

Food, Health and Values: The Effects of Attitudes and Behaviors Regarding Sustainable Food Practices on Overall Diet Quality among College Students

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Abstract

Objective: This study examined the associations between overall diet quality and attitudes and behaviors regarding sustainable food practices among college students. Additionally, the roles of gender and race in attitudes and behaviors regarding sustainable food practices were examined. **Methods:** A cross-sectional survey was conducted with a total of 97 college students. Surveys were completed to assess the relationships between self-reported dietary intake and attitudes toward local and genetically modified foods, along with farmers' market attendance. The roles of gender and race in attitudes and behaviors regarding sustainable food practices were also examined. Independent t-tests and chi square analyses were used for statistical analysis. **Results:** The overall diet quality mean score (ODQMS) was higher for students who attended farmers' markets, for those who had positive attitudes toward local food, and for those who had negative attitudes toward genetically modified food. There was a significant difference between males and females in their farmers' market attendance, attitudes toward genetically modified food, and ODQMS. **Conclusions:** Diet quality of college students was associated with attitudes toward local and genetically modified foods, farmers' market attendance, and gender. Future research should focus on further understanding of relationships between consumer understanding of sustainable food practices and healthy food choices.

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Introduction

Throughout the past twenty years, the rate of obesity among Americans has increased dramatically and remains high (CDC, 2011). The greatest increases in overweight and obesity occur in people 18-29 years old, with approximately 36% of U.S. college students currently overweight or obese. Studies in the college population suggest that unhealthy diets are one of the largest contributors to the overweight/obesity problem among this group (Boyle & LaRose, 2008).

Factors Associated with Food Choices among College Students

As a result of the growing obesity epidemic, factors related to healthy food choices have been receiving increased attention (Moore, Diez Roux, Nettleton, & Jacobs, 2007). There are many considerations involved in college

students' food choices and eating habits such as taste, convenience, health, and price. Numerous studies have shown that college students tend to have poor eating habits, such as consuming fewer fruits and vegetables and high intakes of high-fat and high-calorie foods on a daily basis. (Deshpande, Basil, & Basil, 2009). In addition to suboptimal eating habits, environmental influences, such as buffet style cafeteria and large portion sizes, can also impact college student consumption (Boyle & LaRose, 2008).

Environmental Factors Associated with Food Habits

Aside from the food choice-related factors previously mentioned, environmental awareness and moral obligations also may influence consumer purchasing habits. Public concern linked to issues related to food production has increased in recent decades as evidenced by organic food and beverage sales in the United

States increasing from \$3.6 billion in 1997 to \$26.7 billion in 2010 (Organic Trade Association, 2010). Individuals' food values, such as attitudes toward local food, may underlie their choices for certain types of food (Dreezens, Martijn, Tenbult, Kok, & Vries, 2005). Studies have shown that consumers of organic, local, and sustainable foods tend to believe that these foods are healthier, more wholesome, and better in taste. In addition, these same consumers typically value the environment, food safety, animal welfare and are supportive of the local environment (Conner & Christy 2004).

Sustainable Food Practices

Sustainable food practices include having a preference for organic, local, sustainable, and nonprocessed foods produced by alternative food production practices (Pelletier, Laska, Neumark-Sztainer, Story, 2013). College students in the United States are becoming more supportive of foods produced and distributed in a sustainable manner. Research shows that consumers who purchase organically grown foods believe these foods are of higher quality and that purchasing local food supports local farmers and protects the environment (Rose, Serrano, Hosig, Haas, Reaves, 2008).

Factors Associated with Sustainable Food Practices

Individuals who report a high importance for sustainable food practices consume more fruits and vegetables and fewer fast food and sugar-sweetened beverages (Robinson-O'Brien, Larson, Neumark-Sztainer, Hannan, Story 2009). A recent study demonstrated a positive association between positive attitudes toward local food and healthy food choices (Zhao, Wolff, Bianco-Simeral, & Goto, 2012). Another study with college students found increased intake of vegetables and lower intakes of high-fat dairy, high-fat meat, and sweets after students took a course on societal issues regarding food and food production ((Pelletier, Laska, Neumark-Sztainer, Story, 2013). Consumers interested in sustainable food systems and viability of local agriculture may seek foods that are 'seasonal' and 'local' (Wilkins, Bowdish, & Sobal, 2000). There is currently limited information about the overall

diet quality of individuals who choose to consume local and organic food.

The health benefits of sustainable food practices may go beyond a higher consumption of fruits and vegetables. Local foods are grown closest to the point of consumption providing a fresh, ripe and flavorful product. Previous research indicates that organic farming produces crops with higher levels of beneficial nutrients such as antioxidants compared to conventionally-grown crops (Benbrook, Zhao, Yanez, Davies, & Andrews, 2008). Tagtow and Harmon (2009) argue that meat and milk from pasture-raised, grass-fed animals contain less total fat and higher levels of beneficial fatty acids such as omega-3, alpha-linolenic acid and conjugated linoleic acid. In an effort to improve nutrition and health among college students, it is important to identify strategies for promoting sustainable food practices to this population.

Sustainable Food Practices and Diet Quality

There is limited information about factors associated with sustainable food practices and diet quality among college students. Prior research indicates that gender and race are significant factors associated with certain determinants of food choices and diet quality among college students. Female students tend to avoid certain foods out of concern for health, weight, or other beliefs (Mooney & Walbourn, 2001), while males appear to rate cost and taste as important determinants of food choices (Boek, Bianco-Simeral, Chan, & Goto, 2012). Race may also impact attitudes toward taste, quality and nutritional components of foods (Boek, Bianco-Simeral, Chan, & Goto, 2012). Several recent studies have found greater support for organic, local, non-genetically modified, and nonprocessed food among racial minorities, however there has been no consistent survey found among age and race (Pelletier, Laska, Neumark-Sztainer, Story, 2013). To date, little is known about the roles of gender and race and other determinants of food choices such as attitudes and behaviors regarding sustainable food practices.

The purpose of this study was to examine how university students' attitudes and behaviors

regarding sustainable food practices were associated with overall diet quality. This study also investigated the roles of gender and race in attitudes and behaviors regarding sustainable food practices.

Methods

Study Design

The study utilized a cross-sectional design. A survey was conducted with students from a medium-sized university in northern California. Students were conveniently recruited from campus and the sample consisted of 97 college students. A power calculation carried out a priori indicated that a total sample size of 90 would provide statistical power to detect medium-large effect sizes (0.6 for the independent samples t-test), with an alpha level of .05 and power of 80%.

Instruments and Measures

Survey. Survey questions were derived from the National Health and Nutrition Examination Survey (NHANES) and other published literature on diet quality and attitudes and behaviors regarding local and genetically modified foods. The instrument was a two-page self-administered questionnaire consisting of demographic characteristics, dietary behaviors, and attitudes and behaviors regarding food sustainability practices.

The survey included general demographic questions regarding participants' gender, age, ethnicity, and year in college. There was one general question regarding farmers' market attendance. Three Likert-scale questions (1=strongly agree and 5=strongly disagree) measuring attitudes toward genetically modified food were focused on purchasing behaviors, genetically modified food's roles in ending world hunger, and safety of genetically modified food. Five Likert-scale questions assessing attitudes toward local food focused on food environment, health benefits, safety, taste factors, and the effects on animal rights. Overall diet quality was evaluated by eight items. Participants were asked to report how often they consumed fruits, vegetables, sweets, sodas/soft

drinks, fast food, ready-to-eat food, snack foods, and vitamin supplements by answering multiple choice questions.

Four nutrition professionals evaluated the survey instrument for content validity. To ensure the face validity of the questions, the survey was piloted among 10 college students and comments were then used to revise the survey questions. The final survey was administered by research assistants over a two-week period. The study was approved by the University Human Subjects in Research Committee at [University: blinded for review].

Data Analysis

Data were analyzed using SPSS version 19.0. Descriptive statistics were used to provide a description of the sample.

Cronbach's alpha was used to assess the reliability of the scale items measuring attitudes toward local food and genetically modified food. Cronbach's alpha values were 0.79 for local food and 0.88 for genetically modified foods. These values for all of our subscales are very near to or above 0.80, indicating acceptable internal consistency. Two mean scores were calculated, one for one for local food attitudes and one for attitudes toward genetically modified food, by finding the average score across all of the items in a given scale. To facilitate interpretation of the results, we dichotomized the scores into two categories, "positive" or "negative/neutral." The variable regarding farmers' market attendance, which included five categories ranging from "every week" to "never," was also dichotomized into "attend" and "don't attend" as the responses were very skewed.

In order to adopt a diet quality scale, responses to each of the eight questions related to diet quality were recoded to scale ranging from 1 (least frequent) to 6 (most frequent). The eight questions were categorized into two groups: "healthful items" (fruits, vegetables, and vitamin supplements), and "less nutritious food items" (sweets, sodas/soft drinks, fast food, ready-to-eat food, snack foods). To have a higher score reflect healthier eating habits the "less nutritious

food items” were reverse coded, with 1= most frequent and 6= least frequent. By averaging the total score of all eight recoded diet related questions, we created a composite scale representing the overall diet quality mean score (ODQMS), ranging from 1 (lowest diet quality) to 6 (highest diet quality).

Chi-square tests were used to examine the differences of gender and race on attitudes and behaviors regarding sustainable food practices (attitudes toward local food, attitudes toward genetically modified foods, and farmers’ market attendance). Independent samples t-tests were used to examine differences in ODQMS between groups including gender, race, and attitudes and behaviors regarding sustainable food practices. ODQMS was used as a dependent variable for the independent samples t-tests. Statistical significance was accepted at the level of $p \leq .05$.

Results

Sample Characteristics.

The study sample ($n = 97$) consisted of 37 (38%) males and 60 (62%) females. Race composition was 59% non-Hispanic white and 41% others. The mean age of the participants was 22.4 (SD ± 2.5) years, with a range of 18 to 30 years old.

Attitudes toward Local Food

While 48% of the study participants had positive attitudes toward local food, 52% of respondents had negative or neutral attitudes. Table 1 shows attitudes and behaviors regarding sustainable food practices by gender. There were no significant gender differences in attitudes toward local food ($p=.064$). There was no significant difference in attitudes toward local food between non-Hispanic white and other participants.

Attitudes toward Genetically Modified Food

Overall, 59.8% of the study participants had positive attitudes toward genetically modified food and 40.2% of respondents had negative or neutral attitudes. As shown in Table 1, there was a significant difference among males and females in their attitudes toward genetically modified foods ($p=.007$), with males having more positive attitudes compared to females

who were more uncertain of their attitudes. There was no significant difference in attitudes toward genetically modified food between non-Hispanic white and other participants.

Farmers’ Market Attendance

While 56.3% of respondents reported attending farmers’ markets, 43.8% reported that they never attended farmers’ markets. As displayed in Table 1, there was a significant difference between males and females in their farmers’ market attendance ($p=.006$), with females reporting higher attendance than males (68.3% to 37.1% respectively). There was no significant difference among non-Hispanic white and other participants.

Diet Quality

The average mean score of ODQMS was 4.08 (SD = 0.71). Factors associated with ODQMS are displayed in Table 2. Females had a higher overall diet quality mean score than male students ($p = .015$). As shown in Table 2, ODQMS was higher among respondents who had a positive attitude toward local food ($p = .042$). Respondents with negative/neutral attitudes toward genetically modified food had a higher ODQMS compared to those with positive attitudes ($p=.035$). ODQMS was higher among respondents who attend farmers’ markets ($p = .012$). There was no significant difference between non-Hispanic whites and others related to ODQMS.

Discussion

There is a high prevalence of overweight and obesity among college students and therefore it is important to examine factors affecting their food choices. This study examined relationships between students’ attitudes and behaviors regarding sustainable food practices and healthy food choices. This study also investigated the roles gender and race play in attitudes and behaviors regarding sustainable food practices. To our knowledge, this study is among the first to examine associations between attitudes and behaviors regarding sustainable food practices and healthy food choices. Our study is unique in that our survey items measured both overall

Table 1

Attitudes and Behaviors regarding Sustainable Food Practices by Gender			
	Male n(%)	Female n(%)	p-value
Genetically Modified Food			
Positive	28 (77.8)	30 (50)	0.007**
Negative/neutral	8 (22.2)	30 (50)	
Local Food			
Positive	13 (35.1)	34(56.7)	0.064
Negative/neutral	24 (64.9)	26(43.3)	
Farmers' Market Attendance			
Yes	13 (37.1)	41 (68.3)	0.006**
No	22 (62.9)	19 (31.7)	

The Chi-square test was used for data analysis.

*p values: ≤ 0.05

** p values ≤ 0.01

intake of fruits, vegetables, etc. in addition to local and sustainable foods.

Attitudes toward Local and Genetically Modified Foods

Previous research indicates that gender and race are significant factors associated with certain determinants of food choices among college students (Boek, Bianco-Simeral, Chan, & Goto, 2012). The current study indicates that gender is a significant factor associated with attitudes towards sustainable food practices among college students. In comparison to males, females had more positive attitudes toward local food and had more negative attitudes toward genetically modified foods. Previous research suggests that these differences by gender may be due to greater involvement in food preparation, stronger beliefs about the role and meaning of food, and greater knowledge of alternative production practices among females (Pelletier, Laska, Neumark-Sztainer, Story, 2013). This suggests that nutrition and health professionals should consider a gender-specific approach when promoting sustainable food practices.

Farmers' Market Attendance

The current study indicates that gender is a significant factor associated with behaviors regarding sustainable food practices among college students. Females had more reported higher attendance at farmers' markets compared to males. There is a common perception of local food items at farmers' markets are more

expensive compared to food items at a conventional grocery store. Furthermore, living arrangements in dormitories including lack of space and equipment to prepare foods may become a barrier to sustainable food practices. It is critical to offer college students courses in sustainable food practices addressing strategies for incorporating local foods into their diets in a cost-effective way while living in dormitories.

Diet Quality

The present study indicates that positive attitudes toward local food and farmers' market use may be critical determinants of overall diet quality among college students. The present study revealed that positive attitudes and behaviors regarding sustainable food practices were significantly associated with healthy food choices among the study participants. These findings were congruent with the other study that showed a positive association between positive attitudes toward local food and overall vegetable consumption (Zhao, Wolff, Bianco-Simeral, & Goto, 2012). These findings are also consistent with another study that food participants who placed higher importance on alternative food production practices had healthier dietary patterns (Pelletier, Laska, Neumark-Sztainer, Story, 2013).

Limitations

Limitations of the study include that the data was self-reported and the sample was a convenience sample, which does not represent a

Table 2

Factors associated with ODQMS		
Characteristics	ODQMS¹ Mean (SD)	p-value
Gender		
Male	3.87 (0.78)	0.015*
Female	4.22 (0.63)	
Race		
Non-Hispanic white	4.03 (0.81)	0.428
Others	4.14 (0.55)	
Attitudes toward local food		
Negative/neutral	3.94 (0.74)	0.042*
Positive	4.23 (0.65)	
Attitude toward genetically modified food		
Negative/neutral	4.27 (0.79)	0.035*
Positive	3.97 (0.62)	
Farmers' Market Attendance		
Don't Attend	3.87 (0.73)	0.012*
Attend	4.23 (0.66)	

¹ ODQMS: overall diet quality mean score ranging from 1 to 6
The independent samples t-test was used for data analysis.

*p values: $\leq .05$

wide range of students from multiple universities. In addition, the participants were classified into white and other races for parsimony in data analysis due to the small number of participants from racial groups other than white. Future research is needed to explore possible roles of race in attitudes toward sustainable/local food practices in an ethnically diverse population. Finally, the current study utilized a cross-sectional design, which cannot infer causal relationships between variables and cannot measure changes over time.

Conclusion

In conclusion, this study has given insight into attitudes and behaviors regarding sustainable food practices and their relationships with

overall diet quality among college students. Food choice evolves from values and attitudes which may be influenced by factors including gender. Future research should explore a more thorough understanding of the complex food attitudes and behaviors among college students. Finally, promoting sustainable food practices among college students may allow students to make informed choices about their dietary habits and to consider how these choices might impact their own health, as well as the current and future food systems.

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