



2013-03-12

College Students' Fruit, Vegetable, and Sugar Sweetened Beverage Intake According to Dinner Group Participation

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College Students' Fruit, Vegetable, and Sugar Sweetened Beverage Intake
According to Dinner Group Participation

Erica N. Hansen

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of
Master of Science

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March 2013

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ABSTRACT

College Students' Fruit, Vegetable, and Sugar Sweetened Beverage Intake According to Dinner Group Participation

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Objective: To compare the fruit, vegetable, and sugar sweetened beverage intake of college students who do and do not participate in dinner groups. Also, to determine if dinner group participation affects college students' perception of their overall health and adequacy of their fruit and vegetable intake.

Design: A quantitative study of college students' fruit, vegetable, and sugar sweetened beverage intake through a one-time online survey.

Setting: The survey was accessed via the internet at the time and place of students' convenience.

Participants: A sample of 10,000 students was randomly selected from Brigham Young University's population of single students. 3,651 responded (a 37% response rate), but only 548 met our requirements and completed the survey. Sixty-one percent were female, 39% were male. Subgroups included students not belonging to a dinner group (n=243), students who met with a dinner group 1-3 times per week (n=167), and students who met with a dinner group 4 or more times per week (n=138).

Main Outcome Measure(s): The independent variable measured was dinner group membership. Food intakes and perceptions were dependent variables. Food intakes were collected using adapted Behavior Risk Factor Surveillance System recall questions. Perceptions were reported on a 1-5 Likert rating scale.

Analysis: Post-hoc Tukey-Kramer adjustments were made to analysis of variance comparing intake and perception means. Statistical significance was set at $p < 0.05$.

Results: Prevalence of dinner group membership was 13%. Dinner group members drank significantly less soda than non-dinner group members ($p=0.03$). Intakes of fruits and vegetables did not differ between subgroups. Students' perception of the adequacy of their fruit and vegetable intake was aligned with their actual intake ($p=0.0001$); students who ate fewer cups rated their intake as poor more frequently than students who ate more cups. Dinner group members perceived better overall health and improved intake of fruit and vegetables from their participation in dinner groups.

Conclusions: Though dinner group membership does not appear to affect fruit and vegetable intake, benefits were seen in reduced sugar sweetened beverage consumption. Further research may be warranted to examine other nutritional factors associated with dinner group membership as dinner groups may provide a unique opportunity for nutrition education and interventions and may provide more long term benefits than short term.

Keywords: dinner, young adults, fruit, vegetables, sugar sweetened beverage

ACKNOWLEDGEMENTS

I would like to publicly express appreciation for my committee members, Dr. Lora Beth Brown, Dr. Pauline Williams, and Dr. Rickelle Richards for offering their time and expertise to help me further my education and learn the art of research and writing for publication. In addition, I cannot forfeit the opportunity to thank the professors from my undergraduate work who encouraged me to continue asking questions and pursue a Master's degree, namely Dr. Susan Fullmer, Dr. Nora Nyland, Dr. Michael Brown, and Dr. Steven Wood.

My family too deserves many thanks for their encouragement in a lifetime pursuit of education; most especially my current champion and patron, my husband, Jefferson.

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MANUSCRIPT

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Manuscript to be submitted to the
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INTRODUCTION

As young adults enter college they also enter a period of life known as emerging adulthood. Emerging adulthood is a time distinct from later adulthood; marked by increasing independence and exploration and is a unique life transition point affecting food choices.¹⁻³ Young adults are reported to eat poorly, having inadequate fruit and vegetable intakes and drinking excessive sugar sweetened beverage (SSB), especially compared to their intakes during childhood.³ Young adults who attend college consume more fruits and vegetables than young adults who do not, but college students are still not meeting recommended intakes and find it difficult to eat a healthy diet and manage their weight during the transition to greater independence.⁴⁻⁸

Difficulty eating a healthy diet during this transition may be related to a number of factors. College students have chaotic schedules and may feel pressured for time. Studies have reported that college students cite convenience above taste and nutrition as the biggest factor affecting food choice—differing from studies that have cited taste as the primary influence on food choice in later adulthood.⁹⁻¹² College students may also lack the skills and knowledge to help them prepare healthy meals.¹³

The time barriers college students face in preparing healthy meals are likely contributors to students' frequent consumption of fast food. A large percentage of the food college students' consume is eaten at restaurants.¹⁴ In one study, 91-95% of college students ate out 6 to 8 times per week.⁹ Frequent patronization of fast food establishments by young adults has been associated with increased SSB consumption, decreased intake of recommended healthful foods, and overweight and obese weight status in young adults.¹⁴⁻¹⁷ One study found 95% of students had consumed a SSB in the month recorded and 65% had consumed SSBs daily.¹⁸

Dinner groups (DGs) may be a potential solution to some of the barriers college students face in healthy eating. DGs are a type of social eating that developed spontaneously at a private university in a western state.¹⁹ These groups are composed of three or more students who share meal preparation several nights a week. One qualitative study has described this phenomenon, but it is otherwise not reported in the literature.¹⁹

Within DGs, meal preparation responsibilities are shared and it is common for a student to be in charge of fixing dinner only one night per week while still benefiting from homemade meals the rest of the week.¹⁹ Ready availability of these meals may provide a healthy alternative to convenient fast foods. Researchers have reported that when more fruits and vegetables are served or offered, more are consumed.^{20,21} The data collected from focus groups with DG participants suggested that most DG members expect at least one vegetable side to make a complete, acceptable meal.¹⁹

While research on the effects of DG participation is absent in the literature, there is a large body of evidence suggesting nutritional benefits of family meals. For example, it has been reported that the frequency of family meals and availability of fruits and vegetables at meal times is negatively associated with fast food intake among adolescents.²² In addition, more fruits and vegetables and fewer soft drinks are consumed by adolescents when family meals are held and frequency of family meals and availability of fruits and vegetables have also shown a positive association with higher intakes.^{13,22-24} Perhaps DGs among college students represent a type of pseudo-family meal setting.

Literature also suggests a potential benefit from the social aspect of shared meals. Both adolescents and college students are positively influenced by peer support of healthy eating behaviors and research confirms the validity of targeting social support for improved dietary

habits.^{6,8,22,25} Specifically, when students prepare and eat home cooked meals with peers they say that they support each other in positive eating habits and data show that they tend to eat a larger variety and amount of dark green and orange vegetables and fruits compared to students who eat more frequently “on the run.”⁸ While young adults seem to value eating at home with others, they report finding it difficult to make time to do so.¹⁷

Another potential benefit of DG participation may stem from students’ involvement in meal preparation and planning activities. Two studies have found when adolescents and young adults are actively involved in meal planning and preparation they consume more fruits and vegetables and fewer carbonated beverages and fast food.^{17,26} One study found that adults who cooked their own food most often had the highest Healthy Eating Index (HEI) scores, a tool that compares dietary intake to national dietary recommendations.²⁷ These data suggest that by rotating meal preparation responsibilities in a DG, students may make healthier food choices and have healthier food choices available for others to consume.

The purpose of the current study was to quantify the fruit, vegetable, and SSB intake of students who do and do not participate in DGs. We developed the study using constructs from the Social Cognitive Theory (Table 4). This theory suggests that an individual’s behavior is a result of personal, environmental, and behavioral influences that work dynamically to influence a person’s choices.²⁸ We addressed environment in observation of DG participation and its effect as an external factor on an individual’s food group intake. Behavior, environment, and personal factors were examined in our survey of the participants’ perception of their overall health, fruit, vegetable and SSB intake, and influence of DG participation on all.

We hypothesized that DG participants would have healthier diets (more fruits and vegetables and less SSB) than non-DG participants, such that promoting the formation of them would be warranted.

METHODS

Study Design

The current study was a quantitative assessment of foods consumed by college students. Using an online survey we measured self-reported intake of fruits, vegetables, and SSBs as dependent variables and DG participation frequency as an independent variable (no membership in a DG (non-DG), membership in a DG that meets 1-3 times per week (1-3/wDG), or membership in a DG that meets 4 or more times per week (≥ 4 /wDG)). We defined DGs as a group of 3 or more students who share meal preparation activities. We also measured college students' perceptions of their overall health, adequacy of their intake of fruits and vegetables, and excessiveness of their SSB intake. Lastly, we measured DG participants' perception of how their participation affects their intake of fruits and vegetables.

Participants and Recruitment

We obtained our sample through the sponsoring University's Office of Institutional Assessment and Analysis. A sample of 10,000 students was randomly selected from the population of students (N=34,232) who were single, between the ages of 17 and 25, were currently enrolled in daytime classes, who did not live in the on-campus dormitory where there are no kitchen facilities in the individual rooms, and who did not live with adult relatives because dining experience differs significantly by living arrangements.^{29,30} Our research was reviewed

and approved by the University's Institutional Review Board and implied consent was obtained from participants at the start of the survey.

Screening questions at the beginning of the survey verified that respondents met the sample criterion listed above. Those who did not meet the criterion did not progress to take the survey. Our final sample size was 548 students. Following the screening questions, respondents were asked a question regarding DG membership to separate DG members from non-DG members as well as categorize DG members based on frequency of group meetings. Students not belonging to a dinner group numbered 243, while 167 students met with a dinner group 1-3 times per week and 138 students met with a dinner group 4 or more times per week. We offered 3 free mP3 downloads to all who completed the survey.

Thirteen percent (n=368) of our respondents belonged to a DG; the incidence rate was formerly unknown. We set a quota of 250 respondents for each group; a number established through power analysis of pilot studies. We had 2,564 non-DG students respond, but only the first 250 were allowed to progress to complete the survey. Of those students that belong to DGs, 53% were in the 1-3/wDG group and 47% were in the ≥ 4 /wDG group.

Instruments

Survey questions were adapted from the national Behavior Risk Factor Surveillance System (BRFSS) questions.³¹ Where BRFSS questions are based on frequency of food group consumption (e.g. "about how many times in the last day, week or month did you consume orange vegetables?"), we chose instead to collect data on amounts (e.g. "During the past month, about how many cups of dark green vegetables did you eat?") in order to compare food intake with average recommended intakes.³² We maintained BRFSS's operational definitions for each question (i.e. what to include and not include in counts of orange vegetables) (Table 1.). We

added questions not contained in BRFSS about SSBs and perceptions about health and nutrition (e.g. “how would you rate (on a 1(poor)-5(excellent) scale) the food you eat in terms of the overall amount of fruit?”).

The survey instrument was tested and reviewed before administering to ensure validity and reliability. To obtain evidence of validity we conducted cognitive interviews (n=3) and questions were reviewed by experts in nutrition and survey research for face, content, and construct validity.³³ A pilot study was conducted with students (n=318) who met the demographic criteria needed for our study. Cronbach’s alpha values for intake questions were 0.77 for fruit, 0.68 for vegetable intake, and 0.78 for SSB intake, indicating good reliability.³⁴

Procedures

The survey was administered online using Qualtrics Survey Research Suite software by www.qualtrics.com Inc. Students were e-mailed an invitation to take the survey and reminder e-mails if they had not completed the survey at 2 and 4 weeks after the initial invitation.

Data Analysis

We summed reported intake amounts of the vegetable subgroups (orange, green, beans, and other) and fruit subgroups (fruit and 100% fruit juice) to compare with recommendations for an average 2,000 calorie diet by the U.S. Department of Agriculture: 2.5 cups of vegetables per day and 2 cups of fruit per day.³²

Fruit and vegetable intakes were reported in cups. Adjustments were made to reported amounts of green vegetables to convert to equivalent cup sizes according to ChooseMyPlate standards. Specifically, green vegetable amounts were divided by 2 (2 cups of leafy green vegetables is equivalent to 1 cup of vegetables and the majority of greens included were leafy greens). SSB intakes were reported in ounces consumed and included fruit drinks, sugar

sweetened soda or pop, caffeinated energy drinks, and sports drinks. Daily intakes were calculated by dividing weekly amounts by 7 and monthly amounts by 30. Perceptions regarding overall health and diet adequacy were reported as ratings on a 5-point Likert scale (e.g. 1-poor to 5-excellent). Perceptions of fruit and vegetable adequacy and SSB healthfulness were compared to the reported amounts of these foods actually consumed.

Analysis of variance was used with post-hoc Tukey Kramer adjustments to compare reported means between groups. SAS version 9.3, SAS Institute Inc., Cary, NC, USA, 2010 was used in the analysis. Both overall and pairwise comparisons were made. Significance was set at a level of $p=0.05$.

RESULTS

Respondents' (n=584) ages ranged from 17-24 years, with a mean of 20.5 years. Females made up 61% (n=352), 39% were males (n=222). The population at the University is 48% females, 52% males. Respondents were primarily White (78%), 4% were Asian, 3% Hispanic, and less than 1% comprised American Indian/Alaskan Native, Black/African American, Hawaiian and Pacific Islander ethnic groups. The ethnic distribution closely reflected the population sampled.

Significant differences were observed overall according to DG membership for soda/pop intake alone ($p=0.03$) and for total SSB intake ($p=0.055$) (Table 2). In pairwise comparisons, those in the ≥ 4 /wDG group drank significantly less soda ($p=0.05$) with a mean of 1.7 ± 0.4 oz soda per day, than those in the non-DG group with mean of 2.4 ± 0.3 oz soda per day (Table 2).

No significant differences were observed overall or in pairwise comparisons between students belonging to DGs and non-DG members in intakes of fruit, fruit juice, or total fruit. Daily mean intake of total fruit was about 1.5 ± 0.10 cups for each group (Table 2).

No differences were observed in overall or pairwise comparisons of total vegetable intake or in sub-categories of vegetable intake between DG members and non-DG students. Daily mean intake of total vegetables was less than 1 ± 0.05 cup (Table 2).

Concerning perception ratings, there were no significant differences observed between DG members and non-DG members in their ratings of their overall health ($p=0.32$), adequacy of fruit intake (0.13), adequacy of vegetable intake ($p=0.17$), or SSB consumption excess ($p=0.53$)(data not shown). DG members perceived that DG membership improved their health and fruit and vegetable intakes (Table 3). All but one question regarding DG memberships' benefits (DG's influence on increasing daily fruit intake) reached significance at $p \leq 0.05$ when comparing 1-3/wDG to ≥ 4 /wDG responses; with the ≥ 4 /wDG group rating the effect of DG membership on improving health, diet, and fruit and vegetable intake higher than the 1-3/wDG group.

DISCUSSION

This study of 548 college students' intakes of fruit, vegetables, and sugar sweetened beverages according to dinner group membership revealed significant findings in soda consumption. Although it may have little immediate practical significance, a difference of only about one ounce per day, this could add up to 365 ounces a year or thirty cans of soda for an

estimated 4500 calories more per year. This may be a meaningful difference if energy balance isn't compensated for accordingly.

Perhaps more interesting is the finding that students who did not belong to a DG drank twice the amount of total SSB than did those in the $\geq 4/\text{wDG}$ group. At $p=0.055$ this finding did not reach statistical significance, but may still be meaningful. The difference in intake was 3 ounces, nearly 1/2 cup per day (3.7 ± 1.2 SSB oz per day compared to 6.8 ± 0.8 oz SSB per day) (Table 2).

While we hypothesized that DGs among college students may be associated with increased fruit and vegetable consumption, our results do not support this conclusion. One potential explanation may be that DG members eat an increased quantity of fruits and vegetables on DG meeting days but that they eat fewer on days they don't meet with their DG. In previous research involving focus groups, some DG members said that on non-DG days they relied on convenience foods and fast foods.¹⁹ In the current study (Table 3) students agreed that they typically eat more vegetables on meeting days than non-meeting days. Non-DG members' and DG members' intakes may differ during the week in when and how much fruit and vegetable they eat, but the intakes may average out over the course of the week to be the same.

Despite the fact that DG membership did not prove to increase fruit and vegetable consumption above the intake of students who did belong to DGs, DG participants still perceived benefits from their membership (Table 3). In addition, of the students who belong to DGs, those in the $\geq 4/\text{wDG}$ rated the perceived benefits of DG membership more highly than students who meet less frequently. This suggests that higher exposure to DG can increase participants' perception of healthfulness of DG membership.

Comparing questions regarding overall health perceptions between groups yielded an interesting finding. There were no significant differences in perceived overall health between groups (Table 3). Together, DG members provided a mean rating of 3.95 (data not shown) when rating DGs' effect on their overall health, suggesting that members believe DG membership enhances their health. Though DG members perceive a benefit, they don't rate their overall health any higher than non-DG members.

Research by Laska and colleagues³⁵ suggests that when young adults participate in meal preparation their skills and interest in food preparation activity follows them through later adulthood. In addition, when young adults become involved in food preparation activities they are more likely in later adulthood to eat more fruits and vegetables and less SSB.³⁵ Though we did not observe a difference in intakes between non-DG and DG members, they did engage in food preparation behaviors so perhaps in later years their intakes will differ significantly related to DG membership, as Laska's longitudinal research suggests.³⁵

Though some research has found individuals eat better when they eat in groups, our research failed to support this conclusion.^{8,27} The social aspects of DGs have the potential to affect food intake and as a result make it difficult to isolate the effect of dinner groups alone.

Limitations

Our inability to detect a meaningful difference in fruit and vegetable consumption according to DG membership may be due to several limitations inherent to the study including imprecise quantification of fruit and vegetable intake and methods for measuring equivalent values. Another limitation is that measures of fruit intake in the survey include all forms—fresh, frozen, and dried. While one cup of frozen or fresh fruit counts as 1 cup of fruit equivalent, 0.5 cup of dried fruit is equivalent to 1 cup of fruit. In addition, the green vegetable category

includes broccoli and all leafy green vegetables which have slightly different measurement equivalents according to ChooseMyPlate standards. Also, the data are self-reported and may contain errors due to imprecise estimates.

Several assumptions may also be limitations in this research. First, by measuring only fruit and vegetable consumption and omitting the remaining food groups we only approximate the overall nutritional adequacy of students' diets. In addition, students who belong to DGs may be more aware of their fruit and vegetable consumption than students who do not. This may be due to time DG members spend planning and preparing meals for themselves and others. As a result, DG members may be more accurate in estimating their food intakes, which may actually be higher, whereas non-DG members may overestimate their fruit and vegetable intakes.

Though we were unable to meet our subgroup sample sizes estimated through power analysis, it was determined that additional responses would have little effect on the means and that our group sizes were sufficient. Lastly, our sample was primarily composed of Caucasian respondents, which may not be reflective of all campuses in the U.S. However, the sample was representative of the campus in which the study was conducted.³⁶

IMPLICATIONS FOR RESEARCH AND PRACTICE

The small percentage of University students participating in DGs (13%) may provide unique research and education opportunities to examine the enablers and strengths in those students who volunteer to participate in DGs, suggesting that they have some degree of competency in food preparation and that they are confident enough to share their prepared meals with peers. Encouraging college students to share meal preparation responsibilities with their

peers may be useful in decreasing SSB consumption and improve students' perceptions about their health.

We measured fruit, vegetable, and SSB intake, but other components of diet may be of interest and relevance to study in this population. For instance, it may be pertinent to study frequency of meal preparation between DG members and non-DG members, complexity of cooking techniques incorporated, variety of cooking methods and foods used, and the long term impact of meal preparation activities on students' intake. Perhaps further examination of DG members' nutrient intake would be warranted: total calories, macronutrient distribution, saturated fat intake, and micronutrients of concern.

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Table 1. Food Inclusion Criteria for Fruit, Vegetable, and Sugar Sweetened Beverage Intake Questions.

Food Category	Do Include	Do Not Include
Fruit		
Fruit	Fresh, frozen, or canned fruit. Dried raisins, cran-raisins. Cut up fresh, frozen or canned fruit added to yogurt, cereal, Jell-O and other meal items.	Fruit jam, jelly, or fruit preserves. Dried fruit in ready-to-eat cereal.
100% Fruit Juice	100% pure juices including orange, mango, papaya, pineapple, apple, grape (white or red), or grapefruit. 100% juice blends such as orange-pineapple, orange tangerine, cranberry-grape are also acceptable as are fruit-vegetable 100% blends. 100% pure juice from concentrate (i.e., reconstituted). Only count cranberry juice if it is 100% juice with no sugar or artificial sweetener added.	Fruit drinks with added sugar or other added sweeteners like: Kool-aid, Hi-C, lemonade, cranberry cocktail, Tampico, Sunny Delight, Snapple, Fruitopia, Gatorade, Power-Ade, or yogurt drinks. Fruit juice drinks that provide 100% daily vitamin C but include added sugar. Vegetable juices such as tomato and V8.
Vegetables		
Orange Vegetables	All forms of sweet potatoes including baked, mashed, casserole, pie, or sweet potato fries. All hard-winter squash varieties including acorn, autumn, banana, butternut, spaghetti, hubbard, kabocha (also known as Ebisu, Delica, Hoka, Hokkaido, or Japanese Pumpkin). All forms of carrots including long or baby-cut and carrot-slaw. Pumpkin, including pumpkin soup and pie.	Pumpkin bars, cake, bread or other grain-based dessert-type food containing pumpkin.
Other Vegetables	Tomatoes, tomato juice, or V-8 juice. Corn, eggplant, peas, lettuce, okra, beets, cauliflower, bean sprouts, avocado, cucumber, onions, peppers (red, green, yellow, orange); all cabbage including American-style coleslaw; mushrooms, snow peas, snap peas, broad beans, string, wax, or pole-beans. White potatoes that are not fried such as baked or mashed potatoes. Any form of vegetable (raw, cooked, canned, or frozen)	Vegetables you have already counted. Rice or other grains. Fried potatoes. Products usually consumed as condiments including ketchup, catsup, salsa, chutney, relish.
Dark Green Vegetables.	Broccoli. All raw leafy green salads including romaine, chard, collard greens, spinach, mesclun, romaine lettuce, boy choy, dark green leafy lettuce, dandelions, komatsuna, watercress, and arugula. All cooked greens including, kale, collard greens, choys, turnip greens, mustard greens.	Iceberg (head) lettuce.
Cooked or Canned Beans	Round or oval beans or peas such as navy, pinto, kidney, split peas, cow peas, hummus, lentils, black, black-eyed peas, cow peas, garbanzo, lima beans and white beans. Re-fried beans, baked beans, beans in soup. Soybeans also called edamame, tofu (bean curd made from soybeans), bean burgers including garden burgers and veggie burgers. Falafel and tempeh. Please indicate how many cups per day, week OR month you ate in the last month.	Long green beans such as string beans, broad or winged beans, or pole beans
Sugar Sweetened Beverages		
Fruit Drink*	Kool-Aid, cranberry, and lemonade with added sugar. Fruit drinks you made at home and added sugar to. Sunny Delight, Tampico, punch and like beverages.	100% fruit juice. Calorie-free/sugar-free fruit flavored drinks like Crystal Light
Soda or Pop*	All types of sugar sweetened soda	Diet soda or diet pop

Sports Drinks*	Gatorade or Powerade	Flavored water drinks like Propel
Caffeinated Energy Drinks*	Red Bull, Monster, 5-hour Energy, Rockstar, AMP, Energy Potions	

**All categories but those indicated are consistent with Behavior Risk Factor Surveillance (BRFSS) food inclusion criteria for fruit and vegetable intake questions. The current study's sugar sweetened beverage questions were modeled after BRFSS questions. .*

Table 2. Daily Mean Intakes of Fruit, Vegetable, and Sugar Sweetened Beverage by Dinner Group Membership

	Non-DG Intake±SE (n=243)	1-3/wDG Intake±SE (n=167)	≥4/wDG Intake±SE (n=138)	P-value
Vegetables				
Green Veg (cups)	0.24 ± 0.02	0.26 ±0.02	0.25 ±0.03	0.75
Orange Veg (cups)	0.33 ±0.03	0.35± 0.04	0.27 ±0.04	0.31
Bean Veg (cups)	0.24 ±0.02	0.24 ±0.03	0.23 ±0.03	1.00
Other Veg (cups)	0.73 ±0.06	0.88 ±0.08	0.81 ±0.09	0.33
Total Veg (cups)	0.87 ±0.05	0.92 ±0.06	0.78 ±0.07	0.24
Fruit				
Fruit (cups)	1.02 ±0.07	1.21±0.09	1.18 ±0.10	0.22
Fruit Juice (cups)	0.47 ±0.04	0.41 ±0.05	0.44 ±0.06	0.74
Total Fruit (cups)	1.50 ±0.08	1.61 ±0.10	1.53 ±0.11	0.66
Sugar Sweetened Beverages				
Fruit Drink (oz.)	2.13 ±0.30	2.00 ±0.36	1.93 ±0.41	0.91
Soda/Pop (oz.)	2.40 ±0.30	1.65 ±0.37 ^a	1.12 ±0.42 ^a	0.03
Sports Drink (oz.).	1.72 ±0.33	0.97 ±0.40	0.70 ±0.45	0.12
Caffeinated Energy Drinks (oz.)	0.51 ±0.18	0.09 ±0.22	0.0 ±0.24	0.12
Total Sugar Sweetened Beverage (oz.).	6.77 ±0.81	4.72 ±0.99	3.71 ±1.11	0.06

Non-DG=students who do not belong to a dinner group

1-3/wDG = students who belong to a dinner group who meets 1-3 times per week

≥4/wDG = students who belong to a dinner group who meets 4 or more times per week

SE=standard error

Statistical analysis included overall analysis of variance with Tukey-Kramer post-hoc adjustments

^a = p=0.03in pairwise comparisons

Table 3. Dinner Group Members' Perception Ratings Concerning Effects of Dinner Group Membership

Question	DG 1-3x/wk Rating±SE	DG 4+ x/wk Rating±SE	P-value
Does dinner group membership positively affect your overall health?	3.79±0.07	4.10±0.08	0.004
Does dinner group membership positively affect your diet healthfulness?	3.73±0.08	4.01±0.09	0.02
Does dinner group membership help you eat more vegetables throughout the week?	3.50±0.09	3.90±0.10	0.002
Does dinner group membership help you eat more fruits throughout the week?	2.62±0.09	2.87±0.10	0.05
Do you eat more vegetables on days you meet with dinner group than days you do not?	3.44±0.09	3.90±0.11	0.001
Do you eat more fruit on days you meet with dinner group than days you do not?	2.37±0.09	2.57±0.10	0.14

1-3/wDG = students who belong to a dinner group who meets 1-3 times per week

≥4/wDG = students who belong to a dinner group who meets 4 or more times per week

SE=standard error

Statistical analysis included analysis of variance with Tukey-Kramer post-hoc adjustments

Ratings were reported on a scale of 1 (Strongly Disagree to 5 (Strongly Agree.)

Table 4. Theoretical Basis for Survey Questions

Survey Question	Construct of Social Cognitive Theory
Intake questions	
During the past month, about how many cups of fruit did you eat?	Behavior
Perception questions	
Rate your overall health on a scale of 1-5.	Personal
Rate the amount of fruit that you eat on a scale of 1-5.	Personal
Rate the amount of vegetables that you eat on a scale of 1-5.	Personal
Does dinner group membership positively affect your overall health?	Environment
Does dinner group membership positively affect your diet healthfulness?	Environment
Does dinner group membership help you eat more vegetables throughout the week?	Environment
Does dinner group membership help you eat more fruits throughout the week?	Environment
Do you eat more vegetables on days you meet with dinner group than days you do not?	Environment
Do you eat more vegetables on days you meet with dinner group than days you do not?	Environment
Do you eat more fruit on days you meet with dinner group than days you do not?	Environment

APPENDIX

LITERATURE REVIEW

Health and lifestyle behavior trends documented in the last several decades suggest a state of poor health for the American public.^{37,38} The incidence of overweight and obesity as well as many associated chronic diseases are on the rise. In 2010, 63% of Americans were classified as overweight or obese by body mass index categories.³⁹ According to the Behavior Risk Factor Surveillance System (BRFSS) performed annually by the Centers for Disease Control, in 2010 only 54% of Americans categorized their general health as very good or excellent and 16% classified their health as fair or poor.³⁸

Lifestyle behaviors associated with good health are not practiced as frequently as recommendations suggest. In 2009, 77% of adults consumed less than 5 servings of fruits and vegetables every day and only 24% consumed 5 servings per day.⁴⁰ The young adult population, including college students, is no exception to observations of poor dietary intake.

Government agencies have set national goals and objectives to improve the public's health. The Department of Health and Human Services developed Healthy People 2020 which includes the goal that Americans "consume a variety of nutrient-dense foods within and across the food groups, especially... fruits [and] vegetables" and that they "reduce consumption of calories from added sugars."⁴¹ More research is needed to identify effective methods for helping Americans make healthy lifestyle changes to achieve these goals.

As young adults enter college they also enter a period of life known as emerging adulthood. It is a time marked by increasing independence and exploration and presents a unique life transition point affecting food choices.¹⁻³ Cluskey and Grobe⁸ reported that college students found it more difficult to eat a healthy diet and manage their weight during the transition to greater independence.

It has been reported that young adults eat poorly, having inadequate fruit and vegetable intakes and drinking excessive SSB, especially compared to childhood.³ While it has been reported that young adults who attend college consume more fruits and vegetables than young adults who do not, college students are still not meeting recommended intakes.⁴⁻⁷ One study found an inverse relationship between fruit, fruit juice, and vegetable consumption and the development of metabolic syndrome in young adults; young adults with zero risk factors consumed significantly higher intakes than young adults with 1-2 risk factors. This study also found that higher intakes of SSBs were associated with significantly more risk factors for developing metabolic syndrome in young adults.⁴² Another study found that among college students, 95% had consumed a SSB in one month and 65% had consumed SSBs daily.¹⁸ High consumption of SSBs, most often soft drinks in this population, is associated with higher discretionary calorie intake.^{18,43}

Difficulty in eating a healthy diet during this transition may be related to a number of factors. College students have chaotic schedules and may feel pressured for time. Many studies have reported that young college students cite convenience, above taste and nutrition as the biggest factor affecting food choice—differing from studies that have cited taste as the primary influence on food choice in later adulthood.⁹⁻¹² College students may also lack the skills and knowledge to help them prepare healthy meals.¹³

The barriers college students face in preparing healthy meals are likely contributors to students' frequent consumption of fast food products, which negatively affects their health. A large percentage of the food college students consume is eaten out of the home at restaurants.¹⁴ One study describing dietary patterns in college students found that most students (91-95%) ate out 6-8 times per week.⁹ Of the establishments young adults patronize, fast food restaurants are among the most frequent. Frequent patronization of fast food establishments by young adults has been associated with increased SSB consumption and decreased intake of recommended healthful foods.¹⁴⁻¹⁷ An association has also been observed between poor food choices at restaurants and overweight and obese weight status in young adults.¹⁵

The 2010 Dietary Guidelines for America have suggested goals for eating more home-prepared meals as one potential way to improve Americans' health. They suggest that health professionals should seek to “empower individuals and families with improved...cooking skills to heighten enjoyment of preparing and consuming healthy meals.”⁴⁴

Dinner groups may pose a potential solution to some of the barriers college students face in healthy meal preparation. Because meal preparation responsibilities are shared, it is common for a student to be in charge of fixing dinner only one night per week while still benefiting from homemade meals other nights of the week. Ready availability of these meals may provide a positive alternative to convenient fast foods.

Research on dinner groups among college students is absent in the literature. However, research on the dietary impact of family meals is abundant. For example, the frequency of family meals and availability of fruits and vegetables at meal times was negatively associated with fast food intake among adolescents.²² Perhaps dinner groups among college students represent a type of pseudo-family meal setting.

Positive effects of family meals on children and adolescents have been described in the literature. Researchers have reported that when more fruits and vegetables are served or offered, children and adults consume larger quantities of produce.^{20,21} Data collected from focus groups with dinner group participants suggest that most dinner group members expect at least one vegetable side and maybe one fruit side to make a complete, acceptable meal.¹⁹ Perhaps the presence of regular fruit and vegetable sides at dinner group meals may affect the intake of young adults. A large body of literature suggests both nutritional and social benefits of family meals on adolescents.⁴⁵ More fruits and vegetables and less soft drink is consumed by adolescents when family meals are held and frequency of family meals and availability of fruits and vegetables is positively associated with higher intakes.^{13,22-24}

Evidence suggests a potential dietary benefit from the social aspect of shared meals among college students. Adolescents and college students are positively influenced by peer support of healthy eating behaviors and research confirms the validity of targeting social support for improved dietary habits.^{6,8,22,25} In a study performed by Cluskey and Grobe⁸ on the social influence of meals in college students, students' social environment was found as a highly influential factor affecting food choices. One participant had a roommate who cooked and together they supported each other in positive eating habits.⁸ Other research examining the meal structures and intakes of young adults found that young adults who ate meals with others tended to eat healthier (a larger variety and amount of dark green and orange vegetables and fruits) compared to students who ate more frequently "on the run."¹⁷ Another study examining theory-based targets for behavior change reported social support as an influential target for healthful dietary habits.⁶ While young adults seem to value eating in with others, they report finding it difficult to make time to do so.¹⁷ Dinner groups may provide a formal, predictable, and reliable

structure that allows college students to meet together frequently to eat and observe the associated benefits.

Evidence also suggests a potential benefit of dinner group participation from students' involvement in meal preparation and planning activities. Two studies have found that when adolescents and young adults are actively involved in meal planning and preparation they consume healthier diets. Specifically, more fruits and vegetables and fewer carbonated beverages and fast food products are consumed.²⁶ One study found that adults who obtained the food they ate most often from cooking it themselves in the home had the highest Healthy Eating Index (HEI) scores, an index that compares dietary intake to national dietary recommendations.²⁷ Other studies have found that meal planning promotes higher fruit and vegetable consumption.^{8,46} These data suggest that by rotating meal preparation responsibilities in a dinner group, students may make healthier food choices and have healthier food choices available for others to consume.

Dinner groups are a type of social eating that developed spontaneously at Brigham Young University (BYU) around 2005.¹⁹ These groups are composed of three or more students who share meal preparation activities throughout the week. One qualitative study was performed previously at BYU describing this phenomenon, but it is otherwise not reported in the literature.¹⁹ While participants in that study thought that they ate more variety including fruits and vegetables and less fast food, their actual intake was not measured. The purpose of the current study is to quantify the fruit, vegetable, and SSB intake of students who do and do not participate in DGs. If statistical and practically significant differences are observed, encouraging and aiding DG formation among college students may be a useful method for improving fruit and vegetable intake and decreasing SSB consumption.

OBJECTIVES & HYPOTHESES

Research Question #1 (Intake)

Do students who participate in a DG more closely meet the standard recommended fruit and vegetable patterns on average and consume less SSB than students who do not belong to a DG?³²

Research Question #1 Objectives.

- Determine if students who participate in a DG eat more fruits and vegetables than those who do not participate in a DG.
- Determine if students who participate in a DG drink less SSB than those who do not participate in a DG.

Research Question #1 Hypotheses

- Students who participate in a DG eat more fruits and vegetables than those who do not participate in a DG.
- Students who participate in a dinner group drink less SSB than those who do not participate in a DG.

Research Question #2 (Perceptions)

Does dinner group participation affect college students' perception of their health and nutritional adequacy?

Research Question #2 Objectives.

- Compare the perception of overall health, fruit and vegetable adequacy, and acceptability of SSB intake between students who do and do not participate in dinner groups.

- Determine if students who participate in a dinner group perceive that they eat more fruits and vegetables and less SSBs because of their participation in a dinner group.

Research Question #2 Hypotheses

- Students who participate in dinner groups perceive greater overall health, fruit and vegetable intake adequacy, and acceptability of SSB than students who do not participate in dinner groups.
- Students who participate in dinner groups perceive that they eat more fruits and vegetables and less SSB because of their participation in a dinner group.

METHODS

Research Design

The current study is a quantitative examination of foods consumed by college students. Qualitative data was previously collected from focus groups of students from the same university.⁶

Theoretical Constructs. The current study was developed using constructs from the Social Cognitive Theory (Table 4). This theory suggests that an individual's behavior is a result of personal, environmental, and behavioral influences that work dynamically to influence a person's choices.²⁸ The factor "environment" is addressed in our observation of dinner group participation and its effect as an external factor on an individual's food group intake. We assessed the constructs "behavior," "environment," "and personal factors" in our collection of the participant's perception of their overall health, fruit, vegetable and SSB intake, and influence of dinner group participation on both.

Variables Measured. Using an online survey we measured self-reported intake of fruits, vegetables, and sugar sweetened beverages (SSBs) as dependent variables and dinner group (DG) participation frequency as independent variables (no membership in a DG (non-DG), membership in a DG that meets one to three times per week (1-3/wDG), or membership in a DG that meets four or more times per week ($\geq 4/wDG$)). We also assessed college students' perceptions of overall health, adequacy of their intake of fruits and vegetables, and their perception of the excessiveness of their SSB intake. Lastly, we assessed DG participants' perception of how their participation affects the healthfulness of their diet.

Operational Definitions. We defined dinner groups as a group of three or more students who share meal preparation activities. Though in the previous qualitative research mentioned above the definition of dinner groups included the stipulation that the group meet at least four times per week, we decided to allow groups with fewer frequencies to participate in our study as frequency proved a valuable explanatory variable; the more frequently a student meets with dinner groups, the more favorably they rate dinner groups' influence on their health.

Sample Selection, Exclusions, & Incentive

We obtained our sample through BYU's Office of Institutional Assessment and Analysis. A sample of 10,000 students was randomly selected from the population of BYU students who were single, between the ages of 17 and 25, were currently enrolled in daytime classes (N=34,232), and who did not live in the on-campus dormitory where there are no kitchen facilities in the individual rooms.

Our respondents (n=584) were 17-24 years of age and the average age was 20.5 years. Sixty-one percent were female (n=352), thirty-nine percent were male (n=222). Respondents were primarily White (78%). The next most populous groups were Asian (4%) and Hispanic (3%). African American, Pacific Islander, Hawaiian, and Alaskan Native/American Indian groups each compromised less than 1% of respondents. These percentages closely reflect the student population at BYU where less than 14% of students are from minorities.³⁶

Screening questions at the beginning of the survey verified that respondents met the sample criterion listed above. Students living with adult relatives such as parents or grandparents were disqualified from study participation. Those who did not meet the criterion did not progress to take the survey, thus our final sample size was 548 students. Following the screening questions, respondents were asked a question regarding dinner group membership to separate

dinner group members from non-dinner group members as well as categorize dinner group members based on frequency of group meetings (see survey instrument in appendix for screening questions).

As an incentive we offered 3 free mP3 downloads to all respondents who completed the survey. According to results from a pilot study and power analysis we found that we required a sample size of 230 students in each to detect a practically significant difference of $\frac{1}{2}$ cup fruit or vegetable intake per day. We set a predefined quota of 250 responses from each group within the survey software so the number of rewarded vouchers would be kept within reason and budget limits.

Thirteen percent (n=368) of our respondents belonged to a DG that met either one to three times per week or four or more times per week; the incidence rate was formerly unknown. We had 2,564 non-DG students respond, but only the first 250 were allowed to progress to complete the survey. Of those students that belong to DGs, 53% were in the 1-3/wDG group and 47% were in the ≥ 4 /wDG group. Students not belonging to a dinner group numbered 243, 167 students met with a dinner group 1-3 times per week, 138 students met with a dinner group 4 or more times per week .

More females than males overall responded to the survey and each group had more female respondents than males (non-DG had 110 males, 146 females; 1-3/wDG had 56 males and 116 females; ≥ 4 /wDG had 56 males and 90 females).

Data Collection

The survey was administered online using Qualtrics Survey Research Suite software by www.qualtrics.com Inc. Students were e-mailed an invitation containing a unique link that directed them to the survey. Two reminder e-mails requesting survey responses were sent to

those who had not yet completed the survey, each two weeks apart. While our initial plans included a postcard reminder to utilize a second medium of contact, responses were sufficient through e-mail reminders alone to not warrant the expense.

Survey questions were adapted from the national Behavior Risk Factor Surveillance System (BRFSS).³¹ Where BRFSS questions are based on frequency of food group consumption (e.g. “about how many times in the last day, week or month did you consume orange vegetables?”), we chose instead to collect data on amounts (e.g. “During the past month, about how many cups of dark green vegetables did you eat?”) in order to compare food intake with average recommended intakes. We maintained BRFSS’s operational definitions for each question (i.e. what to include and not include in counts of orange vegetables) (Table 1). We added questions not originally contained in BRFSS about SSBs and perceptions about health and nutrition to the survey.

Though BRFSS questions are usually administered orally over the phone, we anticipated that the digital print medium would increase data reliability by using a standardized question and answer format that would limit surveyor bias. Because our sample was composed of college students, we were not concerned with literacy limitations associated with printed surveys.

Survey respondents were allowed to revisit past questions to modify their answers. We estimated that this would be a benefit if respondents counted foods consumed for one question that were meant for another later in the survey, allowing them to change their former answer to reflect inclusion criteria.

The survey instrument was tested and reviewed before administering to ensure validity and reliability. To obtain evidence of validity we conducted cognitive interviews and questions were reviewed by experts in nutrition as well as survey research for face, content, and construct

validity.³³ A pilot study was conducted with students (n=318) who met the demographic criteria needed for our study. The Cronbach's alpha values for intake questions were 0.77 for fruit, 0.68 for vegetable intake, and 0.78 for SSB intake, indicating good reliability.³⁴

Data Analysis

We added reported intake amounts of the vegetable subgroups (orange, green, beans, and other) together and fruit subgroups (fruit and 100% fruit juice) to compare collected intakes with intakes recommended for an average 2,000 calorie diet by the U.S. Department of Agriculture: 2.5 cups of vegetables per day and 2 cups of fruit per day.³² Survey respondents reported their intakes in day, week, or month increments. Weekly measures were divided by 7 and monthly measures by 30 and then summed to give daily intake amounts.

All fruit and vegetable intake data collected from the survey was reported in cup increments. Adjustments were made to reported values of green vegetables to adjust for equivalent cup sizes according to ChooseMyPlate standards. Specifically, green vegetable values were divided by 2 (the majority of vegetables included in the green category are leafy greens and 2 cups of leafy green vegetables is equivalent to 1 cup of vegetables).

Sugar sweetened beverage intakes were reported in ounces consumed. Daily intakes were calculated using the same methods previously described. Perceptions regarding overall health and diet adequacy were reported as ratings on a five point Likert scale (e.g. 1-poor to 5-excellent). Perceptions of fruit and vegetable adequacy and SSB healthfulness were compared to reports of actual intakes.

Statistical Analysis

Statistical analysis of the data was performed by consulting statistician Dennis Eggett. Analysis of variance was assessed using the Tukey-Kramer post hoc analysis (SAS version 9.3, SAS Institute Inc., Cary, NC, USA, 2010). The level of significance was established at a p-value of 0.05.

RESULTS

All Students

Overall mean intakes of fruit and vegetables were low, a finding consistent with earlier research on college student intake.^{4,5} Our findings show the mean total fruit intake among students was 1.5 cups per day while the mean vegetable intake was 0.86 cups per day, or a mean of 2.36 cups combined. Comparatively, one study reported a mean of 4.5 ± 2.5 cups combined fruit and vegetable intake, and another reported female students at the 75 percentile of intake ate 18.3 servings weekly (2.6 servings daily) and male students at the 75 percentile of intake ate 21.7 servings weekly (3.1 servings daily).^{4,5} While our findings closely align with one study, the other shows high variability in intakes in the young adult population.

Compared to intakes recommended by the USDA for fruit intake, 2 cups of fruit per day, our findings show that students were only 0.5 cups deficient in fruit.³² However, students' vegetable intake was less adequate, being about 1.5 cups short of the 2.5 cups daily recommended intake.

Results from perception ratings and fruit and vegetables intakes indicate that students accurately perceive whether or not their intake is adequate. The total cups of fruit and vegetables reported and the perception of intake adequacy among students was significantly related ($P < .0001$). Students who ate less total fruit cups or total vegetable cups rated their intake more poorly than students who ate more total fruit or vegetables (Table 5). For example, students who rated their total fruit intake as 1 (poor) consumed a mean of 0.68 cups of total fruit per day while students who rated their fruit intake as a 5 (excellent) consumed a mean of 2.49 cups of fruit per day. Students who rated their total vegetable intake as 1 (poor) consumed a mean of 0.33 cups of

total vegetables per day while students who rated their vegetable intake as a 5 (excellent) consumed a mean of 1.53 cups of vegetables per day. This suggests that students are aware of the adequacy or inadequacy of their fruit and vegetable intake compared to recommendations for good health.

Table 5. Fruit and Vegetable Intakes Compared to Intake Adequacy Perception Ratings

Adequacy Rating	Mean Total Fruit Cup Intake±SE	Mean Total Veg Cup Intake±SE
1	0.68±0.20	0.33±0.11
2	0.85±0.11	0.52±0.06
3	1.43±0.09	0.85±0.05
4	2.29±0.10	1.06±0.06
5	2.49±0.17	1.53±0.14

SE=Standard Error

Statistical analysis included analysis of variance with Tukey-Kramer post-hoc adjustments

Ratings and intake relationship significant at $p < 0.0001$

Ratings were reported on a scale of 1 (Poor) to 5 (Excellent) in response to “How would you rate your diet in terms of overall fruit/vegetable?”

Students were asked to rate their overall health with a question used on the national Behavior Risk Factor Surveillance. Students rated their health very similarly to adults nationally and in the state of Utah. On a five-point Likert scale from 1 (poor) to 5 (excellent) the mean rating from students was about 3.8 ± 0.05 . In 2010, the median percentile of 54.6% adults in the U.S. responding to BRFSS reported their overall health as excellent or very good, and equivalent of a 4 or 5 rating on the Likert scale.³⁸

Gender Differences

Food intakes were significantly different between genders. Specifically, the intake of fruit juice differed significantly ($p=0.01$) with the mean intake among males at 0.52 cups per day and the mean intake among females at 0.36 cups per day. However these findings may not be meaningful as they represent a difference of only 2 tablespoons in intake. In the SSB intake category, males drank significantly more fruit drink daily than females ($p=0.0004$). Age approached significance as a factor in fruit drink consumption where it seems that older students consume less than younger students ($p=0.06$, slope -0.21)(data not shown). Concerning soda intake, on average males consumed about 2.5 ounces of soda per day while females consumed about 1 ounce per day ($p=0.004$). In total, male students reported drinking significantly more total SSB than did females ($p=0.004$). Males' mean SSB intake was about 7 ounces per day while females' mean intake was about 3 ounces per day (Table 6).

We did not find significant differences between genders in fruit and vegetable intake. This finding differs from literature that has reported male college students eat more vegetables than female college students.^{4,5}

When asked to rate their overall health, female and male students differed significantly in their perceptions ($p=.03$)(data not shown). Male students perceived their overall health more favorably, selecting a higher rating compared to female students' ratings. Concerning diet healthfulness, females perceived their vegetable intake more favorably than males did ($p=0.01$) and males perceived their SSB intake to be in excess more than females did ($p=0.0003$). This finding coincides with the difference that males drank significantly more SSB than females.

Table 6. Mean Intakes of Fruit, Vegetable, and Sugar Sweetened Beverage by Gender

	Male Intakes/SE	Female Intakes/SE	P value
<i>Vegetables</i>			
Green Veg (cups)	0.22±0.02	0.27±0.02	0.11
Orange Veg (cups)	0.30±0.03	0.34±0.03	0.41
Bean (cups)s	0.26±0.02	0.21±0.02	0.12
Other Veg (cups)	0.83±0.08	0.78±0.06	0.62
Total Veg (cups)	0.87±0.06	0.84±0.05	0.64
<i>Fruits</i>			
Fruit (cups)	1.06±0.09	1.22±0.07	0.17
Fruit Juice (cups)	0.52±0.05	0.36±0.04	0.01
Total Fruit (cups)	1.59±0.10	1.51±0.08	0.52
<i>Sugar Sweetened Beverages</i>			
Fruit Drink (oz.)	2.85±0.36	1.19±0.26	0.0004
Soda/Pop (oz.)	2.41±0.37	1.03±0.27	0.004
Sports Drink (oz.).	1.60±0.40	0.67±0.29	0.07
Caffeinated Energy Drink (oz.).	0.06±0.21	0.32±0.16	0.34
Total Sugar Sweetened Beverage (oz.)	6.91±0.98	3.22±0.72	0.004

SE=Standard Error

Statistical analysis included analysis of variance with Tukey-Kramer post-hoc adjustments

SURVEY INSTRUMENT

I. Implied Consent



You are being invited to participate in this research study of college students' food intake. My name is Erica Hansen I am a graduate student at Brigham Young University. I am working with Dr. Lora Beth Brown, a professor at BYU, to conduct this survey as part of my thesis research. I am interested in finding out about the types and amounts of fruits, vegetables, and beverages students eat.

Your participation in this study will require the completion of the survey. This should take approximately 10 minutes of your time. Your responses to this survey will be kept confidential. You will not be paid for being in this study, but you will be compensated by receiving a PIN to download 3 free MP3's at the completion of this survey. This survey involves minimal risk to you. The benefits, however, may impact society by helping increase knowledge about the food habits and beliefs of college students.

You do not have to be in this study if you do not want to be. You do not have to answer any questions that you do not want to answer for any reason. We will be happy to answer any questions you have about this study. If you have further questions about this project or if you have a research-related problem you may contact me, Erica Hansen at byu.ndfs.research@gmail.com or my adviser, Dr.Lora Beth Brown at lorabeth_brown@byu.edu.

If you have any questions about your rights as a research participant you may contact the IRB Administrator at A-285 ASB, Brigham Young University, Provo, UT 84602; irb@byu.edu; (801) 422-1461. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

The completion of this survey implies your consent to participate.

Thank you!

1. Please indicate your status as a student this semester (Fall 2012):

- Currently on campus attending daytime classes Fall 2012
- Not currently on campus attending classes Fall 2012 (This includes, but is not limited to, students who have graduated, are doing a study abroad, are taking a semester off, on a wait list to attend BYU, who are planning to attend BYU in a later semester, or who are not students at BYU)

2. Indicate your marital status

- Married
- Single

3. Indicate your living arrangement

- Helaman Halls
- Foreign language student housing
- Other apartment-style housing with a kitchen
- Single residence home with other students or young adults
- Single residence home with parents, or other older adult relatives

4. Do you currently participate in a dinner group?

A dinner group is defined as:

A group of three or more single students who share meal preparation responsibilities.

- Yes
- No

4a. If so, how often does your dinner group meet?

- 1-3 times per month
- 1-3 times per week
- 4 or more times per week
- Never. I do not belong to a dinner group.

Instructions

For the next questions please think about all meals, snacks, and food consumed at home and away from home. Please think about all forms of fruits and vegetables including cooked or raw, fresh, frozen or canned.

You only need to provide an answer in ONE of the three answer boxes for each question. For example, 2 cups a day, OR 5 cups a week, OR 3 cups a month, and so forth. If you did not eat any of the particular fruit or vegetable during the past month, type the number zero into the "per month" answer box.

Below is an EXAMPLE QUESTION. Please review to make sure you understand how you are supposed to answer the questions in this survey.

Dairy **Question Category**
Actual Question

During the past month, about how many cups of dairy foods did you eat?

<i>Do Include</i>	<i>Do NOT Include</i>
<i>All types of milk (Skim, 1%, 2%, whole milk, flavored milks)</i>	<i>Butters, creams, half and half, or sour cream</i>
<i>Cheeses: cheddar, mozzarella, provolone, Havarti, Couda, brie, blue cheese, muenster, Colby jack, pepper jack, Parmesan, Romano, queso, Swiss</i>	<i>Ice cream, pudding, or other milk based desserts</i>
<i>Yogurt, Greek yogurt, cottage cheese</i>	

Instruction to help jog your memory and make sure you're including the right foods in your answer.

Please indicate how many cups per day, week OR month you ate of dairy foods in the last month.

Please indicate the amount
in cups

Cups per day OR	<input type="text" value="0"/>	
Cups per week OR	<input type="text"/>	Where you type your answer in ONE of the boxes
Cups per month	<input type="text"/>	

. Click the "next" (>>) button to begin the survey.

5. Fruit. During the past month, about how many cups of fruit did you eat?

<i>Do Include</i>	<i>Do NOT Include</i>
<i>Fresh, frozen, or canned fruit.</i>	<i>Fruit jam, jelly, or fruit preserves.</i>
<i>Dried raisins, cran-raisins</i>	<i>Dried fruit in ready-to-eat cereals.</i>
<i>Cut up fresh, frozen, or canned fruit added to yogurt, cereal, jello, and other meal items.</i>	

Please indicate how many cups per day, week OR month you ate of fruit in the last month.

			Please indicate the amount in cups
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

6. Cups of 100% fruit juice. During the past month, about how many cups of fruit juice did you drink? 1 cup is representative of 1 measuring cup, or 8 ounces of fluid.

<i>Do Include</i>	<i>Do NOT Include</i>
<i>100% pure juices including orange, mango, papaya, pineapple, apple, grape (white or red), or grapefruit.</i>	<i>Fruit drinks with added sugar or other added sweeteners like: Kool-aid, Hi-C, lemonade, cranberry cocktail, Tampico, Sunny Delight, Snapple, Fruitopia, Gatorade, Power-Ade, or yogurt drinks.</i>
<i>100% juice blends such as orange-pineapple, orange tangerine, cranberry-grape are also acceptable as are fruit-vegetable 100% blends.</i>	<i>Fruit juice drinks that provide 100% daily vitamin C but include added sugar.</i>
<i>100% pure juice from concentrate (i.e., reconstituted).</i>	<i>Vegetable juices such as tomato and V8</i>
<i>Only count cranberry juice if it is 100% juice with no sugar or artificial sweetener added.</i>	

Please indicate how many cups per day, week OR month you drank in the last month.

			Please indicate the amount in cups
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

7. Cooked or Canned Beans. During the past month, about how many cups of beans did you eat?

<i>Do Include</i>	<i>Do NOT Include</i>
<i>Round or oval beans or peas such as navy, pinto, kidney, split peas, cow peas, hummus, lentils, black, black-eyed peas, cow peas, garbanzo, lima beans and white beans.</i>	<i>Long green beans such as string beans, broad or winged beans, or pole beans</i>
<i>Re-fried beans, baked beans, beans in soup</i>	
<i>Soybeans also called edamame, tofu (bean curd made from soybeans), bean burgers including garden burgers and veggie burgers.</i>	
<i>Falafel and tempeh. Please indicate how many cups per day, week OR month you ate in the last month.</i>	

Please indicate how many cups per day, week OR month you ate of cooked or canned beans in the last month.

			Please indicate the amount in cups
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

8. Dark Green Vegetables. During the past month, about how many cups of dark green vegetables did you eat?

<i>Do Include</i>	<i>Do NOT Include</i>
<i>Broccoli</i>	<i>Iceberg (head) lettuce</i>
<i>All raw leafy green salads including romaine, chard, collard greens, spinach, mesclun, romaine lettuce, boy choy, dark green leafy lettuce, dandelions, komatsuna, watercress, and arugula.</i>	
<i>All cooked greens including, kale, collard greens, choys, turnip greens, mustard greens.</i>	

Please indicate how many cups per day, week, OR month you ate in the last month.

			Please indicate the amount in cups
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

9. Orange Vegetables. During the past month, about how many cups of orange vegetables did you eat?

<i>Do Include</i>	<i>Do NOT Include</i>
<i>All forms of sweet potatoes including baked, mashed, casserole, pie, or sweet potato fries</i>	<i>Pumpkin bars, cake, bread or other grain-based dessert-type food containing pumpkin.</i>
<i>All hard-winter squash varieties including acorn, autumn, banana, butternut, spaghetti, hubbard, kabocha (also known as Ebisu, Delica, Hoka, Hokkaido, or Japanese Pumpkin).</i>	
<i>All forms of carrots including long or baby-cut and carrot-slaw.</i>	
Pumpkin, including pumpkin soup and pie.	

Please indicate how many cups per day, week, OR month you ate in the last month.

			Please indicate the amount in cups
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

10. Other Vegetables. Not counting what you previously included in this survey, during the past month, about how many cups of other vegetables did you eat?

<i>Do Include</i>	<i>Do NOT Include</i>
<i>Tomatoes, tomato juice, or V-8 juice</i>	<i>Vegetables you have already counted</i>
<i>Corn, eggplant, peas, lettuce, okra, beets, cauliflower, bean sprouts, avocado, cucumber, onions, peppers (red, green, yellow, orange); all cabbage including American-style coleslaw; mushrooms, snow peas, snap peas, broad beans, string, wax, or pole-beans</i>	<i>Rice or other grains</i>
<i>White potatoes that are not fried such as baked or mashed potatoes</i>	<i>Fried potatoes</i>
<i>Any form of vegetable (raw, cooked, canned, or frozen)</i>	<i>Products usually consumed as condiments including ketchup, catsup, salsa, chutney, relish.</i>

Please indicate about how many cups per day, week OR month did you ate in the last month.

			Please indicate the amount in cups
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

III. Instructions

For the next questions please provide your answer in ounces consumed. Not cups.

11. During the past month, about how many fluid ounces did you drink of sweetened fruit drinks? *A standard soda can is 12 fluid ounces, a liter bottle contains 34 fluid ounces, a two liter bottle contains 68 fluid ounces.*

<i>Do Include</i>	<i>Do NOT Include</i>
<i>Kool-Aid, cranberry, and lemonade with added sugar</i>	<i>100% fruit juice</i>
<i>Fruit drinks you made at home and added sugar to</i>	<i>Calorie-free/sugar-free fruit flavored drinks like Crystal Light</i>
<i>Sunny Delight, Tampico, punch and like beverages</i>	

About how many fluid ounces did you drink of sweetened fruit drinks?

			Please indicate the amount in ounces
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

12. During the past month, about how many fluid ounces did you drink of regular soda or pop that contains sugar? *A standard soda can is 12 fluid ounces, a liter bottle contains 34 fluid ounces, a two liter bottle contains 68 fluid ounces.*

<i>Do Include</i>	<i>Do NOT Include</i>
<i>All types of sugar sweetened soda</i>	<i>Diet soda or diet pop</i>

About how many fluid ounces did you drink of regular soda or pop that contains sugar?

			Please indicate the amount in ounces
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

13. During the past month, about how many fluid ounces did you drink of calorie-containing sports drinks? *A standard soda can is 12 fluid ounces, a liter bottle contains 34 fluid ounces, a two liter bottle contains 68 fluid ounces.*

<i>Do Include</i>	<i>Do NOT Include</i>
<i>Gatorade and Powerade</i>	<i>Flavored water drinks like Propel</i>

About how many fluid ounces did you drink of calorie-containing sports drinks?

			Please indicate the amount in ounces
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

14. During the past month, about how many fluid ounces did you drink of caffeinated energy drinks per month? *A standard soda can is 12 fluid ounces, a liter bottle contains 34 fluid ounces, a two liter bottle contains 68 fluid ounces.*

<i>Do Include</i>
<i>Red Bull, Monster, 5-hour Energy, Rockstar, AMP, Energy Potions</i>

About how many fluid ounces did you drink of caffeinated energy drinks?

			Please indicate the amount in ounces
Per day OR			<input type="text"/>
Per week OR			<input type="text"/>
Per month			<input type="text"/>

15. Please indicate your level of agreement with the following statements. Click and drag the sliding bar across the ruler to pull it to the desired location.

	Poor		Excellent
	1	2	3
	4	5	
In general my health is:			

16. How would you rate the food you eat in terms of:

Overall amount of fruits	1	2	3	4	5
Overall amount of vegetables					

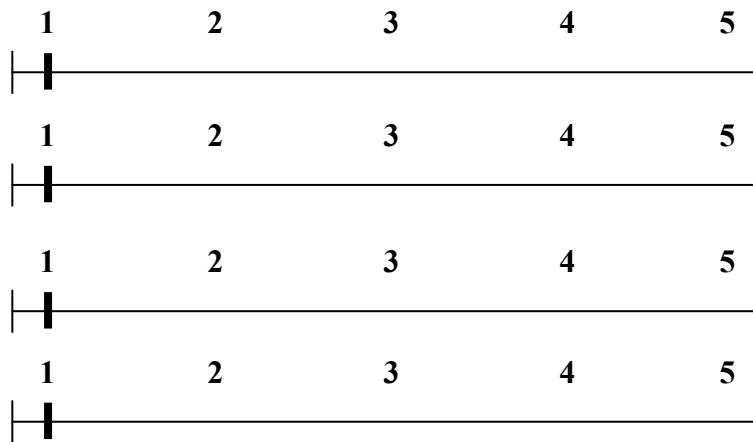
17. Rank your agreement with the following statement:

	Strongly Agree		Strongly Disagree
	1	2	3
	4	5	
I drink too much SSB.			

18. Rank your agreement with the following statements:

My overall health is positively affected by my participation in a dinner group	1	2	3	4	5
Compared to NOT being in a dinner group, my participation in a dinner group helps me eat a healthier, well-balanced diet					
Compared to NOT being in a dinner group, my participation	1	2	3	4	5

in a dinner group helps me eat more vegetables throughout the week.
Compared to NOT being in a dinner group, my participation in a dinner group helps me eat more fruit throughout the week
I eat more fruit on days I meet with my dinner group compared to days I do not
I eat more vegetables on days I meet with my dinner group compared to days I do not



19. What is your age? (In years)

20. Please indicate your gender.

- Male
- Female

21. About how tall are you without shoes?

	Feet	Inches
Indicate your height in feet and inches with the drop down menu to the right.		

22. Please enter your weight in pounds.

23. What is your major?

24. Please indicate your ethnicity.

- American Indian or Alaska Native
- Asian
- Black or African American
- Pacific Islander
- Hispanic
- White
- Hawaiian
- Other

End. Thank you for taking the time to complete this survey.

Please enter your e-mail address below to receive your 3 free music downloads. We'll be sending out the redemption PINS once we've collected all of the responses. You should expect to see them in your inbox in the next two weeks. Thank you!

E-mail address:

Re-enter e-mail address:

Survey Powered By [Qualtrics](#)

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