/sugar*	75	71	11	11	15	14
Coffee without cream/sugar	81	78	10	10	11	11
Pudding, regular*	102	97	3	3	0	0
Pudding, low-fat/low-sugar	90	86	12	11	1	1
Crackers, regular*	58	55	39	37	7	7
Crackers, low-fat	59	56	37	35	8	8
Cottage cheese, regular*	93	89	9	9	1	1
Cottage cheese, low-fat	79	75	21	20	5	5
Other higher-calories snacks*						
Pastry	80	76	23	22	2	2
Chocolate candy/bars	82	78	18	17	2	2
Candy, hard or soft	77	73	21	20	5	5
Nut/seeds	38	36	45	43	20	19
Pizza	75	71	26	25	2	2
French fries	90	86	14	13	1	1
Other lower-calorie snacks						
Pastry, low-fat/sugar	91	87	13	12	0	0
Choc candy/bars, low-fat/sugar	100	95	5	5	0	0
Candy, hard or soft/sugarless	96	941	5	5	4	4
Vegetables	14	13	44	42	44	42
Drinks						
Regular soft drinks*	93	89	6	6	5	5
Diet soft drinks	68	65	18	17	19	18
Bottled water	12	11	15	14	77	73

Lower frequency = consume the snack less than once per week, Moderate frequency = consume the snack between 1-4 days per week, Higher frequency = consume the snack at least 5 days per week.

*Higher calories snacks

Descriptive statistics related to the three subscales of the snacking self-efficacy scale and the four subscales of the barriers to healthful snacking scale are reported in Tables 2 and 3, respectively. We found significant difference in mean score for the three subscales of the self-efficacy scale (Wilk's Lambda = .803, F (2,103) = 12.64, $p < .001$) and for the four subscales of the healthful snack barriers scale (Wilk's Lambda = .590, F (3,102) = 20.74, $p < .001$). Post-hoc comparisons with a Bonferroni adjustment for the self-efficacy subscales revealed that aggregate scores on the difficult/inconvenient subscale (M = 3.71; SD = .76) were significantly higher ($p \leq .01$) than both the negative/affective subscale (M = 3.34; SD = .95) and positive/social subscale (M = 3.32; SD = 1.0). Thus, students tended to be most confident about healthful snacking when faced with difficult or inconvenient situations and least confident when emotionally distressed or in positive social settings.

Table 2 Mean ratings* on self-efficacy snacking subscales for students (*n* = 105)

Item	*n*	Mean	SD
Negative/affective subscale (mean s subscale score 3.3, SD 1.0)			
When I am bored	105	3.5	1.3
When I am anxious or nervous	105	3.4	1.3
When I am angry or irritable	105	3.5	1.3
On days when things are not going my way and I feel frustrated	105	3.4	1.2
When I have had an argument with someone close to me and I feel upset	105	3.3	1.2
When I have experienced a tough day and am not feeling good about myself	105	3.4	1.3
When I am depressed or down	105	3.1	1.1
Difficult/inconvenient subscale (mean subscale score 3.7, SD 0.8)			
When I have to prepare healthful snacks for myself	105	4.5	1.0
When eating a less healthful snack is more convenient	105	3.5	1.2
When mostly less healthful snacks are readily available	105	3.3	1.3
In situations when eating a healthful snack is just too much trouble	105	3.2	1.1
When substituting a healthful snack for the less healthful one I really want is a pain	105	3.7	1.1
When eating a healthy snack means I have to prepare it	105	4.1	1.0
Positive/Social subscale (mean subscale score 3.3, SD 1.0)			
While having a good time with friends at a party	104	3.1	1.3
In situations in which I am celebrating with friends and family	104	3.2	1.3
While eating out at a restaurant with close friends	105	3.6	1.1
While enjoying the company of others at a picnic or barbeque	105	3.5	1.1

*Items scored from (1 = not at all confident) to (5 = very confident)

Table 3 Mean ratings* on barriers to healthful snacking for students (*n* = 105)

Item	Mean	SD
Taste barriers subscale (mean subscale score 2.5, SD 1.0)		
Don't enjoy the taste	3.3	1.5
Not salty enough	2.1	1.3
Not sweet enough	2.0	1.2
Practical barriers subsclae (mean subscale score 2.5, SD 0.8		
Not readily available	3.2	1.2
Take too long to prepare	2.8	1.2
Too expensive	3.3	1.3
Family won't eat them	2.2	1.3
Do not know how to prepare	1.9	1.2
Preparation would limit/interfere/takeaway from study time	2.6	1.4
Friends/roommates do not like	1.9	1.1
Boyfriend/girlfriend does not like	1.8	1.1
Difficult to take on campus	2.6	1.4
Internal cues barriers subsclae (mean subscale score 2.8, SD 1.2		
Doesn't satisfy a craving	3.2	1.4
Doesn't give me the energy I need	2.5	1.4
Awareness cues barriers subsclae (mean subscale score 1.8, SD 1.1		
Don't know how to choose healthful snacks	1.8	1.2
Don't know where to find healthful snacks	1.9	1.2

*Items scored from (1 = not at all important) to (5 = very important)

Post-hoc comparisons with a Bonferroni adjustment for the healthful snack barriers subscales revealed that aggregate scores on the taste barriers subscale (M = 2.48; SD = 1.03) were not significantly lower than the practical barriers subscale (M = 2.47; SD = .82), but were lower compared to the internal cues subscale (M = 2.82; SD = 1.20; p = .002) and the barrier awareness subscale (M = 1.81; SD = 1.14; $p \leq .001$). Aggregate scores on the practical barriers subscale were significantly lower than the internal cues subscale (p = .004) and higher than the barrier awareness subscale ($p \leq .001$); scores for the internal cues subscale were significantly higher than the taste barriers subscale (p = .004), than the practical barriers subscale (p = .02), and higher than the barrier awareness subscale ($p \leq .001$). Thus, students reported that knowing how to choose healthful snacks and knowing where to find healthful

snacks, combined to create the weakest barrier to their healthful snacking; whereas the two items for internal cues addressing that healthy snacks often don't satisfy cravings or provide needed energy combined to create the strongest barrier to healthful snacking.

The students did remarkably well on the Healthful Snack Knowledge Test (HSKT) which had a possible range from 1-26. Scores of participants in this study ranged from 20 to 26 (M = 25.05, SD = 1.27) and the median score and mode was 26. A supplemental analysis was conducted to examine whether or not year in school made a difference in total score on the HSKT, controlling for BMI. The mean score for the 28 sophomores was 24.43 (SD = 1.50); for the 29 juniors was 25.35 (SD = .97); and for the 39 seniors was 25.52 (SD = .91). The effect for Academic Year was significant: $F(2, 92) = 7.68$, $p = .001$; the test of homogeneity of variances was not significant so that assumption stood. Post-hoc multiple comparisons with a Scheffé adjustment demonstrated that seniors scored significantly higher than sophomores ($p = .001$) but not juniors ($p = 1.00$); juniors also scored significantly higher than sophomores ($p = .01$).

Inspection of descriptive statistics for the transtheoretical model (TTM) stages of change component revealed 95% of the total sample, or 100 students, reported their best intention regarding the eating of healthful snacks was in the action stage: 20 (19%) students selected the action phrase, 43 (41%) students selected the maintenance phrase, and 37 (35.2%) students selected the termination phrase. This sample of dietetic students, regardless of academic year, reported strong intentions to actively eat healthy snacks.

Partial correlations were run between HSKT and SQI ($n = 105$), controlling for academic year and BMI. Results for the partial correlation between SQI and responses to the stages of change question for the TTM ($r = .31$; $p = .001$) for the sample. Thus, more healthful snacking for all was significantly and positively associated with higher order stages of change scores on the snacking test.

In addition partial correlations were run, controlling for academic year and BMI, between SQI and each of the snacking self-efficacy subscales and each of the healthful snack barriers subscales. Each of the three self-efficacy subscales was significantly associated (one-tailed tests) with SQI: negative affect ($r = .24$, $p = .007$); difficult or inconvenient ($r = .31$, $p = .001$); and positive social ($r = .24$, $p = .02$). None of the four healthful snack barriers subscales was significantly associated with SQI.

Building upon the correlation results reported above a hierarchical regression analysis was conducted to assess the predictive ability of the stages of change variable and each self-efficacy subscale on the outcome SQI, controlling for academic year and BMI. First, a block of control variables including BMI and academic year was entered; this block explained 7% of the variance; $F(2,102) = 3.96$, $p < = .02$. Academic year was a significant predictor in this block ($\beta = .24$, $p = .01$), whereas BMI was not ($\beta = -.15$, $p = .11$). The second block explained an additional 9% of variance and included the stages of change predictor (controlling for the first block) and it added significantly to the overall model fit: $F(21, 101) = 10.36$; $p < .01$; significantly and positively predicting SQI ($\beta = .26$, $p = .008$). The last block of predictors included the three subscales of snacking self-efficacy and did not significantly add to the model fit, explaining only 4% more of the variance; however of the three self-efficacy

subscales, difficult/inconvenient approached statistical significance (ß = .18, p = .056). Thus, based on these findings, the two snacking self-efficacy subscales were deleted and we re-ran the model. These results are reported in Table 4. This trimmed model explained 19% of the total variance, each block significantly added to the variance explained and controlling for academic year and BMI, the stages of change variable and the difficult and inconvenient subscale were both significantly and positively associated (ß = .20, p = .052 and ß = .21, p = .043, respectively) with higher levels of healthful snacking.

Table 4 Hierarchical regression analyses for predictors of snacking quality index (n = 105)

Predictor variables	Model 1 Controls			Model 2 State of change			Model 3 Difficult/Inconvenient		
	B	SE	ß	B	SE	ß	B	SE	ß
Academic year	2.05	.82	.24*	2.01	.78	.24*	2.07	.77	.24**
BMI	-.33	.21	-.15	-.28	.20	-.13	-.18	.20	-.08
State of change				2.62	.81	.30*	1.78	.90	.20*
Difficult/Inconvenient							2.38	1.17	.21*
$F\Delta$			3.96*			10.36**			4.19*
R^2			.07			.16			.19

*$p \leq .05$ **$p \leq .01$ (two-tailed tests)

Discussion

The objectives of this study were to investigate the relationship between knowledge of healthful snacks, snacking choices, and actual snacking behaviour, and factors that influence this phenomenon; and to identify predictors of snacking behaviour. The snacking frequency reported was 2.6 occasions per day, consistent with the literature indicating one to four snacks are consumed per day by college age students. This population also appeared to know what made a snack healthful and the knowledge of seniors and juniors was significantly higher than that of freshmen and sophomores, as can be expected with the progressive courses in nutrition as indicated in other research studies. However, despite the high scores in knowledge, these students demonstrated low SQI scores, indicating a disconnect between knowledge and behaviour which has been identified in other research. Two factors are proposed that may partly explain this phenomenon: first, the choice of "healthy" and "unhealthy" snacks is based primarily on caloric contribution and fat content of the snack items. Second, students were not asked to record whether the snacks were in lieu of skipped meals, or in addition to the meals. If consumed as meal replacement, the healthfulness of the snack may have been evaluated differently. Further, a relatively low percentage of our students were obese (4.9%) compared to the national average of 29.9% of college students. In this sample of students the focus was on the healthfulness of the snack food selections and the results indicate that the student choices of snacks were high in nutrient density and still healthful overall.

The findings regarding the three subscales of the snacking self-efficacy scale (i.e., difficult/inconvenient, negative/affective, and positive/social) of students were unique. Perhaps atypical of college students in general, the students in this study were most confident (self-efficacy) about healthful snacking in the face of difficult or inconvenient settings. It may be their knowledge of healthful snacking and its subsequent influence on physical health and well-being is a protective factor against such risks toward unhealthy behaviours. Or it could be that a combination of nutritional knowledge with the ease of transporting or accessibility of such high frequency healthful snacks such as bottled water, fresh vegetables, and fresh fruit contributed to this finding. One other factor the study did not assess was whether or not students ate their meals in food service settings or personal apartments. Upper division students who live near campus might return to their apartment for a snack or meal where healthful snacks are available or might provide their own healthful snacks via backpack when heading to school for the day.

This study extended the work of others by assessing the influence of known correlates of healthful snacking in a regression analysis with the SQI as the outcome variable. Two significant findings are shown in Table 4, Model 3. First, in Model 3, when the influence of academic year, BMI, stage of change are entered in Model 2 and thus, controlled for in Model 3, the addition of the difficult/inconvenient subscale measure from the snacking self-efficacy scale contributes positively and significantly above and beyond the other measures to the explanation of variance in participants' scores on the SQI. In regards to this subscale, the previous summarization holds when controlling for the influence of these other correlates, further strengthening that argument. In fact, it is suggested that applied research investigating the efficacy of preventive interventions focus on maximizing the concepts of the difficult/inconvenient subscale as a key to appropriate behaviour with this population. Second, Table 4, Model 3 demonstrates the positive and significant influence of (a) academic year, (b) higher levels of stage of change, and as mentioned previously, (c) the difficult/inconvenient subscale of snacking self-efficacy.

From these results it appears that nutritional knowledge matters. In addition, the self-reported stage of change matters. A possible interaction between nutritional knowledge and stage of change was investigated but was not found with this sample. Thus, these three predictors mattered most for this sample of undergraduate dietetic students: academic year, higher level of stage of change, and difficult/inconvenient factors. However, at the same time, a limitation worth noting in the final Model 3 is that only 19% of the variance in SQI was explained; in other words, 81% of the variance was left unexplained. Some of this variance may be addressed by including questions about the overall number of eating occasions to include meal and snack patterns; portion sizes of food items; definition of healthful snacks; other snack foods consumed; actual height and weight measurements; and the type, amount, and frequency of physical activity. To be more representative of all college students, this research might expand the sample to include a cross section of college students attending Midwestern universities.

Implications for future research and practice

Knowledge of nutrition and nutrient content of possible snack choices is vital to all consumers to make healthful snack choices. Consumption of unhealthy snacks, high in calories and fat, is

seen as a strong contributor to obesity. The reality is that providing people with more knowledge does not necessarily lead to improved snacking behaviour. This study has helped to elucidate aspects of healthy snacking behaviour and may help in effecting change. Identification of predictors of healthful snack selection and behaviour is new and should be further developed to further identify unhealthy snacking. A wider application is the contribution to increased understanding of the complexity of snacking behaviour, the possibility of disconnect between knowledge and practice, and the importance of examining factors that influence the snacking and eating behaviour of individuals. More research should be spawned to identify predictors of eating behaviours.

However, specifically, these researchers believe that this is the first study to investigate snacking behaviour specifically in undergraduate students who had taken at least one nutrition course. As future health professionals, knowing, from their own experience, the powerful influence of psychosocial correlates and readiness to change on snacking behaviour will greatly enhance their ability to provide effective counselling to individuals and communities. For educators, these outcomes will provide signposts to educational strategies in providing students with the necessary tools.

Biography

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