Assessing the factors that influence the food choices of college commuter students

Amanda Miller

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This cross-sectional study examined the factors that influence the food choices of college commuter students. An online survey was distributed to all undergraduate students 18 years or older who lived outside of the county that encompasses the university and were full-time (n = 7,056). A total of 221 eligible students completed the survey. Multinomial cumulative and binary logistic regressions were used to examine the relationship between various factors and the healthiness of participants’ diets. Additionally, Wilcoxon signed rank sum test was used to analyze the importance of specific variables on the food choices of participants. Cost, convenience, and health concerns appeared to influence the food choices of commuter students significantly more than weight control (p < 0.001). Students who were more influenced by health (p = 0.019) and those who lived with their parents (p = 0.014) were more likely to bring food from home, which has been previously associated with higher dietary quality. The majority (91%) of participants failed to meet any or only met one nutrient recommendation. Based on these results, commuter students appear to have inadequate diets and are most influenced by cost, convenience, and health when making food choices. Therefore, nutrition interventions that focus on providing commuter students with education about how to eat healthy on a limited budget and minimal time for food preparation are needed.
ASSESSING THE FACTORS THAT INFLUENCE THE FOOD CHOICES
OF COLLEGE COMMUTER STUDENTS

BY

AMANDA MILLER
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A THESIS SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
MASTER OF SCIENCE

SCHOOL OF FAMILY, CONSUMER, AND NUTRITION SCIENCES

Thesis Director:
Josephine Umoren
ACKNOWLEDGEMENTS

I would first like to thank Dr. Josephine Umoren for her support and guidance throughout this entire process. She has been a constant resource for me while navigating through this project and I cannot express my gratitude enough. Dr. Eunha Myung was very helpful with the statistical analysis of this study and was always willing to provide input when needed. Her feedback was instrumental in formatting the results of this study. Dr. Sheila Barrett provided excellent feedback for all areas of the thesis. Her questions and input helped me to organize my thesis into a concise and readable format. I would sincerely like to thank each and every one of my committee members for their feedback, guidance, and support throughout this process. Recruitment for this study was made possible through the Office of Registration and Records. Deidre Young was always willing to provide assistance with any information I needed. Lastly, I would like to thank Alec Saline for proofreading my thesis, providing feedback, and encouraging me along the way.
DEDICATION

To my parents, Earl and Pam Miller, who have supported me every step of the way. I cannot thank you enough for the love, support, and encouragement you have given me.
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</tbody>
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CHAPTER 1
INTRODUCTION

Factors that influence people’s food choices have been widely studied (1-19). However, the factors that influence the food choices of college students, and specifically college commuter students, have not been as widely studied. Commuter students are of interest because they face the additional challenge of having a long commute, which may make it more difficult to plan meals and have a healthy diet. Therefore, the aim of this study was to examine the factors that most influence the food choices of commuter students’ food choices. The research shows that some factors tend to have a stronger influence than others, especially when looking at the college student population (20-34).

Taste has commonly been cited as the most influential factor on food choices (1, 2, 9, 19). However, other factors seemed to be more influential on the food choices of college students at times. Time constraints and cost have been reported as reasons for not selecting foods based solely on taste (22, 23). Gender has also been identified as having a significant influence on food choices of both the general and college student populations. The data suggests that females are more likely to be more health and weight-conscious than males when making food decisions (3, 12, 25, 30). In one study, individuals were asked to participate in focus groups and fill out a short, anonymous questionnaire relating to healthy eating and body dissatisfaction. Female participants of all ages reported that their food
choices were often influenced by concerns of appearance. Gender appears to influence females of all age groups, including adolescents (12).

A study conducted on 1,918 working Americans found that the factors reported as the most influential on food choices were convenience (34%), taste (28%), cost (21%), and health (17%) (4). Multiple studies have indicated that younger adults were more likely to identify a lack of time as a barrier to healthy eating than older adults (8, 12). Similarly, when assessing the food choices of college students, convenience was consistently found to be one of the most influential factors (22, 23). Cost has also been shown to be more influential on the food decisions of young adults (12). Although it is evident that cost also influences the general population’s food choices (20), cost appears to be a bigger barrier to healthy eating among young adults and college students, specifically (12, 22, 31).

When assessing the impact of health concerns on food choices, it was found that adults who placed more importance on health were more likely to consume healthier diets (8). In one study, older adults were shown to be more likely to be concerned with eating healthy than younger adults (9). While college students appeared to be influenced by health concerns in some studies, health was not considered one of the most influential factors when making food decisions. Health was ranked as the fourth most influential factor, ranking below convenience, taste, and cost (22). Students who placed an importance on alternative food production (27), utilized nutrition labels (30), and had knowledge of the Dietary Guidelines (32) were more likely to have healthier diets than students who did not.

Cooking skills have also been shown to influence people’s food choices and overall dietary quality. A positive correlation between cooking skills and vegetable intake has been demonstrated (18). Men commonly reported a lack of cooking skills as a barrier to healthy
eating more often than women (17). Young adults were also more likely to find it difficult to cook than older adults (12). When assessing college students, similar findings were reported. Inadequate cooking skills were also reported as a barrier to healthy eating in the college student population (31, 33).

In a study conducted on college students’ food choices, several factors that influence their food choices were reported. Students who lived on campus were more likely to have higher fruit and vegetable intakes than those who lived off campus (34). However, another study reported that students who lived with their parents consumed, on average, more fruits, vegetables, and meat compared to all other students who did not (26). Upper-classmen were more likely to consume an afternoon snack, which may have been due to the fact that they typically live off-campus and experience more difficulty with having a consistent eating pattern (22). When comparing 4-year college students, 2-year college students, and non-students, it was found that 4-year college students typically had better dietary intakes than the other groups (20).

Poor dietary choices have been linked to poor health outcomes such as obesity, type II diabetes, and cardiovascular disease (35-41). Poor dietary choices often lead to excessive weight gain and obesity, which has been linked to an increased risk for developing chronic diseases (35). Therefore, it is important to examine what factors are most influential on food choices and how these factors affect the healthiness of diet.

This study was constructed based on the theoretical framework of the health belief model. This model assumes that a person’s readiness to change a specific health behavior is dependent on their perceived susceptibility, severity, benefits, and barriers (42). The health behavior that was assessed in this study was making food choices. This study was designed to
examine perceived barriers such as cost, time, poor cooking skills, living away from parents, and not having access to a microwave on campus and secondarily, to determine if there was a significant relationship between these factors and the healthiness of commuter students’ diets. This study was also designed to assess commuter students’ perceived susceptibility to disease and how it related to their food choices by examining if health concerns influenced commuter students’ food choices.

Justification

Research has often been conducted on college students; however, the literature shows that there is a lack of research regarding college commuter students, specifically. Since nearly half of all undergraduate students at this university lived outside of the county that encompasses the university, it provided an excellent opportunity to conduct research on the college commuter student population (43). The literature has showed that several factors may influence food choices and secondarily, that poor dietary quality is strongly linked to the development of several chronic diseases (35). Additionally, young adulthood is a critical time when dietary habits that will be carried into adulthood are typically formed (44). Therefore, the purpose of this study was to examine the factors that influence commuter students’ food choices and assess the healthiness of their diets in relation to those factors. The multiple factors that have been studied in the general population, and specifically the college student population, were considered when designing this study.
The Problem and Its Setting

Statement of the Research Question

What factors have the most influence on commuter students’ food choices and how do these factors relate to the healthiness of commuter students’ diets?

Objective

The objective of this study was to examine how various factors influenced food choices and test whether a relationship exists between certain variables and the healthiness of commuter students’ diets.

Hypotheses

This study had four hypotheses:

• $H_1$: Commuter students will be most influenced by convenience when making food choices when compared to cost, health, and weight control.

• $H_2$: Commuter students who utilize the commuter lounge will have healthier diets than those who do not.

• $H_3$: Commuter students who bring meals from home to campus two or more times per week will have healthier diets than those who do not.

• $H_4$: Commuter students who indicate having good or excellent cooking skills will have healthier diets than those who do not.
CHAPTER 2
METHODOLOGY

Study Design

This study had a non-experimental, cross-sectional design using a convenience sample of 221 college commuter students at a midwestern university. An online survey was distributed through the university mail system to students who were eligible to participate.

Sample Selection

Participants for this study were recruited from the list of commuter students currently enrolled at a midwestern university. In order to be eligible to participate, subjects must have been full-time undergraduate students, at least 18 years of age, and lived outside of the county that encompasses the university. The list of zip codes within the county that encompasses the university was obtained and students who lived within those zip codes were excluded from participating in this study (45). An application for permission to conduct the study using human subjects was submitted to the university’s Institutional Review Board (IRB) before participants were recruited for this study (Appendix G). Eligible students were recruited through the university’s Admissions Office and contact information for eligible students was obtained through the Office of Registration and Records. A “Request for Student Data” form was completed and submitted to the Office of Registration and Records (Appendix B). A “Request of Mass Email” inquiry was submitted to the Provost Office to facilitate contacting
the eligible students via university e-mail (Appendix C). In order to increase awareness of this study and recruit more participants, a flyer was distributed around campus after approval from Student Involvement and Leadership Development was obtained (Appendix D).

Instrument

A two-part instrument was used for this study in order to examine the influencing factors of food choices and how they relate to the healthiness of commuter students’ diets (Appendix H). The first section of the survey included a 26-item Dietary Screener Questionnaire (DSQ) in order to examine the overall dietary quality of the participants. The Risk Factor Monitoring and Methods Branch of the National Cancer Institute developed the DSQ (46). This questionnaire was used to assess the estimated daily intake of fruits and vegetables, whole grains, fiber, calcium, and added sugar for each participant. Although some quantitative accuracy was lost due to the less detailed nature of the DSQ as compared to the Food Frequency Questionnaire (FFQ), it was a beneficial tool to use when examining interrelationships between diet and various factors. This instrument was chosen for this study because it has been used in previous research studies, took a short amount of time to complete, and provided a comprehensive analysis of the participants’ dietary quality. All of the questions in the DSQ were multiple-choice and asked participants to identify how many times they consumed a particular food or beverage over the past month. The DSQ was appropriate to use in its original form so no revisions were made before the questions were copied into the online survey. Permission to use this instrument was obtained from Ken Bishop, the DSQ Support Specialist (Appendix I).
The second section of the instrument contained questions to collect demographic information and assess the factors that influence food choices. Questions for this section were developed based on results from several studies reviewed in the literature (1, 9, 32). The factors identified as influencers of food choices from various studies were used in developing this section of the questionnaire. The factors that were examined in this study included: cost, health, convenience, weight control, cooking skills, age, gender, year in school, marital status, living arrangements, utilizing the commuter student lounge, bringing food from home, and having access to a microwave on campus. Table 1 provides the description of variables tested in this study. Due to the fact that taste was often reported as being the most influential factor on food choices and considering that most individuals will not eat something unless they like the taste, taste was omitted from the list of factors to be assessed in this study. This section comprised questions #30-39 in the survey and consisted of multiple-choice, Likert scale, and ranking questions. All demographic questions were placed at the end of the survey in an attempt to improve the accuracy of responses.

Pilot Study

A pilot study was conducted to evaluate the logistics of the study and provide a basis for improving the clarity of the survey. Students from a midwestern community college were chosen for the pilot study because all students commute to and from campus, which made them comparable to the target population. Inclusion criteria for pilot participants required them to be full-time undergraduate students, 18 years or older, and commute to campus each day. An introductory e-mail was sent out to a small group of students who met the inclusion criteria. This e-mail described the survey, the completion deadline, and provided a link to
Table 1
Description of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>Dummy variable, &lt; 24= 0, ≥ 24=1</td>
</tr>
<tr>
<td>GENDER</td>
<td>Dummy variable, Female=0, Male=1</td>
</tr>
<tr>
<td>WITH PARENTS</td>
<td>Dummy variable, do not live with parents=0, live with parents=1</td>
</tr>
<tr>
<td>YEAR IN SCHOOL</td>
<td>Dummy variable, Lowerclassmen=0, Upperclassmen=1</td>
</tr>
<tr>
<td>UTILIZE LOUNGE</td>
<td>Dummy variable, Utilized the commuter lounge (no = 0, yes = 1)</td>
</tr>
<tr>
<td>MICROWAVE</td>
<td>Dummy variable, Access to a microwave while on campus (no = 0, yes = 1)</td>
</tr>
<tr>
<td>FROM HOME</td>
<td>Dummy variable, Number of times/week they bring food from home to campus</td>
</tr>
<tr>
<td></td>
<td>(&lt;2-3 days/week=0, ≥ 2-3 days/week=1)</td>
</tr>
<tr>
<td>COOKING SKILLS</td>
<td>Participants ranked their cooking skills from very poor to excellent on a</td>
</tr>
<tr>
<td></td>
<td>scale from 1-5 (&lt;4=0, ≥ 4 =1)</td>
</tr>
<tr>
<td>HEALTHINESS</td>
<td>Each participant was assigned a score between 0-5 based on the number of</td>
</tr>
<tr>
<td></td>
<td>nutrient recommendations they met as defined by MyPlate and the American</td>
</tr>
<tr>
<td></td>
<td>Heart Association</td>
</tr>
<tr>
<td>COST</td>
<td>Participants were asked to indicate the importance of cost, health,</td>
</tr>
<tr>
<td>HEALTH</td>
<td>convenience, and weight control when making food choices</td>
</tr>
<tr>
<td>CONVENIENCE</td>
<td></td>
</tr>
<tr>
<td>WEIGHT CONTROL</td>
<td></td>
</tr>
</tbody>
</table>
the online survey. A total of 10 participants completed the online survey. Based on the results of the pilot study, revisions were made to the survey before it was distributed to eligible students. The feedback from the pilot study confirmed that the survey took approximately ten minutes to complete, was easily understood, and only needed minor grammatical revisions before it was distributed to the target sample.

Data Collection

Upon IRB approval, an introductory e-mail was sent out to eligible students in order to recruit them for the study (Appendix E). The e-mail explained what the study was about and asked them to click on the link to the online survey if they wished to participate. The consent form was formatted into the first question of the survey and also informed participants that all of the information collected in the questionnaire would remain confidential (Appendix F). Participants were informed that by completing the survey they were eligible to enter into a raffle drawing for a $25 Target gift card. Interested participants were instructed to send their contact information to an e-mail address created solely for the purpose of facilitating the raffle drawing. The survey was constructed so that no identifying information or IP address information was collected, but participants were restricted to taking the survey once. All data was saved in an electronic file that was password protected. Using these methods, all data was kept secure and confidential.

Based on the pilot study, the survey was estimated to take ten minutes to complete and participants were not allowed to skip any questions of the survey. The survey was open from April 4th, 2014 to May 4th, 2014. The survey was sent out in three waves since the goal number of participants for this study was 364 and 7,056 students met the inclusion criteria to
participate in this study. The target sample size was determined based on the Table of Recommended Sample Sizes \((n=364)\) for Populations \((N=7,056)\) with Finite Sizes (47). The first wave of the survey was sent to 2,500 randomly selected students from the pool of eligible students. After the survey was open for two weeks, 115 students had taken the survey. The second wave of the survey was sent to 2,500 more eligible students. The total number of students who had taken the survey after one more week was 193. The last wave of the survey was then sent to the remaining 2,056 students who were eligible to participate in the study and remained open for one more week. A reminder e-mail (APPENDIX J) was sent out one week after each of the surveys was distributed, excluding the last wave of surveys due to the end of the semester. After the survey was closed, a participant was randomly selected to receive the $25 Target gift card. The selected participant was contacted via e-mail and was sent the gift card in the mail.

Data Analysis

Each participant’s estimated daily intake of nutrients was determined using the DSQ data analysis software program, which was completed using Statistical Analysis Software (SAS). The nutrients and food groups that were measured in the DSQ included: fruits and vegetables, calcium, fiber, whole grains, and added sugar. The participants’ estimated daily intake of fruits and vegetables, calcium, fiber, and whole grains were compared to the recommended amounts established by MyPlate (48). The participants’ estimated daily intake of added sugar was compared to the recommended amounts established by the American Heart Association (49). Participants were then assigned a number between 0-5 based on the number of recommendations they met. The online survey tool, SurveyMonkey, yielded the
results into an excel document. The variables were coded and the healthiness of diet variable was added into this dataset. The data were then analyzed using Statistical Analysis Software (SAS). The confidence interval was set at 95% with $\alpha = .05$. The demographic information was analyzed using descriptive statistics.

The first hypothesis was originally tested using descriptive statistics. Further analysis was needed in order to test whether the difference between variables was significant. A Friedman’s test was used since the variables were measured at the ordinal level and were therefore, continuous. The results of this test indicated that a significant difference occurred between the mean ranks of the variables. In order to determine where the significant differences occurred, a Wilcoxon signed rank sum test was run, which is used to compare two sets of scores from the same participants and determine if a significant difference between two variables exists. In order to reduce the risk of making a Type 1 error, a Bonferroni adjustment was made since multiple comparisons were being made.

The second, third, and fourth hypotheses were tested using a multinomial cumulative logistic regression model. Since the dependent variable, healthiness of diet, was categorical, ordinary linear regression could not be used. Binary logistic regression also was not appropriate because the dependent variable had more than two levels. Therefore, multinomial cumulative logistic regression model was used to test the hypotheses. This same model was also used to answer three additional research questions, which also set healthiness of diet as the dependent variable. In order to test additional research questions where healthiness was not the dependent variable, binary logistic regression was used since the dependent variables were categorical and had two levels.
CHAPTER 3
RESULTS

Characteristics of the Participants

The purpose of this study was to examine which factors most influence the food choices of college commuter students. The online survey link was sent out to 7,056 commuter students who met the inclusion criteria and 265 students responded. Of the 265 students who responded, 44 were not complete. Therefore, the total number of participants in this study consisted of 221 undergraduate college commuter students, resulting in a 3.1% response rate; which is much lower than the estimated average response rate of 30% for online surveys in the university setting (50).

The mean age of the participants was 24.06 ± 6.03 with an age range of 18-56 years. Females made up 76% of participants, which is much larger than the percentage of females in the undergraduate population (50%) at this midwestern university (43). The percentage of females in this study was also somewhat higher than the typical percentage of females in the average college population (60%) (51). The majority of participants did not live with their parents (75%) and were not married (91%). Juniors and seniors made up the majority (89%) of participants. This was expected since upperclassmen typically live off-campus and therefore were more likely to meet the inclusion criteria for this study (8). Even though a small percentage (21%) of participants reported utilizing the commuter lounge, a large portion (64%) of participants reported they had access to a microwave while on campus. Less than
half (45%) of participants brought food from home two or more days per week. Table 2 presents the previously described characteristics of the study participants.

### Table 2

Demographic Characteristics of Participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>$n$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24 years old</td>
<td>154</td>
<td>69.68</td>
</tr>
<tr>
<td>&gt;24 years old</td>
<td>67</td>
<td>30.32</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>167</td>
<td>75.57</td>
</tr>
<tr>
<td>Male</td>
<td>54</td>
<td>24.43</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With Parents</td>
<td>60</td>
<td>27.15</td>
</tr>
<tr>
<td>Not with parents</td>
<td>161</td>
<td>72.85</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>19</td>
<td>8.60</td>
</tr>
<tr>
<td>Not married</td>
<td>202</td>
<td>91.40</td>
</tr>
<tr>
<td>Year in school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>6</td>
<td>2.71</td>
</tr>
<tr>
<td>Sophomore</td>
<td>19</td>
<td>8.60</td>
</tr>
<tr>
<td>Junior</td>
<td>104</td>
<td>47.06</td>
</tr>
<tr>
<td>Senior</td>
<td>92</td>
<td>41.63</td>
</tr>
<tr>
<td>Aware of commuter lounge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>126</td>
<td>57.01</td>
</tr>
<tr>
<td>No</td>
<td>108</td>
<td>48.87</td>
</tr>
<tr>
<td>Utilize commuter lounge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>47</td>
<td>21.27</td>
</tr>
<tr>
<td>No</td>
<td>174</td>
<td>78.73</td>
</tr>
<tr>
<td>Access to a microwave on campus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>142</td>
<td>64.25</td>
</tr>
<tr>
<td>No</td>
<td>79</td>
<td>35.75</td>
</tr>
<tr>
<td>Bring food from home two or more days per week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>99</td>
<td>44.80</td>
</tr>
<tr>
<td>No</td>
<td>122</td>
<td>55.20</td>
</tr>
<tr>
<td>Total Participants ($N$)</td>
<td>221</td>
<td>100</td>
</tr>
</tbody>
</table>
Healthiness of Diet

Healthiness of diet was assessed by comparing the participants’ estimated daily intakes with the recommended daily amount for the various nutrients and food groups analyzed in this study: whole grains, dairy, fruits and vegetables, fiber, and added sugar. The results showed that the majority (67%) of students failed to meet any of the five nutritional recommendations for their age and gender, while 24% of participants only met one recommendation. Together, these two groups account for 91% of participants. As the number of recommendations increased, the number of participants who met the criteria decreased dramatically. None of the participants met all five recommendations while only one participant met four recommendations. When looking at the standards for specific food group and nutrient intake levels, more participants met the recommendation for added sugar than any other nutrient or food group (16%). A much smaller proportion of participants met the intake recommendations for whole grains, calcium, fruits and vegetables, and fiber. The healthiness of participants’ diets is given in Table 3.
### Table 3

Healthiness of Diet and Number of Students Who Met Specific Nutrient and Food Group Recommendations

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthiness of Diet (Number of recommendations met)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very unhealthy (0)</td>
<td>149</td>
<td>67.42</td>
</tr>
<tr>
<td>Unhealthy (1)</td>
<td>54</td>
<td>24.43</td>
</tr>
<tr>
<td>Somewhat healthy (2)</td>
<td>13</td>
<td>5.88</td>
</tr>
<tr>
<td>Healthy (3)</td>
<td>4</td>
<td>1.81</td>
</tr>
<tr>
<td>Very healthy (4)</td>
<td>1</td>
<td>0.45</td>
</tr>
<tr>
<td>Extremely healthy (5)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nutrients and Food Groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Added sugar</td>
<td>36</td>
<td>16.29</td>
</tr>
<tr>
<td>Whole grains</td>
<td>21</td>
<td>9.50</td>
</tr>
<tr>
<td>Dairy</td>
<td>18</td>
<td>8.15</td>
</tr>
<tr>
<td>Fruits and vegetables</td>
<td>12</td>
<td>5.43</td>
</tr>
<tr>
<td>Fiber</td>
<td>10</td>
<td>4.52</td>
</tr>
</tbody>
</table>

Figure 1 compares the participants’ average daily intake of selected nutrients to the recommended daily amounts as defined by MyPlate (48) and the American Heart Association (49). The daily recommended amounts for females age 18-30 years was used as the standard for comparing the average daily amounts of nutrients and food groups consumed by participants. This reference standard was chosen because the majority of participants in this study were female (76%) and between the ages of 18-24 years (70%). Since the recommended daily servings of nutrients and food groups for females is smaller for almost all nutrients and food groups, these recommendations provide the minimum recommendations that should be met by all participants. From this figure, it appears that the participants in this study met approximately 50% of the recommended daily amounts for each nutrient and food group. For
added sugar, participants consumed an average of 14.4 teaspoons of added sugar per day, which is nearly triple the recommended amount of 6 teaspoons per day. Participants consumed an average of 2.5 cups of fruits and vegetables a day, which is 56% of the recommended daily amount of 4.5 cups per day. The average daily intake of whole grains was 1.2 ounces, which is less than half (40%) of the recommended 3 ounces. Dairy consumption was also suboptimal, with an average intake of 1.6 cups per day, which is approximately half (53%) of the recommended 3 cups per day. Lastly, participants appeared to have low fiber intakes with an average intake of 15 grams per day, which accounts for 61% of the recommended 25 grams per day.

Figure 1: Participants’ Average Nutrient and Food Group Intake Compared to the Daily Recommended Amounts for Females 18-30 Years Old
Factors Affecting the Food Choices of Participants

Table 4 presents the various factors that affected participants’ food choices. When asked about cooking skills, half (50%) of the participants indicated that they had good or excellent cooking skills. A very small percentage (12%) reported that they had very poor or poor cooking skills. The largest proportion of participants (36%) reported that health was a very important influence when making food choices. Cost was the next factor that was most frequently indicated as a very important influence on food choices (32%). Although convenience was indicated as very important by a smaller percentage (29%) of participants, the number of participants who indicated that it was either an important or very important influence on food choices was the largest of all variables (76%). In this study, weight control appeared to be the least influential factor on participants’ food choices with the smallest percentage (21%) of participants indicating that it was a very important influencing factor.

Testing of the Hypotheses

Hypothesis One

In order to test H₁, Commuter students will be most influenced by convenience when making food choices when compared to cost, health, and weight control, the number of students who indicated that these factors were either important or very important were analyzed using descriptive statistics. Participants chose the importance of these variables on a range from 1 (not important) to 4 (very important). Convenience was the variable that most frequently reported as an important influence on food choices (76%). However, the number of participants who indicated that health and cost were important influences on food choices was
Table 4
Factors Influencing Participants’ Food Choices

<table>
<thead>
<tr>
<th>Variable</th>
<th>$n$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cooking Skills</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very poor (1)</td>
<td>11</td>
<td>4.98</td>
</tr>
<tr>
<td>Poor (2)</td>
<td>16</td>
<td>7.24</td>
</tr>
<tr>
<td>Adequate (3)</td>
<td>83</td>
<td>37.56</td>
</tr>
<tr>
<td>Good (4)</td>
<td>84</td>
<td>38.01</td>
</tr>
<tr>
<td>Excellent (5)</td>
<td>27</td>
<td>12.22</td>
</tr>
<tr>
<td><strong>Importance of cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not important</td>
<td>11</td>
<td>4.98</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>45</td>
<td>20.36</td>
</tr>
<tr>
<td>Important</td>
<td>94</td>
<td>42.53</td>
</tr>
<tr>
<td>Very important</td>
<td>71</td>
<td>32.13</td>
</tr>
<tr>
<td><strong>Importance of health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not important</td>
<td>4</td>
<td>1.81</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>51</td>
<td>23.08</td>
</tr>
<tr>
<td>Important</td>
<td>87</td>
<td>39.37</td>
</tr>
<tr>
<td>Very important</td>
<td>79</td>
<td>35.75</td>
</tr>
<tr>
<td><strong>Importance of convenience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not important</td>
<td>7</td>
<td>3.17</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>45</td>
<td>20.36</td>
</tr>
<tr>
<td>Important</td>
<td>106</td>
<td>47.96</td>
</tr>
<tr>
<td>Very important</td>
<td>63</td>
<td>28.51</td>
</tr>
<tr>
<td><strong>Importance of weight control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not important</td>
<td>34</td>
<td>15.38</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>61</td>
<td>27.60</td>
</tr>
<tr>
<td>Important</td>
<td>79</td>
<td>35.75</td>
</tr>
<tr>
<td>Very important</td>
<td>47</td>
<td>21.27</td>
</tr>
<tr>
<td><strong>Total Participants ($N$)</strong></td>
<td>221</td>
<td>100</td>
</tr>
</tbody>
</table>
similar to the number of those who indicated that convenience had an important influence on food choices. Additionally, health had the highest mean score ($M = 3.09$), which makes the results more difficult to interpret. The results are presented in Table 5.

Table 5

<table>
<thead>
<tr>
<th>Influencing Factor</th>
<th>n</th>
<th>%</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>165</td>
<td>74.66</td>
<td>3.02 ± 0.853</td>
</tr>
<tr>
<td>Health</td>
<td>166</td>
<td>75.11</td>
<td>3.09 ± 0.810</td>
</tr>
<tr>
<td>Convenience</td>
<td>169</td>
<td>76.47</td>
<td>3.02 ± 0.786</td>
</tr>
<tr>
<td>Weight Control</td>
<td>126</td>
<td>57.01</td>
<td>2.63 ± 0.985</td>
</tr>
</tbody>
</table>

A Friedman’s test was run to analyze whether a significant difference existed between the importance of variables. The results of this test indicated that a significant difference occurred between the mean ranks of the variables ($p < 0.001$). In order to identify where the significant differences occurred, a Wilcoxon signed rank sum test was run. Since multiple comparisons were being made, a Bonferroni adjustment was made ($p = 0.008$) in order to minimize the risk of making a Type I error. The results are presented in Table 6.
Table 6

Significant Differences Between the Importance of Variables

<table>
<thead>
<tr>
<th></th>
<th>Health &amp; Cost</th>
<th>Conven &amp; Cost</th>
<th>WtCtrl &amp; Cost</th>
<th>Conven &amp; Health</th>
<th>WtCtrl &amp; Health</th>
<th>WtCtrl &amp; Conven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>-1.061</td>
<td>-.120</td>
<td>-4.615</td>
<td>-.713</td>
<td>-6.696</td>
<td>-4.513</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.289</td>
<td>.904</td>
<td>.000*</td>
<td>.476</td>
<td>.000*</td>
<td>.000*</td>
</tr>
</tbody>
</table>

* p < 0.008

When looking at Table 6, it is evident that no significant difference exists between the importance of health, cost, and convenience on food choices ($p > 0.008$). However, there was a significant difference between the importance of weight control when compared with the other variables ($p < 0.001$). Therefore, it is evident that weight control was the least influential factor on the food choices of commuter students in this study.

Hypotheses Two, Three, and Four

$H_2$: Commuter students who utilize the commuter lounge will have healthier diets than those who do not, $H_3$: Commuter students who bring meals from home to campus two or more times per week will have healthier diets than those who do not, and $H_4$: Commuter students who indicated having good or excellent cooking skills will have healthier diets than those who do not, were tested using a multinomial cumulative logistic regression model. The dependent variable was the healthiness of diet, which was determined by assigning each participant a number between 0-5 based on the number of daily nutrient and food group recommendations they met as
defined by MyPlate (48) and the American Heart Association (49). The results are presented in Table 7 and the model used for this test is given below.

Healthiness = Intercept + CookingSkills + Cost + Health + Convenience + WtCtrl + Microwave + From_Home + Utilize_Lounge + Gender + Age + W_Parents

Table 7
Relationship Between Factors That Influence Food Choices and the Healthiness of Commuter Students’ Diets

<table>
<thead>
<tr>
<th>Influencing Factor</th>
<th>f-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilize lounge</td>
<td>0.09</td>
<td>0.767</td>
</tr>
<tr>
<td>From home</td>
<td>2.10</td>
<td>0.148</td>
</tr>
<tr>
<td>Cooking skills</td>
<td>0.70</td>
<td>0.590</td>
</tr>
<tr>
<td>With parents</td>
<td>0.00</td>
<td>0.957</td>
</tr>
<tr>
<td>Gender</td>
<td>2.12</td>
<td>0.147</td>
</tr>
<tr>
<td>Age</td>
<td>2.18</td>
<td>0.141</td>
</tr>
</tbody>
</table>

As shown in Table 7, no significant association was found between healthiness of diet and use of the commuter lounge ($p = 0.767$). Therefore, it cannot be concluded that students who utilized the commuter lounge had healthier diets than those who did not and the null hypothesis cannot be rejected. Similarly, no significant relationship was found between bringing meals from home more than two days per week and having a healthy diet ($p = 0.148$). It appears that students who brought food from home and students who ate on campus had similar dietary quality.
Hypothesis 4 stated that students who had good or excellent cooking skills would have healthier diets than those who did not. This hypothesis was refuted as there was no significant difference found in this study ($p = 0.590$).

**Additional Findings**

Additional research questions that were also tested using the multinomial cumulative logistic regression model are also presented in Table 7 and are as follows: *Do students who live with their parents have healthier diets than those who do not? Do females have healthier diets than males? and Do students who are 24 years or older have healthier diets than students who are younger than 24 years old?* The results of this analysis failed to show any significant relationship between these variables and the healthiness of participants’ diets.

Participants who lived with their parents did not appear to have healthier diets than participants who lived on their own ($p = 0.957$). The results of this study did not show a significant relationship between gender and healthiness of diet ($p = 0.147$). Additionally, no significant relationship was found between age and healthiness of diet ($p = 0.147$).

Further research questions were analyzed using other statistical analyses. Two binary logistic regression models were used to determine whether females were more likely to be influenced by weight control than males and also to examine whether students who were 24 years or older were more likely to be influenced by health concerns than students who were younger than 24 years old. The following models were fitted, respectively, and the results are presented in Table 8.

\[
\text{Gender} = \text{Intercept} + \text{WtCtrl} + \text{Age} + \text{W_Parents}
\]

\[
\text{Age} = \text{Intercept} + \text{Health} + \text{Gender} + \text{W_Parents}
\]
Table 8

Relationship Among Gender and Weight Control, Age and Health Concerns on Participants’ Food Choices

<table>
<thead>
<tr>
<th>Variable</th>
<th>$f$-value</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight control</td>
<td>0.13</td>
<td>0.943</td>
</tr>
<tr>
<td>Health</td>
<td>1.84</td>
<td>0.141</td>
</tr>
</tbody>
</table>

There was no significant difference identified between gender and the influence of weight control when making food choices ($p = 0.943$). Therefore, it cannot be concluded that females are more likely to be influenced by weight control than males. Additionally, older participants did not appear to be more influenced by health when making food choices as compared to younger participants ($p = 0.141$).

In order to test the research question, *Are students who have access to a microwave on campus more likely to bring meals from home than those who do not?* a binary logistic regression was used and the following model was fitted. The results are given in Table 9.

$$
\text{From\_Home} = \text{Intercept} + \text{Microwave} + \text{Cost} + \text{Health} + \text{WtCtrl} + \text{Gender} + \text{Age} + \text{W\_Parents}
$$
Table 9
Relationship Between Having Access to a Microwave on Campus and Bringing Food from Home

<table>
<thead>
<tr>
<th>Variable</th>
<th>$f$-value</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microwave</td>
<td>0.02</td>
<td>0.882</td>
</tr>
<tr>
<td>Health</td>
<td>3.40</td>
<td>0.019*</td>
</tr>
<tr>
<td>With parents</td>
<td>6.16</td>
<td>0.014*</td>
</tr>
</tbody>
</table>

*p < 0.05

Access to a microwave was not found to be statistically insignificant ($p = 0.882$). Therefore, commuter students who had access to a microwave on campus were not more likely to bring food from home. Conversely, participants whose food choices were influenced by health were more likely to bring food from home ($p = 0.019$). Similarly, participants who lived with their parents were more likely to bring food from home to campus than students who lived on their own ($p = 0.014$).

The results of this study indicate that no significant relationship was found between the variables tested and the healthiness of participants’ diets. Additionally, no significant relationship was found between the effects of gender on weight control and the effects of age and importance of health on food choices. Similarly, there was no significant relationship identified between having access to a microwave on campus and bringing meals from home. However, the results of this study did reveal some significant findings. For example, participants who were more influenced by health and participants who lived
with parents were more likely to bring food from home. Bringing food from home has been shown to be positively correlated with improved dietary quality in a previous study (52), which shows the potential implications of these findings. Additionally, participants’ diets appeared to be lacking when compared to the daily recommended amounts for the nutrients and food groups assessed in this study.
CHAPTER 4
DISCUSSION AND CONCLUSION

The purpose of this study was to assess the factors that may influence commuter students’ food choices and secondarily, to examine the relationship between those factors and the healthiness of commuter students’ diets. Overall, the results did not indicate that any significant relationships existed between the identified factors and the healthiness of participants’ diets. However, there were some variables that were shown to have significant associations. These will be discussed in more detail throughout the discussion.

This study was constructed based on the theoretical framework of the health belief model. This model assumes that a person’s readiness to change a specific health behavior is dependent on their perceived susceptibility, severity, benefits, and barriers (42). This theory also hypothesizes that a person’s health related action depends on the occurrence of the following factors: the existence of health concern, perceived susceptibility, and the belief that a particular behavior would be beneficial (53). Therefore, the aim of this study was to examine the barriers to healthy eating that have been identified in previous research and see how they related to the food choices of college commuter students. Additionally, the importance of health was measured and compared to the healthiness of participants’ diets in order to determine if health concerns did positively impact the health behaviors of those participants.
In the current study, convenience was most frequently reported as being an important influencing factor on food choices when compared with cost of food, health concerns, and weight control. This finding must be interpreted with caution due to the number of study participants who indicated that health and cost were equally important influences on their food choices. Further analysis showed that there was no significant difference between the importance of health, cost, and convenience on commuter students’ food choices. However, there was a significant difference between the importance of these factors when compared with weight control. These findings suggest that health, cost, and convenience are more important influences on the food choices of college commuter students than weight control. The findings of the current study are similar to the findings of the study conducted by Driskell et al. on 261 undergraduate students which reported that the most important influences on food choices were: convenience (53%), cost (40%), health (32%), and weight control (24%) (22). In both the current study and the study conducted by Driskell et al., weight control appeared to be the least important influence on participants’ food choices. A possible reason for this finding is that college students typically have inconsistent schedules, do not have a large source of income, and are likely aware of the importance of having a healthy diet. Additionally, some participants may view being healthy as being thin and instead report a greater importance for the influence of health on food choices when they are actually more influenced by weight control.

Although participants in this study appeared to be influenced by health when making food choices, the dietary quality of the large majority of participants was very inadequate. Dietary quality was determined by comparing the estimated daily intake of fruits and vegetables, whole grains, fiber, and calcium for each participant with the recommended daily
amounts as defined by MyPlate (48). Participants’ estimated daily intake of added sugar was compared with the recommended daily amount as defined by the American Heart Association (49). Each participant was then assigned a number between 0-5 based on the number of recommendations they met.

Surprisingly, the majority (67%) of participants failed to meet any of the nutrient and food group recommendations while 24% managed to meet only one recommendation for their age and gender. This is of concern as it suggests that nearly all (91%) of the participants in this study had an unhealthy diet. None of the participants met all five nutrient recommendations. Twenty-one participants met the daily recommended amount of whole grains, while 18 participants met the recommendations for dairy. Only 12 participants met the daily recommended amount of fruits and vegetables. The recommendation that was met by the fewest number of participants was fiber, with only 10 participants meeting the criteria. The nutrient recommendation that was met most often was added sugar, with 36 participants meeting the recommendation. However, participants consumed an average of 14.4 teaspoons of added sugar per day, which is nearly triple the recommended daily amount. On average, participants met only 50% of the recommended daily amounts for every other nutrient and food group assessed in this study, which suggests that college commuter students’ diets are very deficient in essential nutrients and food groups.

Although these findings were somewhat surprising, they are consistent with the findings of a previous study conducted at another midwestern university in 2003 on a convenience sample of 736 college students age 18-27 years old. The results of that study also reported that only a small proportion of college students met the recommended intakes for fruits, vegetables, and fiber (54). Based on the findings from the current study, it is evident
that college commuter students also have very inadequate diets. Poor dietary quality in this population may be due to lack of money to buy healthy foods, minimal time to prepare food, and lack of motivation to eat healthfully.

There was no significant relationship between utilizing the commuter student lounge and having a healthier diet found in this study. The commuter lounge is located on the lower level of the student center, which is found in the center of campus. It is equipped with a microwave, refrigerator, toaster, coffee maker, and eating utensils. The lounge is advertised on the university’s website for off-campus and non-traditional students. However, due to the commuter lounge’s location on the lower level of the student center and the fact that there are not signs located throughout the building to advertise it, many commuter students may not be aware of the lounge. Approximately half (57%) of the participants in this study were aware of the commuter lounge, which indicates that the lounge needs to be better advertised so that more commuter students are aware of its presence. Only 21% of participants reported utilizing the lounge. A barrier for utilizing the lounge identified by three participants was the distance between the lounge and the buildings they had classes in.

Although it may seem logical to advocate that university administrators furnish each building on campus with basic kitchen equipment that is accessible to commuter students in order to encourage them to bring food from home, this may not improve the healthiness of their diets. Bringing meals from home was not shown to be associated with having a healthier diet in this study. A large proportion (64%) of participants reported that they already had access to a microwave on campus and these participants were not shown to be more likely to bring food from home. Therefore, equipping each building on campus with basic kitchen equipment may not improve the dietary quality of college commuter students at this university
as the majority of participants already had access to a microwave and it did not significantly impact the healthiness of their diets.

Previous research indicates that students who bring meals from home have healthier diets than those who purchase food around campus (52). However, this finding was not supported by the current study. This may be attributed to the fact that participants in this study reported cost and convenience as important influences when making food choices. Although participants also appeared to be influenced by health when making food choices, convenience and cost may outweigh the importance of health, especially when students have a hectic class schedules, limited time to prepare and eat meals, and a tight budget. Even if students brought food from home to eat on campus more often, they might not necessarily bring healthy food items. As reported in a previous study, young adults and college students are more likely to purchase convenience items, such as frozen entrees, chips, and pizza than older adults (12). Additionally, young adults have reported a lack of time as a barrier to preparing healthy food in previous research, which indicates that college commuter students may be more likely to bring convenience food items than home-cooked meals to campus (31).

Previous research has shown that students who live on-campus tend to have higher intakes of fruits and vegetables than students who live off-campus (20). Conversely, another study conducted on college students from four different countries reported that students who lived with their parents consumed more fruits and vegetables than all other students who lived on their own (26). The current study found that participants who lived with their parents were more likely to bring food from home than those who lived on their own. Although no significant relationship between bringing food from home and having a healthier diet was
found in this study, an association between bringing food from home and higher dietary quality has been demonstrated by previous research (52).

In this study, participants who reported that health was an important influence on their food choices were more likely to bring food from home. These results suggest that the commuter students who chose to bring their own meals were influenced by health when selecting food. However, this does not appear to have been translated into action because as mentioned above, participants who brought meals from home did not appear to have healthier diets than those who did not, which refutes the assumptions of the health belief model (53).

Although no significant relationship between bringing meals from home and having a healthier diet was found in this study, participants who lived with their parents and those who were more influenced by health when making food choices were more likely to bring food from home and therefore, more likely to have a healthier diet based on the previously mentioned study (52). However, the results of this study did not show a significant relationship between participants who lived with their parents and the healthiness of diet, which contradicts the previously mentioned study (26).

When young adults live away from their parents and off-campus, they are faced with the sole responsibility of obtaining and preparing food. Young adults and college students have reported a lack of cooking skills as a barrier to eating healthy foods (12, 31, 33). Researchers have found a positive correlation between cooking skills and vegetable intake and a negative correlation between cooking skills and fast food consumption for both men and women (18). In a study conducted on young adults that examined the relationship between food preparation and diet quality, participants were asked to rate their cooking skills as very inadequate, inadequate, adequate, or very adequate. The mean age of participants in this study
was 20.4 years and more than half (57%) of participants were college students. Not all participants in this study lived off-campus and away from their parents. Therefore, not all participants had access to cooking facilities and also didn’t need to cook for themselves regularly, which differed from the population being tested in the current study. The results of this study showed that young adults who had adequate cooking skills were more likely to have healthier diets than those who did not (55). Contrary to previous research findings, the results of the current study did not show a significant relationship between having better cooking skills and having a healthier diet. Both the previously reported study and the current study assessed cooking skills by having participants rate their cooking skills, which increases the chance of inaccurate responses since cooking skills are being subjectively measured and participants may interpret the meanings of these rankings differently. Therefore, this creates a potential source of error in the results of both studies, which may contribute to the lack of significant findings in the current study. Although this method of assessing cooking skills increases the risk of inaccurate responses, it is much quicker and a more realistic method of examining participants’ cooking skills when using a survey to collect data. Furthermore, the current study could have asked participants to rank their cooking skills as very inadequate, inadequate, adequate, and very adequate, which may have been easier for participants to understand than ranking their cooking skills on a quantitative scale from 1-5.

The influence of gender on food choices has been widely reported in the literature (1, 3, 10, 11, 21, 24-26, 30). Compared to males, females tend to be more influenced by health and weight concerns and to typically consume less sweets and high-fat foods (26, 56). However, the results of this study did not show a significant relationship between gender and healthiness of diet. The small proportion (24%) of males in this study may have contributed to
the lack of finding a relationship between gender and healthiness of diet. Previous research has shown that females tend to be more interested in nutrition and food choices than males, which may explain the large proportion (76%) of females in this study (2, 3, 30).

Age has also been shown to influence food choices, with older adults reporting that they are more influenced by health concerns than young adults (1, 12). The results of this study did not show a significant relationship between older students and having a healthier diet. However, the majority (70%) of participants were between 18-24 years and the mean age of students was 24.06 ± 6.03 years. Therefore, the small proportion of students who were 24 years or older may have made it difficult to show a significant relationship between age and healthiness of diet.

Implications

This study contributed to the existing knowledge of the factors that influence the food choices of college students and provides a starting point for research in the college commuter student population. Although no significant relationship was found between variables and the healthiness of diet, participants’ food choices were found to be significantly more influenced by cost, convenience, and health than weight control. This finding suggests that nutrition educators should focus on teaching college commuter students about how to prepare quick, healthy meals on a limited budget. Tailoring nutrition messages to provide students with quick and easy recipes, tips for saving money on groceries, and healthy substitutions for convenience items would likely be beneficial for college commuter students. Knowledge of the Dietary Guidelines (32) and utilizing nutrition labels (30) when making food choices has been associated with having a healthier diet in previous studies. Therefore, providing college
commuter students with this information may positively impact their dietary quality. Since it may not be feasible for the majority of commuter students to take an introductory nutrition course, the commuter lounge could serve as a place to provide nutrition education to commuter students. Handouts and posters could be tailored to meet the needs of college commuter students as previously mentioned. By providing commuter students with education about the benefits of eating healthy foods and strategies for implementing these behaviors, commuter students may be more likely to bring food from home and therefore more likely to have a healthier diet.

This study also demonstrated that participants who lived with their parents and those who were more influenced by health were most likely to bring food from home. Surprisingly, these participants did not appear to have healthier diets than those who did not live with their parents or those who were not influenced by health. This finding suggests that participants who brought food from home may not have been packing healthy foods. Therefore, providing nutrition education to college commuter students may increase the influence of health concerns on their food choices and secondarily, it may encourage them to bring healthy foods from home more often, which has been associated with increased dietary quality (52).

Although nutrition education may motivate some students to bring healthy foods from home, other students will likely still prefer to buy food on campus due to the fact that convenience is an important influence on commuter students’ food choices. Therefore, the university could enable commuter students to have healthier diets by providing more healthy dining options on campus that are easily accessible to commuter students. Additionally, the majority of college commuter students did not live with their parents and were shown to be less likely to bring food from home. Therefore, it is important to provide students with information about how
fast food restaurant items are typically higher in fat, sugar, and added calories than food cooked at home. Additionally, it is important to educate students on how to choose the best options when they eat away from home. By increasing commuter students’ awareness of the poor nutritional value of fast food restaurant items, they may be more likely to bring food from home even if they do not live with their parents.

This study demonstrated that the majority (91%) of participants had unhealthy diets because they failed to meet any or only met one nutrient and food group recommendation for their age and gender. Based on this study and the findings of previous studies, nutrition interventions are needed in order to improve the dietary quality of college students’ diets, especially with respect to commuter students’ diets (54, 57). Young adulthood is a critical time when dietary habits that will be carried into adulthood are typically developed (44). Therefore, it is crucial to target nutrition interventions at the college student population in order to prevent life-long poor dietary habits, which will likely contribute to the development of chronic diseases later on in life (58-62).

Limitations

As previously mentioned, this study had several limitations that need to be considered when interpreting the results of this study. This study had a smaller sample size than what was needed in order to reach statistical significance. In an effort to increase participation, a flyer was distributed around campus and a reminder e-mail was sent out one week after the original survey was distributed. Participation in this study may have been larger if the survey had been distributed earlier in the semester since students were likely preparing for finals and may have been less interested in the study due to time constraints. This study used an online survey to
collect responses. Although online surveys provide a quicker and less expensive method of collecting data, using online surveys also creates a potential for bias sample selection. For example, students who don’t have Internet access or a computer at home were less likely to participate in this study. Additionally, using an online survey may have decreased the response rate since students receive numerous e-mails through the university mail system and may have disregarded the e-mail inviting them to participate in this study.

Another factor to consider is that the food frequency questionnaire used to determine the healthiness of participants’ diets may have created a source of potential error due to the subjective nature of reporting food choices in a questionnaire and the complicated process of obtaining the estimated daily intakes of nutrients and food groups for each participant from the DSQ data analysis program. Conducting data analysis of the food frequency questionnaire in the pilot study would have likely helped control for this limitation. Furthermore, the healthiness of participants’ diets was determined by assigning them a number based on the number of recommendations they met, which may not have been the best method of quantifying the healthiness of diet. Instead of analyzing the estimated intakes of multiple nutrients and food groups, this survey could have analyzed the participants’ estimated servings of fruits and vegetables in order to determine their dietary quality. Assessing fruit and vegetable intake has been shown to be an adequate method of determining dietary quality in a previous study (59). By assessing fruit and vegetable intake instead of analyzing the many food groups and nutrients, this study may have resulted in more significant findings, decreased the amount of time required to take the survey, and increased the response rate of this study. Although determining the healthiness of participants’ diets by comparing their estimated daily intakes with the recommended intakes provided insight into the amounts of
food groups and nutrients participants were consuming. This method is flawed because it does not take into account participants who may have eaten healthy foods, but did not consume them in large enough quantities. Therefore, the tool used to measure the healthiness of participants’ diets and the method used to quantify the results are sources of potential inaccuracy in the results of this study.

There was a large proportion of females to males in this study, which may have made it difficult to find any significant difference between the healthiness of female and male commuter students’ diets. The proportion of females in the undergraduate student population is 50%, which is significantly smaller than the proportion of females in this study, which may not make the results generalizable to the entire population. Lastly, the instrument used in this study could have been designed more effectively. It failed to assess the ethnicity of participants, which may have provided more insight into the commuter student population’s characteristics. It also allowed participants to indicate the importance of cost, health, convenience, and weight control individually instead of having participants rank the importance of these factors on their food choices, which may have yielded more statistically significant results. Additionally, participants were asked to quantitatively rank their cooking skills on a scale from 1-5, which may have been confusing. A more effective method of assessing cooking skills would have participants indicate their cooking skills on a qualitative scale as done in a previous study (55).

Several limitations may have interfered with the results of this study and may have increased the risk of yielding inaccurate results. In hindsight, the methods and construction of the survey would have been altered in order to provide more straightforward questions, increase the response rate, and improve the chance of yielding more significant results.
Conclusion

This study explored the relationship between various factors that have been shown to influence food choices and how those factors relate to the dietary quality of commuter students’ food choices. Based on the findings of this study, it is evident that college commuter students are in dire need of nutrition interventions in order to improve the healthiness of their diets. It also appears that college commuter students are most influenced by convenience, health, and cost and least influenced by weight control when making food choices. Therefore, further research should be conducted in order to determine effective nutrition promotion strategies that can be targeted at the specific factors affecting the food choices of college commuter students.

Prior to this study, little research had been conducted on the factors that influence the food choices of college commuter students. This study was conducted at a university with a large commuter student population, which demonstrated the importance of conducting research on this population to determine the need for nutrition interventions in order to improve the dietary quality of college commuter students. Although the results of this study did not show any significant relationships between the measured variables and the healthiness of diet, this study can serve as a starting point for future studies in order to determine the best strategies to provide successful nutrition interventions in this population. Additionally, nutrition interventions should be tailored to meet the needs of college commuter students by educating them on how to eat healthy on a limited budget and with a minimal amount of time for food preparation.
REFERENCES


APPENDIX A

REVIEW OF LITERATURE
REVIEW OF LITERATURE

Food choices are a complex interaction between multiple factors that lead people to eat the way they do. There are several factors cited throughout the literature; each thoroughly investigated to better understand why people choose to eat the foods they do. Investigating each of these factors is important in order to understand which factors are most influential and gain a full understanding of why people choose the foods they do. This literature review will begin by examining these factors first in the general population and then comparing the influence of these factors in college students. Lastly, gaps in the literature will be addressed and a need for conducting a study on college commuter students will be justified.

Factors Influencing Food Choices

Taste

Many social interactions are centered around food, perhaps due to food’s innate preoccupation in human physiology and psychology. However, if a food does not appeal to one’s sense of taste, that person is not likely to eat it, regardless of nutritional value or cost. Several studies have assessed the influence of taste on food choices and reported it as the most influential factor on food consumption (1-4). Glanz et al. conducted two cross-sectional surveys in a national sample of 2,967 American adults. The results of this study showed that although nutritional concerns are a factor influencing food choices, other factors, such as taste and cost, might be more influential on people’s food choices (1). Stewart and Tinsley reported similar findings in a study they conducted on working young adults. The results of their study
showed that the taste and appearance of food were the two most influential determinants of food consumption frequency (2). However, the sample size of this study was quite small (n=111) and it only focused on working, young adults.

In a study conducted by Shannon et al. on nearly 300 high school students in Minnesota, students reported that taste was the most important factor when choosing foods at lunch (5). Because a convenience sample was used in this study, the results may not be generalizable to all high school students. A 10-year longitudinal study was also conducted in Minneapolis by Larson et al. to assess predictors of fruit and vegetable intake in young adults. Participants completed surveys and food frequencies in high school classrooms and follow-up assessments at five years and ten years. The only factor that was significantly associated with higher vegetable intakes in young adulthood (at the 10-year follow up assessment) was a taste preference for them. Other factors, such as lower perceived time barriers, greater home availability, and health concerns, were also shown to have an influence on fruit and vegetable consumption of young adults (6). This study was strong because it was a longitudinal study and had many participants (n =1130). Based on these studies, taste appears to play an important role in determining consumers’ food choices.

Taste was commonly cited as a major determinant of food choices amongst college students as well. A study was conducted on 405 college students to assess the various factors that influence college students’ food choices. Participants completed a survey where they provided demographic information and selected the main determinants of food likes and dislikes. The results of this study indicated that taste (45%) was cited as the most common determinant of food likes, followed by convenience (27%) and low cost (11%). Food dislikes
were most commonly determined by poor taste (30%), followed by poor quality (26%), poor nutrition (20%), and high cost (11%) (7).

Another study conducted on 258 college students by Driskell et al. reported that convenience (53%) was the most significant factor influencing food choices, followed by taste (43%) and cost (40%) (8). In a study that examined the breakfast consumption patterns of 112 college students, some participants described that their “ideal” breakfast would consist of foods such as pancakes, waffles, French toast, eggs, and bacon. However, students reported that they did not regularly consume these foods for breakfast due to a lack of time and concerns about eating high fat foods regularly (9). Based on the current research, taste appears to have the largest influence on food choice; however, various factors have also been shown to influence and in some cases, be more influential than taste on food choices.

**Gender**

Throughout the literature, females tended to be more influenced by health and weight concerns than males. Several studies have reported that males tend to consume fewer fruits and vegetables; fewer low-fat foods, and more sugar-sweetened beverages than females (10-16). Glanz et al. conducted a study in order to examine the determinants of food choices. The researchers found that gender was a strong predictor of the importance of taste, cost, nutrition, and weight control when making food choices, with women ranking each of these factors as greater influences than men (1).

A study conducted at a university in England assessed the influence of age and gender on food choices through the use of six focus groups with a total of 43 participants. Participants were assigned to focus groups in order to provide optimal homogeneity amongst
group members. Women between the ages of 18-30 reported that body image influenced their food choices. However, women in the older age groups (60+ years old) reported being significantly less influenced by appearances and having the ideal body. It was also evident that females were more likely to be influenced by health concerns when making food choices than males. Overall, female participants were more likely to express weight concerns than male participants, which is consistent with the findings reported by Glanz et al. (17).

The influence of gender was similar amongst high school students’ food choices, as reported in the previously mentioned study by Shannon et al. Females reported more interest in nutrition labels and choosing healthy foods than males. The food choices of males were more influenced by cost and getting a large serving size for a minimal price (5). Furthermore, the influence of weight status and appearance on food choices of females was evident even during adolescence. In a study conducted on a convenience sample of 736 young adolescents (ages 11-15), females reported a greater influence of avoiding weight gain on their food choices than males (18).

Overall, the effects of gender on food choices were consistent throughout the general population, as well as the college student population. A study conducted on 1,294 college students reported that females used nutrition labels more frequently than males when purchasing foods (19). A longitudinal study was also conducted on college students from 23 different countries between 1999-2001. Data was collected from 19,298 participants who completed a survey that was distributed at a single university in 23 different countries. Researchers found that females were more likely to report that they were dieting and having a greater belief in the importance of healthy eating than males. Females were also more likely to report having healthier diets than males, such as consuming high-fiber foods, limiting high-
fat foods, and restricting sodium intake (10). The findings of these three studies are similar in their findings that females are more likely to be influenced by health and weight concerns than males.

Davy et al. conducted a study assessing sex differences in food choices and dieting trends on 286 college students at the University of Nebraska. The results showed a larger percentage of women than men agreed or strongly agreed that they ate too much sugar, with the importance of limiting carbohydrate and fat consumption to lose weight, and needing to lose weight. The authors also reported that a significantly greater proportion of women than men had tried various diets, which is a consistent finding in the literature throughout all age groups (20).

In another study that surveyed 358 college students, participants rated the importance of cost, convenience, healthfulness, food quality and appearance, taste, and label information when deciding what to eat. Both sexes perceived cost as equally important. Females rated healthiness, quality and appearance of food, taste, and label information as more important factors when making food decisions. Consistent with the other studies’ findings, women showed a much greater involvement and interest in food decisions. It was also evident that some of the male participants perceived reading nutrition labels as a feminine activity (21). In a study that assessed the food consumption patterns of 2,402 college students in four countries by using a cross-sectional survey, significant differences in eating patterns were observed between males and females. Women reported more frequent consumption of sweets, cakes, fruits and salads, while men reported more frequent consumption of meat, fish, and fast food (22).
The literature indicates that the influence of gender on food choices begins at a young age and continues throughout most of adulthood, with females tending to be more health and weight-conscious than males. The research regarding the effects of gender on the food choices among college students was in agreement with the effects of gender on the general population’s food choices.

Food Costs

With the increase in food prices, especially for healthier food items, cost is becoming an even greater determinant of people’s food choices. According to a 2-year study conducted in 2007, the price of the most energy-dense foods, such as processed foods, decreased by 1.8% while the price of the least energy-dense foods, such as fruits and vegetables, increased by 19.5% in the United States (23). When comparing the factors that influence food choices, Glanz et al. found that cost was the second most influential factor, after taste, while nutrition was considered third (1).

In a study conducted on adults from European Union member states, approximately 43% of respondents perceived price as very important when making food choices (24). A few studies have indicated that manipulating food prices can alter food choices. For example, lowering the price of fruits and vegetables increased the sales of these food items, while increasing the price of less healthy food options caused a decrease in the sale of those items (25-29). A study conducted at a university in England to assess the effects of age and gender reported that younger adults (18-30 years old) were more likely to perceive cost as a barrier to eating healthy than older adults (17). When assessing the influence of cost on high school
students’ food decisions, younger students were significantly less influenced by “getting a lot for their money” than older students (5).

Consistent with the findings of the effects of cost in the general population’s food choices, college students also appear to be influenced by cost when making food choices. The previously mentioned study conducted by Driskell et al. reported that cost was the third most influential factor, behind convenience and taste, on food choices of college students (8). A cross-sectional study conducted in 1,710 young adults (18-24 years) reported that 25% of participants felt that they lacked the money needed to prepare their own food (30). The results of these studies are in agreement with the findings of the study on the effects of age and gender, which reported that participants between the ages of 18-30 years old were most likely to report cost as a significant factor when making food choices (17).

**Time Available for Meal Prep and Eating Meals**

Although taste and cost have been shown to significantly influence food choices, it is important to consider time as a factor in food choices. Americans generally have busy schedules and seek foods that can be made quickly and easily. In a study conducted on 1,918 working Americans, the most important factors reported to influence lunch choices were convenience (34%), followed by taste (28%), cost (21%), and health (17%). Approximately half of the participants reported that they purchased lunch two or more times per week (31). Convenience was most likely to be reported as the most influential factor on food choices due to participants’ lack of time for meal preparation, short time allowed for lunch breaks, and inadequate cooking skills. Among adults in the 18-30 and 31-59 age groups interviewed in six focus groups, time was cited as a significant factor for not always eating healthy foods (17).
However, a study conducted among working young adults (18-24 year olds) found that convenience was of only moderate importance to them when making food choices (2). A survey of 250 adults in England found that participants reported a shortage of time as a barrier to healthy eating; however, the cost of a healthy diet was not reported as a significant barrier. Younger participants (< 50 years old) were more likely to report that time was a barrier to eating healthy (32). Glanz et al. found that the importance of convenience was positively related to fast-food consumption (1). The research regarding the impact of time on food choices is unclear. However, younger individuals appeared to be more heavily impacted by time constraints when making food choices.

In a study conducted to assess the use of nutrition labels by college students, researchers found that other factors, such as price and convenience, had a bigger influence on food choices than nutrition information. However, these results were only based on the information collected in focus groups consisting of a total of 16 students, with 13 of them being female and 3 of them being male (33). In the study conducted at the University of Nebraska by Driskell et al., 261 participants completed a questionnaire to assess typical eating habits of lower-level and upper-level college students. The results indicated that the factors reported to be most influential on food choices of college students were convenience (53%), taste (43%), cost (40%), health (32%), weight control (24%), and family/friends (6%) (8). In the study that assessed breakfast patterns of college students, time availability was an apparent factor that influenced students’ breakfast choices during the week. Many students reported choosing quicker breakfast items such as cereal and granola bars due to a lack of time in the mornings (9). The available literature suggests that college students were more heavily influenced by time constraints when making food choices than the rest of the
population. Therefore, college students are more likely to report convenience as being a significant influential factor on their food choices.

Role of Health on Food Choices

Food choices may also be influenced by an individual’s motivation to be healthy. Importance attached to health is most notable among older adults, females, and people living with a partner. In a survey of 250 European adults, older participants were most likely to report eating more fruits and vegetables. Participants who reported attaching importance to health and appearance were most likely to report consuming healthier diets (32). Unlike findings from other age groups, working young adults did not appear to place much importance on eating foods they considered healthy. They were also not concerned about the caloric content of the foods they consumed. However, since a sample of 111 working, young adults (between the ages of 18-24) was used for this study and due to the small sample size, results of this study may not be generalizable to all young adults. The fact that younger individuals seem to be less concerned with eating healthfully may be due to the fact that they are usually not as concerned with preventing and managing chronic diseases as older individuals (2).

Conversely, placing high importance on alternative food production was correlated with having a higher dietary quality among college students. A sample of 1,201 college students from a 2-year community college and a 4-year university in Minneapolis, Minnesota was used to assess attitudes toward alternative food production and dietary quality of college students. The participants’ dietary quality was measured by their intake of fruits and vegetables, fiber, added sugar, and fat. Participants who were women, twenty-five years or
older, and those not living with their parents were most likely to place a higher importance on alternative food production such as organic practices (34). In the study that assessed the breakfast consumption patterns among college students, researchers reported that several students made their food choices at breakfast based on health beliefs and concerns about disease. Students whose food choices were influenced by these factors reported commonly consuming foods such as high fiber cereal, whole-grain breads, peanut butter, cottage cheese, and fruit for breakfast (29).

High dietary quality can often be predicted by nutrition label usage. A study to examine the determinants of nutrition label use among college students was conducted at a large university in Texas using a convenience sample of 1,294 students to complete a survey. The survey included questions about nutrition label knowledge, attitudes, behaviors, and beliefs about diet-disease relationships. Participants who had a greater knowledge of nutrition labels and more accurate perceptions of diet-disease associations were more likely to utilize nutrition labels when making food choices (19).

The factors that were most highly associated with frequent nutrition label use were: health reasons, interest in specific nutrient information, nutrition knowledge, and weight control. The variables that were highly associated with infrequent label usage were time constraints and not caring about nutritional information (19). Another study conducted on 1,201 college students to assess nutrition label use and dietary quality reported similar results. Participants in this study completed a survey with questions about nutrition label use and importance of preparing healthy meals, along with reporting dietary behaviors. The findings of this study indicated that participants who reported using nutrition labels more frequently
were more likely to have a healthier diet than those who rarely or never utilized nutrition labels (35).

A study using a convenience sample of 200 college students at the University of Vermont was conducted in order to examine the relationship between knowledge of the Dietary Guidelines and food choices. Participants completed an online survey consisting of questions related to eating behaviors and nutrition knowledge. The results indicated that increased knowledge of the Dietary Guidelines was strongly associated with a higher likelihood of consuming a healthy diet (36). Another study conducted on a random sample of 456 college students at a university in Taiwan reported that participants who were more concerned with developing diseases or gaining weight were more likely to make healthier food choices (37). Therefore, these studies suggest that both nutrition knowledge and weight concerns may influence food choices of college students.

According to the literature, young adults are typically not as concerned about eating healthily in order to prevent diseases as older adults. The study conducted by Driskell et al. reported that health was the fourth most significant factor influencing college students’ food choices (8). Therefore, although health is a factor in the food choices of college students, it is not typically the most influential factor. However, the research regarding college students and attitudes toward health reveals that college students can be influenced by a variety of factors to develop healthier eating habits. Students who utilized nutrition labels (19), placed importance on alternative food production (34), and had knowledge of the Dietary Guidelines (36) were more likely to have healthier diets than students who did not. Although college students may be more likely to choose a healthy diet in order to avoid weight gain instead of preventing disease, they too are influenced by health beliefs when making food choices.
Social Influences of Food Choices

Food is commonly the focus of many social interactions, whether it is an extravagant holiday dinner or a simple meal with a friend. Therefore, social influences are likely to have an impact on people’s food choices. Researchers examined the relationship between social networks and their effects on food choices between spouses, friends, and siblings. Using food-frequency measurements, they assigned each participant to one of seven eating patterns that most accurately described them. Statistically significant associations were found between participants’ food patterns and those of their spouses, friends, and siblings. It was determined that participants who were more socially connected were most likely to report having lighter intakes, but conversely, they were also shown to consume more sweets. Spouses’ food patterns were strongly correlated but not significant. However, alcohol and snack consumption were strongly correlated between spouses, friends, and siblings (38).

A study conducted in the Netherlands examined the food choices of adolescents and adults and the associations within their social networks. Data was collected from 15-year old adolescents \( n=347 \), their friends \( n=240 \), their parents \( n=579 \), and the friends of their parents \( n=108 \). A total of 361 social networks with a minimum of two participants were formed, with 169 of those comprised of at least an adolescent, both parents, and a best friend of the adolescent. Family interviews and focus group interviews were conducted and all participants completed a food frequency questionnaire. The results showed that adolescents’ snack food consumption was highly correlated with those of their friends. However, their overall food habits appeared to be more highly related to their immediate family members (39).
Another study examined the influence of families on food choices. However, this study differed from other studies in that it compared women who had been diagnosed with and had survived breast cancer to women who had never been diagnosed with cancer. Since women’s food choices are often influenced by the food preferences of their significant others and children (40-42), researchers were interested in finding out if those women who had been diagnosed with cancer became less influenced by their family’s preferences than women who had not been diagnosed with cancer. The women who were breast cancer survivors reported family members as being more supportive than resistant to eating healthily, while the women without a breast cancer diagnosis reported that their family members were often resistant to eating healthily. None of the women who reported facing resistance from family members about eating more healthy foods implemented dietary changes in either group (43). From this study, it is clear that the food choices of women from both groups were heavily influenced by the support from and food preferences of their families.

Another type of social interaction that has been shown to influence eating patterns is eating in the company of others. It has been consistently reported that both men and women eat more when they are with others than when they eat alone. These results were similar when participants were observed in a lab or when people were observed in their natural environment (44, 45). Furthermore, social facilitation appears to have an effect on people’s intakes, regardless of their age. For example, when the delivery person stayed with elderly people who were participating in a home-delivery meal program, the participants ate a significantly larger amount of food (46). Consuming meals with friends, family members, or spouses tends to result in larger amounts of food consumed than eating meals with strangers, coworkers, or eating alone (47). When participants consumed meals with a partner of the
opposite sex whom they considered to be attractive they consumed less food, especially females (48). When examining the influences of the work environment on people’s food choices, researchers found that their work environment influenced the food choices of workers. The only workers who brought in food from home were those who could not leave work to purchase food or those who had significant health concerns. One woman reported that bringing in food from home was not the norm of the office so she did not feel comfortable bringing in food from home (49). All of these findings support the significance that social influences can have on people’s eating behaviors.

Similar to the other findings, college students also appear to be influenced by social norms and interactions. Robinson et al. conducted a systematic review and meta-analysis in 2013 to examine the evidence that exists regarding the relationship between social norms and eating behavior. Fifteen experimental studies were reviewed and analyzed, with 14 of them being conducted on college students. The researchers concluded that both high intake norms and low intake norms had a moderate influence on the amount of food that was consumed. They also found evidence that indicated that participants’ food choices were influenced by social norms. For example, telling participants that the social norm was a high-energy food choice increased the likelihood that they would make the same choice (50).

Burger et al. conducted a study to examine the effect of social norms on female college students \((n=125)\). The participants were told that previous participants had either chosen a healthy snack bar or an unhealthy snack bar. When participants were asked to choose a snack bar, they tended to pick a snack that was consistent with what they thought previous participants chose. When comparing the snack bar choices made by participants, a significantly larger percentage of participants in the healthy condition (67.5%) than the
unhealthy condition (40%) chose the healthy snack bar (51). It appears that social norms not only influence the healthiness of the food participants chose to consume, but also the amount.

**Role of Education on Food Choices**

The level of education, regardless of whether or not it included nutrition education, has been shown to have an influence on food choices. A study conducted on 1,340 participants between the ages of 18-24 years old to examine the differences in food choices between college students and graduates versus non-college students found that college students and graduates were more likely to have healthier diets than non-college students. Both college students and graduates reported they ate more whole grains, fruits and vegetables, low-fat milk, and lean meat than non-college students. Another finding was that non-college students were more likely to skip meals (52). Young adults who were not college students were less likely to have participated in a nutrition education class, may not have had as much access to fruits and vegetables, and had work schedules that interfered with eating meals regularly. This study suggests that differences in education may have an impact on food choices; however, it might not be quite that simple. Other factors may contribute to the difference in food choices amongst college students and non-college students, such as time, money, and access to fruits and vegetables. Although the previous study reported that college students and graduates tend to have healthier diets than non-college students, college students are often far from meeting the recommendations of the Dietary Guidelines (53).
Effects of Age on Food Choices

Age plays a significant role in many decisions throughout the life span. As people age, their values, attitudes, and outlook on life shift, and with that their food preferences often change for various reasons. As reported earlier, older adults are typically more likely to choose healthier foods due to an increased awareness of the benefits in regards to disease prevention (32). In addition, younger participants were more likely to buy frozen, pre-packaged, or canned food items than older adult participants. The younger participants were also less likely to buy meat and fish than older adult participants. However, regardless of age, the main reasons for making food choices included cost, time, health, and appearance (17). The study by Glanz et al. was in agreement and concluded that cost and convenience seemed to be more important in influencing younger adults’ food choices of than those of older adults. On the other hand, nutrition and weight control were more influential on the food choices of older adults (1). Since the majority of college students are young adults, it can be assumed that college students are less likely to be concerned with disease prevention and selecting fruits and vegetables than older adults.

The Role of Cooking Skills

A factor that is commonly overlooked as a barrier to healthy eating is an individual’s cooking skills and self-efficacy to prepare nutritious foods. The study conducted in England through six focus groups reported that both men and women in the young adult age range (18-30 years) found it difficult to cook often and cited a lack of cooking skills as a barrier to eating healthy foods (17). The results from the Health and Lifestyles Survey showed that
12.7% of men and 5.4% of women reported lack of cooking skills as a barrier to consuming healthy foods (54). Cooking skills are commonly associated with the healthfulness of a person’s diet. A population-based longitudinal study conducted in Switzerland, consisting of 4,436 participants, reported results that support this assumption. The researchers in this study found a positive correlation between cooking skills and vegetable intake, for both men and women. They also found a negative correlation between cooking skills and soft drink consumption in females and dessert consumption in males, as well as fast food consumption in both genders (55).

Similar to the findings that young adults often cited lack of cooking skills as a barrier to eating healthy, studies conducted amongst college students revealed that college students reported lacking sufficient cooking skills. A study conducted on 704 college students to assess cooking skills and attitudes toward cooking revealed that college students have limited knowledge of food preparation. This finding may be due to the level of importance placed on the use of convenience foods for college students. A weakness of this study is that actual cooking skills were not evaluated and were simply reported by participants, which makes the results of this study less objective (56). The previously reported, cross-sectional study conducted on 1,710 young adults between the ages of 18-23 years found that inadequate cooking skills were a barrier to preparing food for 23% of males and 18% of females. Over one-third of both males and females reported a lack of time as a barrier to preparing food, which is consistent with the previous study’s findings (30).
Summary

After examining the various factors that influence consumers’ food choices, it is clear that food choices are influenced by various confounding factors. Factors that influence food choices appear to be individualized to each person. However, being able to identify the most influential factors has helped researchers better understand why people make the food choices they do.

Factors Influencing College Students’ Food Choices

Place of Residence: On-Campus/Off-Campus

Often times, upper-level college students are more likely to live off-campus than lower-level college students (57). Living off-campus can create challenges in regards to meal planning and food availability. Adams and Colner obtained data from the American College Health Association—National College Health Assessment that was conducted between 2002-2003. From this data they were able to collect information from a sample of 40,209 college students within the 18-25 year old age range. The researchers then examined their fruit and vegetable intakes and the factors associated with them. Students who lived on-campus were more likely to report having higher intakes of fruits and vegetables than students who lived off-campus. Full-time students were also more likely to report having higher fruit and vegetable intakes (58).

The study conducted to assess college students’ breakfast consumption patterns found that participants’ food choices were often influenced by what foods were available to them. Their food availability relied heavily on whether they lived on their own, with their parents, or
in the dorms (9). The study that assessed food consumption and living arrangements among college students in four different countries reported that students who lived with their parents consumed more fruits, vegetables, and meat, on average, than those who did not (22).

**Upper-Level/Lower-Level Students**

The study conducted at the University of Nebraska at Lincoln by Driskell et al. looked at the differences in eating habits of upper and lower-level students. A significantly larger percentage of upper-level students reported typically consuming an afternoon snack compared to lower-level students. Significant differences were also seen in the frequency of typically eating in university cafeterias, with lower-level students reporting a significantly higher frequency. Slightly more lower-level students (95.1%) than upper-level students (91.9%) reported eating, on average, at fast-food restaurants 6-8 times per week, which was a surprising finding since lower-level students typically have access to dining facilities on campus. It was also reported that a significantly larger proportion of upper-level students (59.9%) than lower-level students (47.4%) typically consumed an afternoon snack (8). Because upper-level students typically live off-campus, it is reasonable to assume that it might be more difficult for them to have a consistent eating pattern while on campus and therefore more likely to consume snacks.

**4-Year/2-Year/Non-students**

Similar findings were reported in another study that was conducted to examine the differences in the diets and meal patterns of 4-year college students, 2-year college students, and nonstudents. Researchers in this study collected data through Project Eating Among
Teens, a longitudinal study of adolescents and young adults in Minnesota. The sample was comprised of 750 males and 937 females who completed the follow-up assessment as young adults, with a mean age of 20.5 years. Students who lived off-campus reported that it was more difficult for them to have a set eating time, which likely increased the amount of snacks they typically consumed. When comparing young adult non-college students, 2-year students, and 4-year students, 4-year students reported having better dietary intakes and eating meals more regularly than both 2-year students and non-college students (59).

Whether a college student lives on-campus or off-campus is a major factor that influences food choices. Students who live off-campus experience greater difficulty having a set eating time for meals and must plan meals ahead of time if they do not want to purchase foods on campus (8). Therefore, students who live off-campus are faced with a greater challenge when it comes to eating healthily.

Healthiness of College Students’ Diets

As reported in previous studies, younger adults tend to buy more convenience items and also consume less fruits and vegetables than older participants. College students and young adults appear to be influenced by cost and convenience more so than health (1, 17). Previous studies have reported that college students’ diets are typically low in fruits in vegetables, high in convenience food items, and fail to meet the recommendations for fruits and vegetables, calcium, and whole grains (60, 61). From the literature, it is evident that college students’ diets are likely falling short of the nutrition recommendations and they may be setting themselves up for the development of chronic disease later on in life (62).
How Food Choices Affect Health

Poor dietary choices have been linked to poor health outcomes such as obesity, type II diabetes, and cardiovascular disease (63-70). Poor dietary choices often lead to excessive weight gain and obesity, which has been linked to an increased risk for developing Type II diabetes, cardiovascular disease, and osteoarthritis (63). Obesity is not only linked to increased morbidity, but also increased mortality. It is estimated that 1 in 10 modifiable deaths are attributed to overweight/obesity (64).

Cardiovascular disease has been the leading cause of death in the United States for several years. Several risk factors for heart disease that can be improved through dietary intervention have been identified. These risk factors include dyslipidemia, glucose intolerance, hypertension, and obesity (66). The rate of diabetes has increased tremendously over the past decade. Type II diabetes used to be referred to as “Adult-onset diabetes,” however, this condition is now being seen in adolescents as well as adults (67). Obesity and family history are the biggest risk factors for type II diabetes. Hypertension, low HDL cholesterol, and high triglyceride levels have also been identified as predictors of type II diabetes risk (68). Osteoporosis is another disease that has been linked to dietary factors. Adequate calcium and Vitamin D intake has been strongly related to the prevention of osteoporosis and fractures (71). It is evident that poor diet quality does play a role in the development of several chronic diseases. Due to the strong relationship between the healthiness of diet and disease, it is important to consider how various factors may impact food choices, and therefore, impact the healthiness of individuals.
The theoretical model that is most commonly used in health education and promotion is the health belief model, which can be directly tied into the research that has been conducted on the influencing factors of food choices. The main concept of this theory is that health behaviors are determined by personal perceptions about disease and the strategies available to decrease its occurrence. There are four main constructs that make up the model: perceived seriousness, perceived susceptibility, perceived benefits, and perceived barriers. Each of these perceptions can be used to explain and predict health behavior, such as making food choices (72).

The first construct that applies to this area of research is perceived benefits. This construct assumes that people will adopt healthier behaviors when they believe it will decrease their risk for developing disease. This idea relates back to the research that illustrates that people who are concerned about health and disease prevention are more likely to have healthier diets than those who are not. Therefore, it is reasonable to assume that the more health education a person has the more likely they are to adopt healthy behaviors. The second construct that applies to this area of research is perceived barriers, which has been identified as the most significant construct in determining health behaviors, and more specifically, food choices (72). By examining which barriers seem to have the biggest influence on food choices, nutrition educators can focus on helping individuals devise strategies to work through these perceived barriers and adopt healthier behaviors.
REFERENCES


APPENDIX B

REQUEST FOR STUDENT DATA
REQUEST FOR STUDENT DATA
(Projects will be completed as time allows.)

Please submit only the Request for Student Data page to the Office of Registration and Records and retain the attached informational sheet as your reference to the FERPA policy.

Requests with the intention of sending a ‘mass email’ require a mass email submission form to be submitted to and approved by the Provost Office prior to the release of information. To read the policy and find the submission form, go to ITS Home on the NIU web site and find Mass E-Mail under the E-Mail link.

Description and purpose of project (how information will be used):
(FERPA requires R&R to collect this response. Only requests with this information included will be considered.)

The purpose of this project is to examine the factors that influence the food choices of college commuter students.

Information needed: LG GRAD LAW Specify if needed

I am hoping to recruit undergraduate NIU students whose residential address is outside of DeKalb County as participants for this study.

Approximate number of students you expect to receive information about: 150

Sequence: X Alpha by name ZIP Code Other

If needed: Residence Hall Address Local Address Permanent Address X Campus E-Mail Address

Send Excel file to this NIU e-mail address: amiller3@niu.edu

Date needed: 2/15/14
Our office receives a large volume of requests for data. Please allow ample time to fulfill a request.
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Department</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amanda Miller</td>
<td>Graduate Student</td>
<td>FCNS</td>
<td>712-898-1512</td>
</tr>
<tr>
<td>Josephine Umoren</td>
<td>Thesis/Faculty Advisor</td>
<td>FCNS</td>
<td>815/753-6351</td>
</tr>
</tbody>
</table>

**Statement of Confidentiality:**
I will ensure that adequate measures will be taken to protect the confidentiality of the student information requested, and that only those people identified above will have access to individual data.

Signature of Person Making Request: [Signature] Date: 10/13

Include your e-mail address and phone number:
amiller3@niu.edu  712-898-1512

Signature of Faculty Advisor (required for requests submitted by students): [Signature] Date: 1/14/2014

Printed name of Faculty Advisor and phone number:
Josephine Umoren  815/753-6351

Office of Registration and Records Date

Approved: 

Denied: 

Page 2 of 2
APPENDIX C

REQUEST OF MASS E-MAIL
Mass Mailing Request Form

### Requestor Information

- **Name:** Amanda Miller
- **Department:** FCNS
- **Telephone Number:** 712-898-1512
- **E-Mail Address:** amiller2@niu.edu

### Message Information

- **Message Title:** Looking for participants
- **Message Body:**
  Dear Student,
  My name is Amanda Miller, a nutrition and dietetics graduate student at Northern Illinois University. I am conducting a thesis to examine the factors that influence college commuter students' food choices.

- **Contact Organization:** FCNS
- **Contact Website:**
- **Contact Telephone Number:**
APPENDIX D

RECRUITMENT FLYER
Are you a full-time student?
Do you live outside of DeKalb County?
Are you at least 18 years of age?

We want YOU!

WHAT: Complete a 10-15 minute online survey about food choices

WHEN: You have until April 25th to complete the online survey

HOW: Take the survey by going to this website:
https://www.surveymonkey.com/s/CollegeFoodChoices

By participating, you will have a chance to win a $25 Target gift card!
APPENDIX E

RECRUITMENT E-MAIL
Dear Student,

My name is Amanda Miller, a nutrition and dietetics graduate student. I am conducting a thesis to examine the factors that influence college commuter students’ food choices.

You are invited to participate in a 10-15 minute online survey. If you decide to participate, you will have the option to be entered into a drawing for a $25 Target gift card. In order to be entered into the drawing, you must provide your contact information in the last question of the survey. Your contact information will only be used for the purpose of entering you into the drawing.

You have until _________ to complete the survey.

If you have any questions, please contact me at amiller3@niu.edu or 712-898-1512. You can also contact my thesis director, Dr. Josephine Umoren, at jxu1@niu.edu or the Office of Research Compliance at 815-753-8588.

If you are interested in taking this survey, please follow the link to the survey. I’d greatly appreciate your response to this survey.

https://www.surveymonkey.com/s/GWC5MSY

Thank you,

Amanda Miller
Graduate Student
APPENDIX F

ONLINE CONSENT FORM
I understand that if I agree to participate in this study, I will be asked to complete a 39-question survey on food choices and the factors that influence them. The survey will take approximately 10 minutes to complete.

I am aware that my participation is voluntary and that I may end the quiz at any time without penalty and that if I have additional questions, I can contact Amanda Miller at amiller3@niu.edu or 712-898-1512.

I understand that there are no reasonably foreseeable risks to participating in this study. I understand that all data collected in this study will be kept confidential at all times and used only for the purpose of this study.

The closing date for this survey is ________.

I understand that upon completing the survey, I have the option to enter into a drawing for a $25 Target gift card. If I am interested in being entered into the drawing, I will enter my contact information into the last question of the survey.

--------------------------------------------------------------

If the statement below applies to you, choose YES to start the survey. Thanks for participating!

I am a full-time student, 18 years or older, and live outside of DeKalb County. I agree to participate in this study.
APPENDIX G

IRB APPLICATION
# Application for Institutional Review of Research

**INVOLVING HUMAN SUBJECTS**

*Note:* Please complete this form thoroughly keeping in mind that the primary concern is the potential risk (economic, ethical, legal, physical, political, psychological/emotional, social, breach of confidentiality, or other) to the participants. Provide copies of all materials to be used in the investigation. The Institutional Review Board (IRB) must have enough information about the transactions with the participants to evaluate the risks of participation.

**Name(s) and employee ID for faculty, Z-Id for students**

| Amanda Miller, z1685630 |

**Status:**

- Faculty
- Graduate Student
- Undergraduate Student

**Department:**

[ ] ECON

**Mailing Address (if not department):**

1206 Rushmore Dr, Unit A DeKalb, IL 60115

**Phone:**

712-898-1512

**E-mail:** amiller3@niu.edu

**Project Title:**

Factors Influencing Commuter Students' Food Choices

**Proposed Data Collection Start Date:**

[ ] April 2, 2014

**Note:** Unless the authorized departmental reviewer (e.g., chair or designee) has deemed on the screening form that IRB review is not needed, all projects must receive formal written clearance from the IRB Chair (or an IRB member designated by the Chair) prior to the start of data collection.

**Type of Project (Check one)**

- [ ] Departmental Research (faculty/student projects not externally funded and not indicated below)

- [ ] Graduate Thesis/Dissertation (IRB application should be submitted AFTER proposal defense)
  Advisor/Committee Chair (& e-mail): Josephine Umoren, jxu@niu.edu

- [ ] Undergraduate Project (Senior thesis/capstone, research rookies, independent study)
  Advisor/Committee Chair (& e-mail):

- [ ] Externally Sponsored Research

  A complete copy of the grant proposal or contract must accompany this application form for IRB review to take place.

  - Source of Funding:

  - Title of grant proposal (if different from IRB protocol):

  - Name of principal investigator on grant proposal:

  - Office of Sponsored Projects file number (Note: this is not the grant number):
    - OSP#

- [ ] Other
  Specify:
Part I. Purpose and Procedures:

1) Describe the purpose of your study and the reason(s) this study is needed. Include any necessary background information and a description of your hypothesis or your research question.

The purpose of this study is to examine what factors have the most influence on commuter students' food choices and explore if there are any correlations between factors and the dietary quality of commuter students. This study is needed because there is a lack of research in this area concerning college commuter students.

2) The following items will help the IRB reviewers understand the step-by-step procedures of your study:

2A) Explain the participant eligibility and exclusion criteria that will be used.

Full-time student, at least 18 years of age, and lives outside of the Dekalb county.

2B) Explain the recruitment procedures (how will participants learn about the study?). If using the snowballing technique, please explain who contacts potential participants (other participants or the researcher).

Please attach recruitment scripts, flyers, or postings [Appendix A].

A mass e-mail will be sent out to eligible students informing them of the study and providing them a link to complete the online survey. Flyers will be distributed around campus and announcements will be made in classes to help recruit more participants.

2C) Explain the consent process (verbal and/or written procedures for informing participants of the nature of the study and what they will do).

[Please attach all documents (assent, consent, parent permission – Appendix B) that are appropriate for each group of subjects participating in the study. Consent forms should be prepared for adult participants (age 18 or over). Assent forms should be prepared for minor subjects appropriate to their ages, and permission form(s) for parents or legally authorized representatives should also be prepared. For children too young to comprehend a simple explanation of participation, parental permission is sufficient only if the research will provide direct benefit to the subject, a member of the subject's family, or other children with the same condition as the subject.]

The consent form will be formatted to be the first question of the online survey. Participants must select "yes" to indicate their consent before they are allowed to continue on to the survey.

2D) Describe the data collection procedures including what data will be collected, how it will be collected (include a description of any interventions to be used), the duration of participation in the study session(s), and how the session(s) will end.

Participants will complete a two-part questionnaire designed to measure factors that determine food choices in young adults. Data will be collected through a self-administered online survey which will remain open for three weeks. If not enough participants are recruited to complete the survey, it will remain open for a longer period of time and more students will be invited to take the survey. The data collected will include demographic information, the various factors that influence food choices, and food frequency consumption [Dietary Screener Questionnaire].

Please note: It is the researcher’s responsibility to seek out permission to use copyrighted materials. Please indicate whether you have permission to use any copyrighted materials for your project:

☐ Yes, I have permission to use any copyrighted materials for this project
☐ No, I do not yet have permission to use any copyrighted materials for this project
☐ This is not relevant for the materials being used in this project

2E) If applicable, explain the procedures for providing compensation.

All participants will have the option to be entered into a drawing to win a $25 Target gift card by submitting their contact information to a separate e-mail account set up for this purpose.

2F) If applicable, explain the procedures for debriefing participants. Please attach a debriefing script or sheet [Appendix D].

N/A

Reminder: As appendices to this application, attach copies of all: A) Recruitment information [script/flyer/etc.], B) Informed consent documents [assent/parent permission/scripts/etc.], C) Materials [questionnaires/surveys/interview questions/listing of all information/data to be collected/etc.], D) Debriefing information [documents/scripts], E) Referral
Part II: Research Participants

3) Participant demographics:

- Gender: Male □ Female □ Both □
- Estimated age(s): □ >18 years of age
- Are any subjects under age 18? Yes □ No □
- Potentially vulnerable populations (please indicate if any of the following groups are the target population of the study):
  □ Pregnant women & fetuses
  □ Prisoners
  □ Decisionally impaired/mentally disabled
  □ Specific ethnic group(s) (list in box):

If any potentially “vulnerable populations” have been indicated above, please explain the necessity for using this particular group, or if specific groups are excluded from the study, please indicate the exclusion criteria used.

- Target number of participants in the entire study (including controls) from start to finish (keep in mind that this is just an estimate of the total):

4) Please explain any outside institutional (i.e., schools, hospitals) approval you will need to obtain and how approval will be sought. Provide scripts, letters, or emails providing any information that will be used to obtain needed approvals/permission. It is the responsibility of the researcher to follow all applicable policies of any outside institution(s).

N/A

Part III: Risk/Benefit assessment

5) What knowledge/benefit(s) to the field will be gained from the study?

Knowledge of what factors influence food choices of college commuter students.

6) What direct benefit(s) are there to the participant(s) (if any) from the proposed research? [Please note that compensation is NOT considered a direct benefit.]

No direct benefits to participants, but the results of this study may be used to develop nutrition education materials for students who commute to help them make wise food choices that may lead to improvement in future health status.

7) Describe any potential risks (breach of confidentiality, economic, ethical, legal, physical, political, psychological/emotional, social, or other) to the subjects posed by the proposed research. (Note: Some studies may have “no reasonably foreseeable risks.”) Investigators are required to report all unexpected and/or adverse events to the IRB. Therefore, it is important that you list all reasonably anticipated risks because unanticipated adverse events may need to be reported by NIU to OHRP.

No foreseeable risks.

8) Federal regulations require that researchers use procedures that minimize any risks to participants. What procedures will be used to minimize each risk and/or deal with the challenge(s) stated in “7” above?

N/A
9) If support services are required to minimize risk of harm to participants, explain what will be provided (list of services available – Appendix E). [A resource list for the DeKalb area is available on the ORC website – if using this, please provide a copy with your application.]

N/A

10) How do the potential benefits of the study justify the potential risks to the participants?

N/A

Part IV: Consent Document Variations

11) Will audio, video, or film recording be used?

Yes □ No □

If yes, specify the recording format to be used.

Please keep in mind that specific consent must be sought in the informed consent document(s) by including a separate signature/date line giving consent for recording. This is in addition to the signature/date line giving consent to participate in the research project.

12) Will this project require the use of consent/assent documents written in a language other than English?

Yes □ No □

Reminder: If non-English documents will be used, please have the document translator provide documentation (email or written) that the translation is equivalent to the English version. [This can be done after the protocol is approved in order to minimize the number of changes needed.]

13) Are you requesting a waiver of a signed informed consent document?

Yes □ No □

Please indicate the justification for requesting this waiver:

- The only record linking the subject to the research would be the signed consent document and the principal risk of the research would be breach of confidentiality.
- The research involves minimal risk to the subjects and involves no procedures for which written consent is normally required outside of the research context (e.g., online surveys).

14) Are you requesting a waiver/alteration of some other aspect of the informed consent document?

[This section is relevant for studies involving deception.]

Yes □ No □

14a) Please explain which aspects of informed consent will be missing or altered along with a justification for the change.

14b) Please explain how the project meets all of the following criteria:

1) The research presents no more than minimal risk of harm to the participants.

2) The waiver/alteration will not adversely affect the rights or welfare of the participants.

3) The research could not practicably be carried out without the waiver or alteration.

4) Whenever appropriate, the participants will be provided with additional pertinent information after participation.

15) Will any HIPAA protected health information be collected as part of the data?

Yes □ No □
If yes, describe the procedures for protecting the information.

[Please provide a copy of your HIPAA disclosure form to be given to participants.]

16) Will any protected school records be collected as part of the data?  
Yes ☐ No ☐  
If yes, describe the procedures for protecting the information.

Part V: Confidentiality and Anonymity
17) Will identifying information be connected to the data (even through an identification key linking identities to a pseudonym or code that is kept separate from the data)?  
Yes ☐ (confidential data)  No ☐ (anonymous data)

18) If you answered yes to the above question, describe precautions to insure the privacy of the subjects, and the confidentiality of the data, both in your possession and in reports and publications.

Participants will not be required to list any identifying information on the survey instruments. In addition, all data files will be saved under password protection and will be accessed only by the researcher and advisor.

19) How will the records (data, recordings, and consent forms) be stored? Also indicate how long records will be kept and how and when they will be disposed of.  
[Note: Signed informed consent documents must be maintained for 3 years following completion of the study.]

The records will be saved on the researcher's private computer and be password protected. The records will be kept for three years after the study has been completed.

Part VI: Does this project involving deception  
[complete this section only if your study includes deception]

20) Describe the deception being used. Be sure to clarify whether this is deception by omission (an important aspect of the study is withheld from the participants) or commission (the participant is misled about some aspect of the study) or both.  
[Complete item 14 if aspects of consent are missing.]

21) Why is deception a necessary and unavoidable component of the experimental design?

22) Debriefing of participants will be:

☐ Immediate (directly following the research session)  
☐ Delayed  
☐ Full (all aspects of deception will be revealed)  
☐ Partial (some aspects of deception will remain unexplained)

a) If debriefing is delayed, why is the delay necessary, and when will it occur?

b) If debriefing is partial, why is the partial debriefing necessary? Would the participant be harmed in any way by full debriefing?

c) If debriefing is partial, will full debriefing occur later?

d) Does the presence of deception increase risk of harm to the participants?
e) Is the respondent free to withdraw his/her data after being fully debriefed?

Who will provide the debriefing?

Reminder: Please include a copy of your debriefing script/sheet with this application [Appendix D].

Part VII: Credit and Compensation
24) If participants will receive course credit for participation, please describe it below.

25) If participants will receive some other form of compensation for participation, please describe it below.

All participants who complete the survey will have the option of entering into a drawing for a $25 Target gift card by submitting their contact information to a separate e-mail account set up for this purpose.

26) Describe any alternative tasks that will be available for participants to earn the credit or compensation.

Part VIII: Conflict of interest
27) Do any of the researchers conducting this study have any potential conflicts of interest? [Conflicts of interest may include financial or personal interest, or any condition in which the investigator’s judgment regarding a primary interest may be biased by a secondary interest.]

Yes [ ] No [ ]

28) If yes to the above question, please describe the nature of the conflict of interest.

Please use the following link to access the NIU research conflict of interest policy:

Part IX: Researcher Qualifications
29) In addition to listing the investigators’ names, indicate their qualifications to conduct procedures to be used in this study (specifically describe past experience conducting research with humans or how training will occur).

Amanda Miller, graduate student, successfully completed graduate level Research Methods and Statistics courses. She has also completed the required training module for human subjects research. Dr. Josephine Umoren, thesis advisor and researcher, has overseen many thesis projects at Northern Illinois University.

30) State the date of completion of CITI Human Subjects Protection training program(s) for the individuals listed in the above question. [Note: NIU Policy requires that research investigators must complete appropriate training before conducting human subjects research.] If you have comparable training, please attach certification indicating this.
CITI (Collaborative Institutional Training Initiative) training is thorough and well recognized:
https://www.citiprogram.org/Default.aspx?

11/04/12
To be completed by investigator and confirmed by advisor (if student project) and departmental reviewer. Initials indicate all required parties ratify that application is complete:

Checklist of items required to accompany completed application form:
1. Complete grant proposal/contract (for externally funded projects)
2. All surveys, questionnaires, interview questions, or other instruments to be used
3. Subject recruitment/introductory materials
4. Informed consent documents (must select at least one):
   - Consent form for adults (if participants are age 18 or over)
   - Assent form for minors (if participants are under age 18)
   - Parental permission form (if participants are under age 18)

Initial indicating all listed materials are attached and application is complete; INCOMPLETE APPLICATIONS WILL NOT BE PROCESSED. The investigator will be notified of deficiencies in the application via e-mail from the Office of Research Compliance (ORC); if no response is received by the ORC within five (5) working days the application will be considered void.

Investigator Advisor (if student project) Department Chair/Designee

REQUIRED SIGNATURES: ALL PROJECTS

CERTIFICATION
I certify that I have read and understand the policies and procedures for research projects that involve human subjects and that I intend to comply with Northern Illinois University Policy. Any changes in the approved protocol will be submitted to the IRB for written approval prior to those changes being put into practice unless it involves an immediate safety issue for the subject during a procedure. (In such instances, the researcher is required to promptly notify the IRB after the fact.) I also understand that all non-exempt projects require review at least annually.

Investigator(s) Signature(s) Date

Signature of Faculty Advisor (Student Project Only) Date

Authorized Departmental Review:
- Project qualifies for Administrative Review. Cite the appropriate exempt category:
- Project qualifies for Subcommittee Review. Cite the appropriate expedited category:
- Project is referred for review by the convened IRB.

Signature of Authorized Departmental Reviewer Printed name Date

Return this form, together with necessary documentation, to the Office of Research Compliance, Lowden Hall, 301. For information or additional assistance with the approval process, please call the office at (815) 753-8588 or access the ORC web page at www orc.niu.edu.
APPENDIX H

ONLINE SURVEY
1. I understand that if I agree to participate in this study, I will be asked to complete a 35-question survey on food choices and the factors that influence them. The survey will take approximately 10 minutes to complete.

I am aware that my participation is voluntary and that I may end the quiz at any time without penalty and that if I have additional questions, I can contact Amanda Miller at amiller3@niu.edu or 712-898-1512.

I understand that there are no reasonably foreseeable risks to participating in this study. I understand that all data collected in this study will be kept confidential at all times and used only for the purpose of this study.

The closing date for this survey is April 12, 2014.

I understand that upon completing the survey, I have the option to enter into a drawing for a $25 Target gift card. If I am interested in being entered into the drawing, I will enter my contact information into the last question of the survey that asks if I am interested in entering the drawing.

If the statement below applies to you, choose YES to start the survey. Thanks for participating!

I am a full-time student at Northern Illinois University, 18 years or older, and live outside of DeKalb County. I agree to participate in this study.

☐ Yes
☐ No
Factors Influencing Food Choices

**2. During the past month, how often did you eat hot or cold cereals?**
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

**3. During the past month, what kind of cereal did you usually eat?**

4. If there was another kind of cereal that you usually ate during the past month, what kind was it?

**5. During the past month, how often did you have any milk (either to drink or on cereal)?**
Include regular milks, chocolate or other flavored milks, soy milk, lactose-free milk, buttermilk. Please do NOT include small amounts of milk in coffee or tea.
- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2-3 times per day
- 4-5 times per day
- 6 or more times per day
**Factors Influencing Food Choices**

**6. During the past month, what kind of milk did you usually drink?**
- Whole or regular milk
- 2% fat or reduced-fat milk
- 1%, 1/2%, or low-fat milk
- Fat-free, skim, or non-fat milk
- Soy milk
- Other kind of milk

If other kind of milk, please specify: [ ]

**7. During the past month, how often did you drink regular soda or pop that contains sugar? Do NOT include diet soda.**
- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2-3 times per day
- 4-5 times per day
- 6 or more times per day
Factors Influencing Food Choices

8. During the past month, how often did you drink 100% pure fruit juice such as orange, mango, apple, grape, and pineapple juices? Please do NOT include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2-3 times per day
- 4-5 times per day
- 6 or more times per day

9. During the past month, how often did you drink coffee or tea that had sugar or honey added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappucino. Please do NOT include artificially sweetened coffee or diet tea.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2-3 times per day
- 4-5 times per day
- 6 or more times per day
**Factors Influencing Food Choices**

10. During the past month, how often did you drink sweetened fruit drinks, sports or energy drinks, such as Kool-Aid, lemonade, Hi-C, cranberry drink, Gatorade, Red Bull or Vitamin Water? Include fruit juices you made at home and added sugar to. Please do NOT include diet drinks or artificially sweetened drinks.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2-3 times per day
- 4-5 times per day
- 6 or more times per day

11. During the past month, how often did you eat fruit? Include fresh, frozen, or canned fruit. Please do NOT include juice.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
**Factors Influencing Food Choices**

**12. During the past month, how often did you eat a green leafy or lettuce salad, with or without other vegetables?**

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

**13. During the past month, how often did you eat any kind of fried potatoes, including french fries, home fries, or hash brown potatoes?**

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
### Factors Influencing Food Choices

**14. During the past month, how often did you eat any other kind of potatoes, such as baked, boiled, mashed potatoes, sweet potatoes, or potato salad?**

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

**15. During the past month, how often did you eat refried beans, baked beans, beans in soup, pork and beans, or any other type of cooked dried beans? Please do NOT include green beans.**

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
Factors Influencing Food Choices

**16. During the past month, how often did you eat brown rice or other cooked whole grains, such as bulgur, cracked wheat, quinoa, wheat pasta, or millet? Please do NOT include white rice.**

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

**17. During the past month, not including what you just told me about (green salads, potatoes, beans), how often did you eat other vegetables?**

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
### Factors Influencing Food Choices

**18. During the past month, how often did you have salsa made with tomato?**

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

**19. During the past month, how often did you eat pizza? Include frozen pizza, fast food pizza, and homemade pizza.**

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
Factors Influencing Food Choices

20. During the past month, how often did you have tomato sauces such as with noodles or mixed into foods such as lasagna. Please do NOT include tomato sauce on pizza.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

21. During the past month, how often did you eat any kind of cheese? Include cheese as a snack, cheese on burgers or sandwiches, and cheese in foods such as lasagna, quesadillas, or casseroles. Please do NOT include cheese on pizza.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
Factors Influencing Food Choices

*22. During the past month, how often did you eat read meat, such as beef, pork, ham, or sausage? Please do NOT include chicken, turkey, or seafood. Include red meat you had in sandwiches, lasagna, stew, and other mixtures. Red meats may also include veal and lamb.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

*23. During the past month, how often did you eat any processed meat, such as bacon, lunch meats, or hot dogs? Processed meats are those preserved by smoking, curing, or salting, or by the addition of preservatives. More examples include: ham, pastrami, salami, sausages, bratwursts, and spam.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
Factors Influencing Food Choices

24. During the past month, how often did you eat whole grain bread including toast, rolls, and for sandwiches? Whole grain breads include whole wheat, rye, oatmeal, and pumpernickel. Please do NOT include white bread.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

25. During the past month, how often did you eat chocolate or any other types of candy? Please do NOT include sugar-free candy.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
Factors Influencing Food Choices

26. During the past month, how often did you eat doughnuts, sweet rolls, danishes, muffins, pan dulce, or pop-tarts? Please do NOT include sugar-free items.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

27. During the past month, how often did you eat cookies, cake, pie, or brownies? Please do NOT include sugar-free items.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
## Factors Influencing Food Choices

### 28. During the past month, how often did you eat ice cream or other frozen desserts? Please do NOT include sugar-free items.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

### 29. During the past month, how often did you eat popcorn?

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

### 30. My cooking skills are:

- Excellent
- Good
- Adequate
- Poor
### Factors Influencing Food Choices

#### 31. Please indicate the importance of these various factors on your food choices:

<table>
<thead>
<tr>
<th></th>
<th>Not important</th>
<th>Somewhat important</th>
<th>Important</th>
<th>Very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convenience (time constraints)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 32. While on campus, do you have access to a:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microwave</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toaster</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 33. How many days per week are you typically on campus for more than four hours?

- 1
- 2
- 3
- 4
- 5 or more

#### 34. How many times per week do you typically...

<table>
<thead>
<tr>
<th></th>
<th>1-2</th>
<th>2-3</th>
<th>3-4</th>
<th>4-5</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bring food from home to eat while on campus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buy food on campus or a restaurant nearby while on campus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat alone on campus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat with others on campus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 35. Are you aware of the Holmes Student Center Commuter Lounge?

- Yes
- No

If so, do you utilize it?
### Factors Influencing Food Choices

**36. Are you male or female?**
- [ ] Male
- [ ] Female

**37. What is your age (in years)?**

**38. Who do you currently live with?**
- [ ] With a significant other
- [ ] With roommate(s)
- [ ] With parents
- [ ] I live alone

**39. Please indicate your year in school:**
- [ ] Freshman
- [ ] Sophomore
- [ ] Junior
- [ ] Senior
- [ ] Graduate Student

**40. If you wish to be entered into the drawing for a $25 Target gift card, please type your e-mail address into the box below.**

Thank you for taking the time to complete this survey. It is greatly appreciated!
APPENDIX I

DSQ APPROVAL
Amanda,

You have my permission to use the DSQ in either the web-based or paper-based forms for use in your study. You also have permission to use the SAS programs supplied on the DSQ website to analyze the results of the questionnaires.

Ken Bishop
DHQ Technical Support
Information Management Services, Inc.
Calverton, MD
dhq@imsweb.com
APPENDIX J

REMINDER E-MAIL
Dear participant,

Thank you for taking the time to read this e-mail. You still have time to participate in a graduate thesis research project about the factors that influence college commuter students’ food choices.

The online survey will take approximately ten minutes to complete if you choose to do so.

You have until this date, ____________, to complete the survey.

If you have any questions, please contact Amanda Miller at amiller3@niu.edu or 712-898-1512. You can also contact my thesis director, Dr. Josephine Umoren, at jxu1@niu.edu.

By completing the survey, you have the option of being entered to win a $25 Target gift card.

Thanks for taking the time to read this e-mail. Your participation in this survey is greatly appreciated and will help further research in this area.

If you’re interested in taking the survey, please click on the link below:

https://www.surveymonkey.com/s/GWC5MSY

Thank you,

Amanda Miller