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Pepperdine University  
Graduate School of Education and Psychology

EXAMINATION OF FOOD CHOICE MOTIVES: THE INFLUENCE OF AN INNOVATIVE,  
INTERDISCIPLINARY LEARNING COMMUNITY RELATED TO ENVIRONMENTAL  
SUSTAINABILITY

A dissertation submitted in partial satisfaction  
of the requirements for the degree of  
Doctor of Education in Learning Technologies

by

Kelly J. Billingsley

February, 2014

Kay Davis, Ed.D. – Dissertation Chairperson

This dissertation, written by

Kelly J. Billingsley

under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

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## DEDICATION

I dedicate this dissertation to my husband, Mike. It takes a very patient man to endure over three years of a spouse's demanding doctoral degree. His unwavering support and understanding nature allowed me to focus and thrive.

My dear, this culminating piece of work is as much yours as it is mine. I am forever grateful for you.

## ACKNOWLEDGEMENTS

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## ABSTRACT

What and how much an individual eats largely defines his/her health. The most used dietary intervention models target individuals' concern for personal health, thereby undermining the interdisciplinary trajectory of the nutrition field. The purpose of this study was to compare the food choice motives of students enrolled in an interdisciplinary learning community (LCOM) to students enrolled in a non-integrated nutrition course and gain insight into student experiences with interdisciplinary nutrition education. A two-phase sequential mixed methods design was used. The first phase compared the personal health and ethical concern motives of the LCOM ( $n = 13$ ) and non-integrated students ( $n = 60$ ). The secondary phase employed a web-based interview to explore the LCOM experiences. Both groups highly valued the ability of food to improve personal health. There was no statistically significant difference in the ethical concern motives between the two groups however, interview responses revealed that LCOM participants made dietary changes as a result of ethical concern. The study concluded that participants made dietary choices based on personal health, regardless of the type of nutrition education received, and the LCOM was effective in developing a greater value for ethical concern. The learning community framework could provide a rich education experience that helps students develop an improved sense of social responsibility and initiate behavior change. Recommendations included how health and nutrition departments could integrate related disciplines into nutrition curricula. Future research examining the longevity of motives is needed to explore the effectiveness of this educational framework in producing lasting behavior change.

## Chapter 1: Introduction

The food environment in America has changed drastically in the last two decades. Instead of selecting high quality, whole foods, rich in micronutrients, omega-3 fats, and fiber, consumers are more frequently opting for readily available, processed items that are high in saturated and trans fats, refined carbohydrates, and sodium (Vay Liang et al., 2004; Weil, 2004). What and how much an individual eats largely defines his/her health. The poor dietary choices made by millions of Americans today are reflected in this country's rising rates of obesity and chronic disease. Currently, 68% of adult Americans are overweight and 34% are obese, making the United States the most overweight developed country in the world (Centers for Disease Control and Prevention [CDC], 2009). Obese people are more likely to develop heart disease, cancer, hypertension, and diabetes, thereby making the obesity epidemic one of the nation's leading public health concerns (Pi-Sunyer, 2003).

Today, the two leading causes of death among Americans, heart disease and cancer, are directly influenced by the quality of Americans' food choices. Research has consistently shown that diets rich in saturated and trans fats and low in omega-3 fats, vegetables, and fiber are directly related to the development and progression of heart disease (de Lorgeril et al., 1999; Heidemann et al., 2008; Lechtenstein et al., 2006; Ornish et al., 1998; Van Horn et al., 2008). In fact, some research suggests that following specific dietary recommendations, such as those created by the American Heart Association, can eliminate heart disease as a chronic ailment for people under the age of 70 (Kromhaout, Menotti, Kesteloot, & Sans, 2002). Cancer risk is equally influenced by changes in dietary patterns. According to a study published in the *New England Journal of Medicine*, 80% of cancer risk is related to environmental factors and 40% is related to diet (Hoover, 2000). Specifically, a high intake of beef, processed meats, saturated fats,

refined carbohydrates, and alcohol increases the risk for multiple forms of cancer, making the typical American diet a risky choice (Vay Liang et al., 2004). Unfortunately, the consequences of obesity and chronic diseases are rather far reaching and do not end with only individual ill health effects. In 2008, both direct and indirect medical costs for obesity totaled \$147 billion in the U.S. (Finkelstein, Trogon, Cohen, & Dietz, 2009). Recently, the American Heart Association predicted the costs of heart disease would triple before 2030, increasing to over \$800 billion per year (Finkelstein, et al., 2009). Unfortunately, health statistics and medical costs show no sign of improving, making weight loss a \$61 billion industry (MarketData Enterprises, 2011).

The most common approaches to improving dietary behavior have focused on individual behaviors and health outcomes. Since individual behaviors have been viewed as the most modifiable determinant of food choices, most interventions rest on the belief that an increase in nutrition knowledge is enough for individuals to abandon their poor dietary choices in an effort to prevent future illness. If this were the case, obesity and chronic disease rates would be decreasing as a result of public health initiatives distributing nutrition information. Instead, obesity and related illnesses continue to be a leading public health concern and strategies to promote healthful dietary change remains a priority of nutrition research and professionals in the field.

Nutrition professionals are becoming more engaged with agricultural policy and environmental sustainability movements while consumers are slowly beginning to push for improved transparency in food production methods, including increased support for consumer right to know measures. Consumer research has identified that ethical concerns and social values play a role in what consumers chose to buy (Chen, 2009; First & Brozina, 2009; Rimal,

Fletcher, McWatters, Misra, & Deodhar, 2001). However, dietary change strategies have only begun to leverage the impact of societal issues on motives for healthy eating (Robinson, 2010a). The immediacy of this issue lends itself to much needed research. If dietary change efforts are to be successful they must consider the current trends and interdisciplinary nature of the nutrition discipline as well as the societal level issues that govern food choices.

### **Background of the Problem**

Dietary change efforts vary greatly in their approach. The most studied interventions employ a conceptual model to help explain dietary behaviors. Typically, these models are grounded in the assumption that obesity and lifestyle related illnesses are ultimately an issue of personal responsibility (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003; Nestle et al., 1998). For example, the Knowledge-Attitude-Behavior Model (KAB) explains the role of knowledge accumulation in gradual behavior change. Obesity interventions employing the KAB model strive to improve individuals' understanding of healthy eating (Baranowski et al., 2003). Although it appears self evident that an increase in knowledge would help promote behavior change, research reveals continuous discrepancies in individuals' nutrition knowledge and dietary choices. Several studies report a tension between what participants believe they *should* eat, what they intend to eat, and their actual food choices (Kennedy, Meyers, & Layden, 1996; Lloyd, Paisley, & Mela, 1995; Nestle et al., 1998). With respect to dietary change towards healthful eating, knowledge alone has not been proven to shape behavior. The Health Belief Model (HB), another commonly used model among obesity intervention efforts, considers an individual's level of perceived susceptibility for diet related illnesses. Intervention strategies using the HB model target perceived levels of threat and personal relevance as cues that promote action (Baranowski et al., 2003). The underlying assumption here is that people are able to think

and act rationally in their own best interest, which research has also refuted (Kahneman, 2003; Wansink, 2007).

Both of these individually focused models assume that when individuals learn about nutrition related concepts or level of risk, they will abandon dietary habits that promote obesity and disease in exchange for healthful dietary patterns that promote optimal health. Although intervention efforts focused on health outcomes may be effective for some, the dietary changes seen are often short lived (Robinson et al., 2003; Robinson & Sirard, 2005; Robinson, 2010a). Overall, employment of these models has not resulted in any significant decrease in the obesity epidemic or related chronic illnesses. Dietary change strategies that target personal behaviors are not only ineffective but also undermine the interdisciplinary nature of the nutrition field as well as the powerful influence environmental factors have in governing food choices.

Nutrition is a dynamic field; it's perspectives and recommendations often reflect trends in food production and consumer health. Early in the 20th century, food was limited and nutritional deficiencies prevalent in the U.S. Nutrition education focused on dietary strategies to reverse diseases caused by nutritional inadequacies. In the early 1950s, before consumerism, home economics served as the backbone of nutrition education, teaching homemakers how to prepare balanced meals for their families. Most of the food consumed in the U.S. was either prepared at home or purchased fresh from local farms and bakeries. After World War II, food became more readily available, particularly in the form of canned goods and commercially prepared fortified food items. Nutrition education underwent a shift, focusing attention on creating balance in the American diet by creating specific recommendations for nutrient ratios (Weinsier et al., 1989). As food availability continued to increase and food production methods grew larger in scale, so did the portions of food and the waistlines of Americans. In 2000, the



United Nations reported that the number of people suffering from overnutrition officially exceeded the number suffering from malnutrition worldwide (de Onnis & Blossner, 2003). For the past 2 decades obesity and related chronic diseases, such as heart disease and type 2 diabetes, have been increasing at prolific rates in the U.S. (CDC, 2009). Nutrition professionals have focused much of their work on educating both consumers and health care professionals about weight management strategies to reduce the prevalence of these illnesses. Based on theories of energy balance (calories in vs. calories out), intervention strategies have incorrectly focused on the quantity of food being consumed. In truth, food quality probably affects health more than calorie consumption and expenditure (Weil, 2004). Unfortunately, many dietary change approaches discount the impact of food quality. Approaches to dietary change should integrate agricultural policies and food production methods, as they are most responsible for the quality of American food.

Agricultural policies dictate which crops are subsidized, which ultimately influence the ingredients used in a large percentage of commercially available food items, including soybean and corn oil, enriched flour, and high fructose corn syrup. Current U.S. agricultural policies have driven down the cost of convenience, ready-to-eat foods, which consequently increase obesity and disease rates. Recent farm policies have also impacted the health of the environment, both nationally and globally. Legislative decisions promote large monocultures and genetically modified crops, both of which have greatly reduced biodiversity and food safety. Such decisions have also impacted local economies by undermining local farmers and the production of their fruits and vegetables (Billig & Wallinga, 2012). The discipline's new found focus on food production agriculture has led to an increased demand for sustainable, local, and organic foods as a means for improving both environmental and human health. The seemingly simple shift

from food quantity to food quality has laid the foundation for health professionals and consumers alike to question the safety, quality, and sustainability of the U.S. food system.

### **Purpose of the Study**

The purpose of this two-phase, sequential mixed methods study is to examine the influence an innovative learning community focused on societal level issues related to environmental sustainability and food production methods has on students' motives for dietary choices. The first phase is designed to compare the influence of social/ideological values to individual level determinants, such as health concern, on food choice motives. This will be accomplished by quantitatively measuring the self-reported motives of students enrolled in the learning community *Food for Thought* and those enrolled in a non-integrated nutrition course. Information from this first phase will be explored further in a secondary phase, during which a two round, web based interview will be conducted to explore the experiences of students enrolled in this learning community. The reason for following up qualitative data in the second phase is to gain in-depth insight into specifically how the *Food for Thought* content and experiences influence motives for dietary choices. The following research questions are considered:

RQ 1: Is there a significant difference between the personal health food choice motives of students who completed the *Food for Thought* LCOM and students who completed a non-integrated nutrition course?

RQ 2: Is there a significant difference between the ethical food choice motives of students who completed the *Food for Thought* LCOM and students who completed a non-integrated nutrition course?

RQ3: What aspects of the learning community have the most influence on students' motives for dietary choices?

### **Conceptual Framework**

This study proposes examining motives for dietary choices through the perspective of societal level issues and interdisciplinary nutrition education. Conceptually, the dynamic between social/ideological values, interdisciplinary education, and food choice motives is consistent with the new and innovative research on *stealth interventions*.

**Food choice motives.** Motives behind what people chose to eat are created by personal beliefs and values regarding food. Such beliefs and values are often the target of intervention efforts and research studies since they can typically predict dietary choices (Nestle et al., 1998). For example, if an individual reports *convenience* as the primary motive for food selection then it is likely the individual is more likely to consume pre-packaged meals, food that is easily accessible such as fast food, and/or foods that require little to no preparation. Eating habits however, are not dictated by one specific factor. Instead, they are developed over a lifetime as a result of the interplay of various influences (Larson & Story, 2009; Nestle et al., 1998). Research has identified a wide range of determinants that govern food choices that are generally categorized as individual, social, physical, or macro-level (Larson & Story, 2009).

Individual level determinants typically refer to biological food preferences, learned food preferences, demographic factors, and personal knowledge. These influences have been studied and serve as the backbone for most conceptual models used in current obesity intervention efforts (Nestle et al., 1998). Studies have shown food preferences to be a strong determinant of food choices, often overriding individual knowledge (Carrillo, Varela, Salvador, & Fiszman 2011; Drewnowski, 1995; Glanz, Basil, Maibach, Goldberg, & Synder, 1998). This is consistent

with the research reporting discrepancies in eating habits and nutrition knowledge (Kennedy et al., 1996; Lloyd et al., 1995; Nestle et al., 1998). Social factors influencing food choices include eating in the presence of others and social support (Larson & Story, 2009). The social nature of eating has been well documented including the role of personal relationships in making and sustaining dietary change (De Castro, 1995; Peterson, Kris-Etherton, & Sigman-Grant, 1994). Physical determinants such as the availability of food, location of purchase, and location of consumption also determine dietary choices. Physical factors have not been the focus of nutrition research since these issues are largely related to economic and political influences and therefore are often not at the center of dietary change efforts (Nestle et al., 1998). However, a related category, macro-level determinants, has caught the attention of recent nutrition research and dietary change strategies. Politics, economics, social movements, and societal issues are all considered macro-level determinants, expanding the influence of dietary choices well beyond personal responsibility and preference. Historically, societal level issues have not greatly influenced social norms about food likely because food and nutrition have rarely been viewed as social problems worthy of inclusion in a political agenda. However, in the last decade, the public has become increasingly aware of issues surrounding food production methods and food quality, making this a new and exciting area of nutrition research and a much needed inclusion in nutrition education curriculum (Chen, 2009; First & Brozina, 2009; Rimal, et al., 2001).

**Teaching nutrition in higher education.** Several studies have revealed that college nutrition courses can serve as an inexpensive and effective intervention method for improving young adults' dietary habits (Ha & Caine-Bish, 2009; Ha & Caine-Bish, 2011; Ha, Caine-Bish, Hollomon, & Lowry-Gordon, 2009; Hekler, Gardner, & Robinson, 2010a; Pearman et al., 1997).

However, these studies have not considered (a) the role of macro level determinants and (b) the recent trends in college education, namely interdisciplinary learning communities.

Although the research indicates that knowledge alone does not promote behavior change, studies examining college nutrition courses have found that they are effective in promoting healthful dietary changes among students. College nutrition courses have specifically been successful in reducing soda consumption and increasing fruit, vegetable, and whole grain intake (Ha & Caine-Bish, 2009, 2011; Ha et al., 2009). However, the research is limited to nutrition courses that utilize behavioral models that focus on individual factors to promote change. Typically, general college nutrition courses emphasize diet and disease prevention, self-assessment, meal planning, and goal setting techniques (Pearman et al., 1997). Therefore, the research is limited in the utility of leveraging current social issues to influence dietary motives. Additionally, most college nutrition education intervention efforts have discounted the new interdisciplinary curricular approaches being seen in higher education.

***Learning communities.*** Curricular learning communities (LCOMs) have recently emerged as a trend for improving student learning and engagement in undergraduate education, particularly in the community college setting (Mikler, 2004). LCOMs can be defined as classes that are linked during an academic term, typically around an interdisciplinary theme, and enroll a common cohort of students. Learning communities provide students an opportunity to explore content through multiple disciplines, improve student awareness and engagement, all of which enhances the learning process as a whole (Tinto, 2000). A learning community that integrates nutrition with outside, but related, disciplines is likely to broaden a student's perspective of his/her food environment, providing a unique setting in which motives for eating can be examined.

**Stealth interventions.** The idea that a societal issue such as environmental sustainability can influence personal dietary choice is consistent with the stealth intervention model. Coined by Stanford researchers, stealth interventions target behavior change through a motivating process for the participant (Robinson et al., 2003). As a result, motivation becomes the primary focus, while the desired health outcome (i.e. weight loss, improved energy, greater physical activity, etc.) becomes a side effect of the process.

The stealth intervention model has taken inspiration from the sustained behavior change seen in populations engaged in certain religious and social beliefs. Seventh Day Adventists following a vegetarian diet, Hindus not eating beef, or Jews keeping kosher all serve as examples. Large populations have been successful in adhering to certain dietary prescriptions, regularly resisting the temptation to stray from their dietary practices regardless of opposing social norms. It is doubtful that people of such religious movements are born with traits that allow them to practice self-discipline more effectively than others. Therefore, something about the social or ideological movement itself must help these individuals adhere to certain lifestyle choices (Robinson, 2010a). Researchers believe this phenomenon can be harnessed into a potential obesity intervention strategy with a focus on an existing social movements rather than health related outcomes (Hekler et al., 2012; Robinson, 2010a). One method is to find existing social movements that share behaviors consistent with obesity prevention, such as environmental sustainability, which includes lifestyle habits consistent with approaches to improve dietary habits. For example, individuals who are motivated to lessen their carbon footprint may chose to reduce their consumption of animal products, increase intake of organic fruits and vegetables, and reduce dependency on processed foods. While these food choices will reduce body weight and risk for several types of chronic illnesses, the individuals have chosen to adopt this new

pattern of eating as a result of their motivation to become part of a social/ideological movement rather than their interest in improving their own personal health. This phenomenon suggests that societal level influences may play a greater role than individual factors in promoting healthful dietary change.

### **Definition of Terms**

Definitions are organized by conceptual area including, food choice motives, nutrition instruction and interdisciplinary education, and stealth interventions.

#### *Food choice motives.*

- Individual determinants: individual factors such as personal preferences, demographics, and level of knowledge that influence what a person chooses to eat (Larson & Story, 2009). Individual determinants will be measured in the survey portion of the research by the *health, mood, natural content, sensory appeal, and weight control* domains found in the Food Choice Questionnaire.
- Macro level determinants: social issues relating to politics, economics, and cultural norms that influence what a person chooses to eat (Larson & Story, 2009). Macro level determinants will be measured in the survey portion of the research by the *ethical concern* domain, which was extended using the Ethical Food Choice Motives supplement.
- Physical determinants: factors such as cost of food, availability of food, and location of purchase and consumption that influence what an individual chooses to eat (Larson & Story, 2009). Physical determinants will be measured in the survey portion of the research by the *convenience* and *price* domains found in the Food Choice Questionnaire.
- Social determinants: factors such as family involvement, social relations with friends and peers that influence what a person chooses to eat (Larson & Story, 2009). Social

determinants will be measured in the survey portion of the research by the *familiarity* domain found in the Food Choice Questionnaire.

*Nutrition instruction and interdisciplinary education.*

- Interdisciplinary: more than one discipline contributing to a common subject of inquiry (Garkovich, 1982). Interdisciplinary is a way to characterize the *Food for Thought* LCOM as it integrates four disciplines including Biology, English, Environmental Science, and Nutrition.
- Learning community (LCOM): classes that are linked during an academic term, typically around an interdisciplinary theme, and enroll a common cohort of students (Minkler, 2004). The students enrolled in the LCOM focusing on sustainability, offered at XYZ College, are a source of data for both the survey and web based interview phases of the research.
- Non-integrated nutrition course: a nutrition course that focuses primarily on informing the relationship between diet and disease and personal skill building rather than integrating content with outside disciplines (Pearman et al., 1997). A non-integrated nutrition course will be used as the comparison group in this study during the survey portion of the research.

*Stealth interventions.*

- Social/ideological values: personal beliefs related to social issues and/or religious values that impact an individual's actions, preferences, and attitudes (Robinson, 2010a). Operationally social/ideological values will be measured using the *ethical concern* domain in the survey portion of the research. Conceptually,



social/ideological values related to sustainability will be explored further in the web-based interviews.

- Environmental sustainability: the prevention of global warming and climate change through activities such as supporting sustainable farming, buying local, organic foods, recycling, reducing waste, conserving water, improving air quality, etc. (Robinson, 2010b).

### **Significance**

Considering the complex underpinnings of the proposed research, the significance of this study could potentially be far reaching. Results of the study could contribute to the literature on, (a) determinants of food choices, (b) stealth interventions, and (c) nutrition education and interdisciplinary approaches.

The research surrounding societal issues as underlying motives for healthy eating is both new and scant. While consumer studies have indicated that ethical concerns and ideological values may determine organic food consumption, the motives have not been related to a current social movement or educational approaches (Chen, 2009; First & Brozina, 2009; Rimal et al., 2001). The findings of this study could contribute to the literature regarding whether or not educating students about current social movements could help govern their food choices. Factors influencing food choice may ultimately inform obesity and dietary intervention strategies, particularly for the understudied young adult population. Currently, obesity prevention efforts have largely focused on youth or high-risk populations, giving little attention to the transition from adolescence to early adulthood. In fact, clinical and public health programs targeting this age group are virtually nonexistent (Laksa, Pelletier, Larson, & Story, 2012). College courses are easy to disseminate and more accessible than ever, providing a suitable opportunity for a

population based intervention. In addition, if the study finds that students' motives for dietary choices are more heavily influenced by social/ideological values than any other determinant, the *Food for Thought* LCOM could be used as an example of a stealth intervention, which would expand this new area of research.

Empirical studies on stealth interventions are limited. The studies that do exist show promise, but only one empirical study has been related to dietary intervention (Hekler et al., 2010). That particular study employed a *Food and Society* course as an intervention method for dietary change and was conducted at an upper-tier academic institution, which is not representative of the general public. For stealth interventions to be appropriate as a population based approach, the participants should be more diverse and representative of the American population. Although this study did not implement an experimental design, it did use the conceptual framework of stealth interventions to determine whether social/ideological values impact motives for healthy eating. Outcomes of this study could help validate the innovative research surrounding stealth interventions and the effectiveness of utilizing the environmental sustainability movement to provide a different ideological framework that may resonate with students more than a traditional health outcome based approach. Therefore, this study could also provide a new direction for building curriculum and teaching nutrition in higher education.

If students' motives for dietary choices are influenced by the interdisciplinary nature of the *Food for Thought* LCOM, then this study could provide new insight into innovative approaches to nutrition education, impacting the way college faculty build curriculum and engage with colleagues. Creating interdisciplinary curriculum requires faculty to work in the margins of their field, integrating outside disciplines and colleagues. The area of interdisciplinary learning communities could also benefit from this study. Most of the current

literature focuses on student learning, retention, and engagement (Mikler, 2004). This study could potentially broaden the benefits to include behavior change, an outcome that has not yet been explored through the perspective of interdisciplinary education.

Even if this study finds no impact of the *Food for Thought* LCOM on motives for dietary choices, the results can still contribute to the literature. When considering viable change strategies or educational methods of any kind, it is equally important to identify what is not successful. This may help research efforts direct their focus on other potential strategies for improving dietary habits. Therefore, regardless of the outcome, this study will shed further light on how to improve the success of approaches to improve healthy eating and ultimately weight loss and obesity related illnesses.

### **Summary**

This research is grounded in the belief that impacting the factors that govern food choices requires strategies that target factors beyond health outcomes. A more holistic perspective on the American food environment, including environmental sustainability, is necessary to impact individuals' values and beliefs surrounding food. The interdisciplinary learning community, *Food for Thought*, provides a unique setting in which students are exposed to both social/ideological values related to environmental sustainability and health outcomes of dietary choices. This study will examine the impact the *Food for Thought* LCOM has on motives for dietary choices in an effort to contribute to the literature on possible approaches to dietary change.

## **Chapter 2: Conceptual Foundation**

The nutrition field has and continues to carefully consider the motives behind American's dietary choices since they provide a necessary framework for the development of effective dietary intervention strategies. Unfortunately, the most commonly used intervention models undermine the role of societal issues in developing eating habits and the interdisciplinary trends of the nutrition discipline. Nutrition courses in higher education could provide a unique opportunity to not only improve dietary habits but also leverage the social and interdisciplinary nature of the field. Stealth interventions could serve as a viable framework for the development of interdisciplinary nutrition courses that target college students' dietary choices, at the macro level. Given the importance of dietary decisions, the purpose of this review is to summarize the scientific literature on the factors that influence dietary habits, how intervention efforts leverage these factors to promote healthful behavior change, the function of college nutrition courses in successful dietary change, and the role of stealth interventions in improving motivation and health outcomes.

### **Determinants of Dietary Choices**

Why individuals chose to eat the foods they do cannot be answered simply. Determinants of dietary choices include a complex array of social-psychological behaviors and influences that can be categorized as individual, social, physical, and macro level (Larson & Story, 2009). However, food choices typically involve a constant interplay between various factors. To illustrate the complexity of dietary change, consider the following example:

A middle-aged male learns he has high blood cholesterol and wants to increase his intake of fiber by increasing his fruit and vegetable consumption. He first needs to locate a store that

sells fresh produce (physical). He may live in an area that predominately supports convenience items and does not provide much fresh produce either due to seasonality, transportation costs, or poor turnover rate (physical, macro-level). He will need to find a location where he can purchase produce that is both acceptable to him in taste and in price (individual, macro-level). When he brings the produce home he will need to properly store it to extend the shelf life (physical) and may have to manage family members who have different dietary preferences than him (individual, social).

While a dietary goal of increasing fruit and vegetable intake may appear simple, it is actually quite intricate; influenced by several factors other than individual motivation and behavior. Therefore, dietary change efforts need to be clear on which factor(s) are being targeted in order to generate the greatest level of success. Reviewing the range of food choice motives provides an appreciation for the complexity of dietary decisions as well as their importance in constructing meaningful intervention strategies.

**Individual.** Individual level factors include food preferences, knowledge, and demographic variables such as age, gender, and ethnicity. Consumer study reports show that regardless of age, gender, and ethnic background, sensory appeal, namely taste, is the primary reason Americans chose to eat the foods they do (Carrillo et al., 2011; Glanz et al., 1998; Szczesniak, 1971). In fact, in a national survey sample of 2,967 adults, taste was the self-reported number one reason for dietary preferences (Glanz et al., 1998). Biologically, humans have developed a taste for calorically dense foods (Nestle et al., 1998). The innate preference for fat, sugar, and sodium is more frequently acted on in childhood than in adulthood. During infancy and early childhood such flavors determine whether a child prefers or dislikes a food (Birch, 1995), whereas adults seem to experience some level of tension between sensory cues

and cognitive function (Drewnowski, A., Kurth, C., Holden-Wiltse, J., & Saari, 1992). As people age their concerns for health and body weight increases, which may influence their food choices equally or sometimes more than sensory appeal (Glanz et al., 1998).

Knowledge is useful in making dietary change, however alone it has not proven to be effective in changing behavior (Baranowski et al., 2003; Contento et al., 2005; Nestle et al., 1998). For example, the level of nutrition knowledge among Americans is fairly high, yet consumers continue to make unhealthful decisions (Kennedy et al., 1996; Lloyd et al., 1995; Nestle et al., 1998). Numerous studies have demonstrated the discrepancy between knowledge and action. A meta-analysis of 9 studies found the effect-size of the relationship between nutrition knowledge and dietary intake small (Axelson, Federline, & Brinberg, D, 1985). For example, fat consumption is predicted more accurately by personal attitudes, perceptions, and beliefs than knowledge (Shepherd & Stockley, 1987; Shepherd & Towler, 2008; Stafleu, Van Staveren, De Graaf, Burema, & Hautvast 1996).

Demographic variables also play a role in governing what a person chooses to eat. Age impacts the importance of nutrition, weight control, convenience, and cost in determining dietary habits. In a consumer survey, older participants reported a greater importance of nutrition and weight control while younger participants reported convenience and cost as their primary influences. However, females often report health and weight control as factors in what they eat in comparison to males, regardless of age (Glanz et al., 1998). According to Glanz et al. (1998), the importance of nutrition and weight control is also influenced by how individuals self identify themselves and categorize their lifestyle habits according to a *health lifestyle membership*. Respondents who perceived themselves as active and healthy reported nutrition and weight control as more important factors than those who perceived themselves as sedentary. This

suggests that an individual's self perception also plays a significant role in dietary motives.

While the literature is consistent in that individual level factors play a considerable role in what many Americans chose to eat, social factors can be equally as influential.

**Social.** Social factors significantly influence dietary choices since most eating occurs in the presence of others. Family involvement and relationships with friends and peers not only contribute to individual food choices but also to the likelihood of being overweight. Family involvement is strongest in young children and adolescents eating at home. Parents are seen as the gatekeepers of food access, providing and preparing meals and snacks that influence what a child consumes (Hannon, Bowen, Moinpour, & McLerran, 2003; Savage, Fisher, & Birch, 2007). What a parent decides to make available in the home determines most food choices made by the entire family. For example, parents that buy in bulk tend to have children who eat larger quantities of convenience and processed foods (Chandon & Wansink, 2002). Additionally, parents shape a child's dietary habits by role modeling specific dietary choices, which most children eventually adhere to (Hannon et al., 2003; Savage et al., 2007). While parental access to food is important for the development of childhood food choices, relationships and familiarity among friends and peers influence the dietary choices and weight status of adults.

Dietary relations with friends and peers have mainly been studied in the context of weight management. Who individuals choose to surround themselves with influences specific dietary choices. This has specifically been shown in studies examining social support and fruit and vegetable consumption (Sorensen et al., 2007; Steptoe, Perkins-Porras, Rink, Hilton, & Cappuccio, 2004). Sorensen et al. (2007) found that individuals with supportive coworkers and friends reported consuming an increased amount of fruits and vegetables per day (a minimum of 5 servings). Unfortunately, social relations have also been seen to increase Body Mass Index

(BMI), a value that measures appropriate weight for height. Overall, eating in the presence of others increases calorie intake in comparison to eating alone, which can increase overall weight (Nestle et al., 1998). A number of studies have found that certain social relations increase an individual's likelihood of becoming overweight or even obese. The Framingham Heart Study found that a person's chance of becoming obese increased by 57% if they had an obese friend and rose to 171% if the friendship was reported mutual (Christakis & Fowler, 2007). The National Longitudinal Study of Adolescent Health also found that BMI increased with having overweight friends (Trogon, Nonnemaker, & Pais, 2008). Social connections with family, friends, and peers are inarguably influential in dietary choices but are often not realized by the effected individual. On the other hand, physical influences such as food availability and the setting in which an individual eats tends to go less unnoticed.

**Physical.** As a result of the U.S. food industry, foods are widely available to most populations across the country. *Availability* can refer to the food options accessible and acceptable to the consumer or reference the readiness of a food in terms of immediate food consumption (i.e. ready-to-eat, single serving foods; Nestle et al., 1998). Consumer emphasis on immediate availability typically results in the consumption of less nutritional food choices, since ready-to-eat foods are commonly high in fat, sodium, and sugar. Nutritionally dense whole foods generally take time to prepare, which often lessens their desirability. While physical access to food falls under the physical determinant category, it is predominately dictated by macro level issues such as policy, which is the next determinant reviewed.

The majority of Americans spend most of their day either in school or at the workplace, making both significant environmental influences of dietary choices. Schools have been found to provide between 19 and 50% of a child's daily energy requirements, indicating that the



amount of time spent at school can greatly impact the developing dietary habits of children and adolescents (Gleason & Sutor, 2003). Unfortunately, the quality of foods that are provided are a result of agricultural and federal policies, which provide meals that contain high amounts of total and saturated fat (Gordon, Cohen, Crepinsek, Fox, Hall, & Zeidman 2009). The School Health Policies and Programs Study, conducted by the Centers for Disease Control, found the most popular foods purchased on campus by elementary, middle, and high school students include high fat, salty snacks, and beverages including soda, sports drinks, and juices not made from 100% juice (O'Toole, Anderson, Miller, & Guthrie, 2007). Children and adolescents are not the only groups at risk of developing poor eating habits at school. Young adults in college have also been found to have inadequate diets low in fruits and vegetables (Ha & Caine-Bish, 2009). However, the eating habits of college students have much to do with the transitional period that takes place in early adulthood, and not solely dictated by the campus food environment (Nelson, Story, Larson, Neumark - Sztainer, & Lytle, 2008).

Full time employees spend half of their waking hours at work, making the workplace environment a setting in which many people eat a substantial amount of their calories (United States Department of Labor, Bureau of Labor Statistics, 2008). The workplace factors specifically highlighted in the research include social support of coworkers, food availability and variety in the surrounding neighborhood, the amount of time allowed for meals/breaks, and employer health/education policies (Sorensen, Linnan, & Hunt, 2004). Evaluation studies have shown that targeting the workplace food environment can lead to substantial improvements in employee food choices, as long as certain barriers are considered (Engbers, van Poppel, Paw, Marijke, & van Mechelen, 2005). Lack of time for meals/breaks and lack of accessibility to workplace health programs are major barriers to healthful eating among trade employees and

those with lower levels of education (Thompson, Smith, & Bybee, 2005). Considering the amount of time students and employees spend away from home it is not surprising that physical settings outside of the home play a crucial role in determining what one chooses to eat. What is surprising is the lack of emphasis on health and wellness in these environments.

**Macro.** Macro level issues refer to larger societal issues such as cultural norms, agricultural policies, and food marketing. Although issues related to policy and marketing may seem distal in their relationship to food choice motives, research has shown they play a central role in the dietary decisions of Americans.

Personal attitudes, beliefs, and values about food are mainly derived from cultural norms and values. Culture is a structure of shared understandings and interactions between community members and society (Caprio et al., 2008). Culture helps to shape human behavior and in turn evolves by experience. Relationships with food are a significant aspect of cultural norms. This may include a community's set of cultural values, such as Jews keeping kosher, Seventh Day Adventists adhering to a vegetarian diet, or Southerners preferring high fat foods. This can also include the sociocultural norms of a society as a whole (Crocker, Whitaker, Cooke, Wardle, & Ernst, 2009; First & Brozina, 2009). For example, certain ethnicities have nutritionally acculturated themselves to the United States, abandoning their traditional dietary practices for the Westernized diet laden with calories, sugar, and fat (Popkin, 1994). Food choices can become representative of an individual's and a society's cultural identity. The high demand for fast food and the globalization of the Western diet demonstrates this point (Caprio et al., 2008).

The Farm Bill is a piece of legislation on which the quality of American food hangs. This 5-year policy dictates which crops are subsidized (grains vs. vegetables and fruits), which sectors of agribusiness receive the most funding (large food production agriculture vs.

family farmers), and which nutrition programs are funded (including school lunch programs and supplemental nutrition assistance programs [SNAP], formerly known as Food Stamps) (Schoonover & Muller, 2006). Lobbying and vested interests have historically determined the type of food policy the U.S. has seen. Currently, the top five most heavily subsidized crops include corn, soy, cotton, rice, and wheat (Schoonover & Muller, 2006). The government's financial support of these crops has led to the infiltration of cheap ingredients into a large percentage of commercially available food items, including soybean and corn oil, enriched flour, and high fructose corn syrup, all of which have been identified by nutritional science as the leading pro-inflammatory factors of the standard American diet (Schoonover & Muller, 2006; Schwartz & Brownell, 2007). Current farm policy has intentionally, and artificially, driven down the cost of high glycemic index carbohydrates (i.e. sugar laden beverages, snack foods, processed baked goods, etc.), making them more affordable for consumers than vegetables and fruits (Putnam, 2000). Food industry giants utilize these cheap ingredients to develop recipes that intentionally stimulate the human desire for salt, sugar, and fat. In fact, food companies employ chemical engineers to develop flavors that guarantee consumers continue to buy their products (Moss, 2013). Seemingly, consumers make food choices based on personal preferences, however it is apparent that politics and food industry have a significant influence. This type of influence is also seen in the marketing aspects of the U.S. food industry.

The U.S. food system spends an average of \$9.6 billion annually to promote their products, making the food and beverage industry the largest advertiser in the U.S. (Federal Trade Commission, 2008; Schwartz & Brownell, 2007). Food marketing and advertising has been shown to greatly impact consumer beliefs and food choices. For example, when Kellogg marketed their new cancer fighting, high-fiber cereals, their sales of high-fiber cereals increased

by 47% within the first 6 months (Levy & Stokes, 1987). However, according to the Federal Trade Commission (2008), energy dense, low nutrient foods are the most frequently advertised products, namely those containing subsidized ingredients from the Farm Bill. Specifically, soda, fast food, snack foods, and candy/frozen desserts make up 69% of the market's expenditures, which are often directed at children and adolescents. Studies have shown that television marketing of food products can influence the attitudes, food preferences, and dietary habits of children under the age of 12 (Buijzen, Schuurman, & Bomhof, 2008; Needlman, 2009). However, studies have also reported that these changes are often short lived and rarely induce permanent change (Job, 1988; Shannon & Rowan, 1987). Although consumers are not always aware of the power of these influences over their seemingly individual food choices, the trend is growing and a shift has occurred in both the nutrition discipline and in the level of consumer concern.

The U.S. food industry has largely explained American food choices as an issue of personal responsibility, insinuating that consumer decisions are purely a result of individual preference and knowledge, uninfluenced by larger societal issues. The blame on personal irresponsibility is to strictly limit government regulation and involvement (Brownell et al., 2010; Schwartz & Brownell, 2007). However, health professionals worldwide are arguing for federal policies that regain control over the production, marketing, and access to healthful foods (Brownell, et al., 2010; Schwartz & Brownell, 2007; Swinburn, 2008). The field of health and nutrition has broadened in the last few years, considering the role macro level issues play in public health. According to many health and nutrition experts, the trends in farm policies and food marketing have been the most significant contributors to America's *toxic environment*; an environment in which increased obesity and chronic disease has become the default (Brownell et

al., 2010; Schwartz & Brownell, 2007). As Americans gradually become more aware of how their food is being produced, where it comes from, and the effects it has on both human and environmental health, consumers are looking for both local and organic alternatives (Honkanen, Verplanken, & Olsen, 2006; Magnusson, Arvola, Hursti, Aberg, & Sjoden, 2003; Wandel & Bugge, 1997).

As determined by the literature, the factors that influence what Americans chose to eat are as diverse as they are plentiful. Nutrition research has and continues to focus on the motives behind dietary decisions predominately because food choice motives can be used to predict dietary behaviors (Carrillo et al., 2011; Eertmans, Victoir, Vansant, & Van den Bergh, 2005; Glanz et al., 1998) and because health professionals can leverage identified determinants to help create nutrition education and intervention strategies that are meaningful to participants.

### **Approaches to Dietary Change**

Typically, obesity prevention approaches use the mediating variable model, which postulates that improved changes in health or weight are a result of a specific variable applied in an intervention (Baranowski et al., 2003). Using the previous example of a middle aged man with high cholesterol, an intervention strategy may focus on educating him on the reasons why it is important to reduce certain foods such as red meat, dairy, and refined carbohydrates and increase foods like fruits, vegetables, legumes, and whole grains. While this is useful information, it may not be of interest to him since he has already chosen to increase his fruit and vegetable intake but is struggling to find produce he likes and is available in the area in which he lives. Therefore, the mediating variable model is only effective when the variable employed is of interest or is found particularly meaningful to the participants. In order to identify the appropriate variable(s), intervention efforts must employ one of the commonly used conceptual

models, which are used to explain dietary behaviors and the behavior change process. According to the literature, several conceptual models are used to initiate healthful behavior change.

However, not all have been proven effective. The most commonly used behavior change models are reviewed, including a description of how change occurs and any potential limitations that may render the model(s) ineffective in dietary change efforts.

**Health belief model.** The Health Belief Model (HBM) was the first behavioral model developed for public health issues. The HBM posits that perceived threat acts as a motivator for change. In the case of dietary behaviors, an individual's perceived level of susceptibility for developing a specific disease may be motivating enough to initiate adoption of more healthful food choices. Additionally, the HBM considers perceived level of severity of susceptibility, perceived benefits of changing behavior(s), and the perceived barriers to making the change. Based on a meta-analysis of fear-appeals used in the public health sector, this type of fear-based approach has been shown to be moderately effective in behavior change (Witte & Allen, 2000). However, in a study that examined women with confirmed substantial risk for cardiovascular disease, only 26% of the women believed they were susceptible to cardiovascular disease and 36% to high cholesterol. These findings demonstrate a legitimate concern with the HBM; tension in matching subjective perceptions to objective levels of disease risk (Leventhal, Kelly, Leventhal, 1999). Another limitation of the HBM is that it relies heavily on self-efficacy. Individuals with a greater confidence in their abilities will likely see greater benefits and fewer barriers to change, thereby making their attempts more successful and possibly longer lasting. Dietary intervention efforts are not usually intended for those already motivated in making change and can thereby limit the effectiveness of the HBM.

**Knowledge-attitude-behavior model.** The Knowledge-Attitude-Behavior Model (KAB) explains the role of knowledge in facilitating behavior change. It is grounded in the notion that knowledge is the prerequisite to change. The model assumes that engagement in unhealthful behaviors is a result of the lack of education and that remediation can lead to attitudinal changes, which promotes gradual changes in behavior. While the KAB has predominately been employed in large population based interventions and school curricula, there is little evidence that demonstrates improving knowledge leads to behavior change (Baranowski, 2003; Contento et al., 1995; Nestle et al., 1998). Additionally, the KAB model assumes that individuals are capable of rationale thinking and decision making. Specifically, abandoning unhealthy behaviors that lead to future illness to adopt new behaviors that promote wellness. Research shows that human decision making is often not rationale (Kahneman, 2003; Wansink, 2007). Furthermore, the KAB model makes little to no differentiation in the type of knowledge that may facilitate change. *How to* knowledge is likely useful information since it can improve the skills of individuals attempting change. Therefore, most conceptual models use knowledge in developing a level of understanding or in the development of skills. However, it is not the only variable used in more effective intervention approaches. In current experimental designs, this model is often used as the control group, demonstrating its ineffectiveness in promoting significant behavior change (Robinson et al., 2003). However, anecdotally some people are capable of making positive behavior changes as a result of education. This is likely a very small subset of individuals and little is known about other qualities they possess that may assist them in being successful in the behavior change process.

**Social cognitive theory.** Social Cognitive Theory (SCT) is the most commonly used model in nutrition education interventions as well as the most researched (Contento et al., 1995).

Based on social learning theory, the SCT approach uses reciprocal determinism to explain dietary behaviors. Individuals interact with their environment and behavior is a function of that reciprocal interaction. The primary concepts of SCT used in changing dietary behaviors include skill development, self-efficacy, and self-regulatory behaviors. Individuals that are successful with their skills early on develop a greater level of self-confidence in their ability to change, whereas individuals who don't require a sense of self-regulation to monitor their progress. Such self-regulatory behaviors often include redirecting goal setting and creating rewards for reaching specific goals (Baranowski et al., 2003). Performing an act increases self-efficacy more than modeling behavior or persuasion techniques (Wise & Trunnell, 2001). The development and value of self-efficacy has mainly been reported in studies investigating physical activity outcomes. According to Straus, Rodzilsky, Burack, & Colin (2001), self-efficacy was the most significant correlate of the amount of physical activity among adolescents and teens. Improvement in the self-efficacy of college students resulted in appropriate goal setting and self-monitoring techniques that improved the intake of dietary fiber (Schnoll & Zimmerman, 2001). SCT provides a variety of methods in which an individual can become successful at making change, which likely contributes to the varied use as well as the overall effectiveness of programs that employ this theory. However, SCT relies on the individual's level of motivation, perceived self-efficacy, and perceived benefits of making behavior changes. Therefore, the SCT is likely effective for those individuals who are capable of self-regulation and/or already self-motivated.

**Theory of reasoned action/theory of planned behavior.** The Theory of Reasoned Action (TRA) was originally developed to explain the dynamic between attitude and behavior (Fishbein & Ajzen, 1975). An individual's attitude toward a particular change impacts his/her



belief about what will happen as a result of that change. Additionally, the TRA considers *subjective norm*, which is an individual's belief about whether or not certain people want him/her to make the change and how much he/she is interested in pleasing others. Overall, if an individual feels positive about the act and believe others want them to engage in the behavior, then they are more likely to believe the change will be impactful and therefore are more likely to make the change (Montano & Kasprzyk, 2002). However, not all behaviors are entirely within an individual's control. For example, a middle-aged man may want to buy more fruits and vegetables but the availability of produce is limited in the area that he resides. Therefore, the Theory of Planned Behavior (TPB) extended the model to suggest that attitude and intent are also influenced by perceived behavioral control, which is what the individual feels he/she can control regarding the change (Ajzen & Madden, 1986). Change only occurs when a person believes they are in control of their behaviors. TPB is considered a fairly innovative model for explaining behavior and studies have indicated its functionality in adolescents reducing soda consumption (Kassem, Lee, Modeste, & Johnston, 2003). Unfortunately, these theories only describe the intent and likelihood of making change and don't include the actual behavior change process itself, which makes them more appropriate in predicting behaviors rather than changing them.

**Transtheoretical model.** The Transtheoretical Model (T) uses theories and concepts of clinical psychology to describe how behavior change occurs (Prochaska & DiClemente, 1984). Specifically, the T model employs the stages of change construct (Parcel & Baranowski, 1981) to explain individuals' level of readiness, categorized by stages, which can be influenced at various points in time. These stages include: precontemplation (not considering change), contemplation (considering change but no action taken), preparation (deciding which action to follow), action

(engaging in behavior change efforts), and maintenance (making efforts to retain the changes made). The first three stages are dependent on the individual's perceived benefits of making the necessary change while the action stage requires self-efficacy. Unfortunately, traits or skills required for the maintenance phase are not specified. Proponents of the T model have been unable to produce substantial benefits of using it. Although Siero, Broer, Bemelmans, & Meyboom-de Jong (2000) used the T model to increase the consumption of fish, fruits, and vegetables among socioeconomically deprived populations in the Netherlands, the stage based intervention wasn't any more successful than an intervention using the KAB model with additional skill development. The literature has predominately illustrated inefficiencies of employing the T model, mainly methodological issues related to the difficulty and inaccuracies of staging individuals (Povey, Conner, Sparks, James, & Shepherd, 1999; West, 2005; Whitelaw, Baldwin, Bunton, & Flynn, 2000).

At present, no one model sufficiently explains the complexity of dietary behaviors. However, most of the described models focus on changing individual attitudes through the acquisition of knowledge, the development of specific skills, and/or the improvement of self-efficacy. These models rely heavily on an individual's psychological perspective. Those that have positive attitudes towards nutrition and health are more likely to make healthful behavior changes. Therefore, approaches that employ these models depend on participants who have positive attitudes and high perceived levels of self-confidence to be effective. This description is unfortunately not representative of the individuals who most require dietary intervention. Additionally, these approaches completely undermine the influence of societal issues, which have become the recent focus and drive behind the nutrition field and recent consumer concern. Neglecting the trends and the interdisciplinary nature of the nutrition field will render these

approaches even less effective in the near future. Furthermore, approaches that emphasize individual education, skill building, and the development of self-efficacy are likely to be expensive and require personalized attention from a health professional, making it difficult to reach large populations with varied levels of interest. However, dietary change strategies do exist that target large populations of individuals, inexpensively, while having the possibility of leveraging the interdisciplinary nature of both the nutrition and education fields. Examining nutrition courses in institutions of higher education can provide further insight into this area.

### **Teaching Nutrition in Higher Education**

The literature has closely examined the knowledge, attitudes, and poor dietary behaviors of college students, which has developed a sense of urgency for the development of successful intervention strategies (Bull, 1992; Hampl & Betts, 1995; Huang, Song, Schemmel, & Hoerr, 1994; Leibman, Cameron, Carson, Brown, & Meyer, 2001; Nelson et al., 2008; Skinner, Salvetti, & Penfield, 1984). While studies have found college health courses useful in preventing weight gain and promoting physical activity (DeVahl, King, & Williamson, 2005; Gokee-LaRose, Tate, Gorin, & Wing, 2010; Gow, Trace, & Mazzeo, 2010; Hivert, Langlois, Berard, Cuerrier, & Carpentier, 2007; Stice, Orjada, & Tristan, 2006), limited studies exist that examine the usefulness of college nutrition courses in promoting dietary change

**Health Outcome Based Education.** Historically, college nutrition courses have strived to increase nutrition knowledge in an effort to improve dietary behaviors and ultimately health. Early studies show some promise of college nutrition courses being effective in promoting overall awareness of dietary habits and improved dietary change. Mitchell (1990) compared the nutrition knowledge and perceptions of students enrolled in a general education nutrition course to other general education courses. Control students (those enrolled in a non-nutrition course)

reported their diet needed little improvement while those who enrolled in the nutrition course reported their diet either required *some* or *a great deal* of improvement. Unfortunately, it is difficult to determine whether or not student perceptions were a result of learning nutrition related concepts or the reason they initially enrolled in the course. However, students enrolled in the nutrition course reported being more concerned with health issues such as weight control and reducing fat, cholesterol, and sodium intake, as a result of taking the course and 45% reported making dietary change. Unfortunately, pre and post tests did not extensively evaluate dietary behaviors and therefore cannot confirm the significance of the changes. However, Skinner (1991) used pre and post dietary assessments, including 3-day dietary records, to examine the dietary behaviors of 286 students (228 females and 58 males) during a basic nutrition course offered three consecutive semesters. Although no significant changes were seen in the dietary habits of male students, the female students decreased their consumption of fat and calories and increased calcium, potassium, Vitamin A, and Vitamin C intake. These early studies demonstrate the potential of college nutrition courses but lack a framework for behavioral change and a detailed description of the intervention and instructional methods employed. Subsequent studies have further explored these areas.

General education nutrition courses evolved from evaluating textbook knowledge to including practical applications of nutrition concepts. Currently, SCT has been the primary theory applied in studies using college nutrition courses as intervention strategies for dietary change (Abood, Black, & Birnbuam 2004; Ha & Caine-Bish, 2009; Poddar, Hosig, Anderson, Nickols-Richardson, & Duncan, 2010). Courses focusing on improving knowledge, developing self-efficacy, and practicing self-management skills such as self-control and goal setting, report mixed results in their ability to promote dietary change. A study examining the use of a college

nutrition course to improve the dietary habits of female athletes focused on building self-efficacy. Students were either enrolled in an 8-week nutrition course or an 8-week study hall session. Each nutrition class consisted of nutrition information specific to athletes and included an activity that allowed students to practice the learned concepts. Students enrolled in the course reported significantly greater nutrition knowledge and self-efficacy than those enrolled in the control group. Students enrolled in the nutrition course improved their dietary habits but not significantly. Similarly, self-efficacy improved with little change in dietary habits in a 5-week online nutrition intervention course used to improve dairy consumption among college students (Poddar et al., 2010). The interactive course distributed electronic flyers about nutrition, offered membership to an interactive website, links to resources and social support groups, and provided tailored feedback of dietary self-assessments. This study also found an increase in self-efficacy in addition to improved self-regulation, however no change was seen in the amount of dairy consumed. However, two studies have reported significant improvement in the dietary intake among college students enrolled in a general education college nutrition course employing the SCT framework. Similar to the previously described studies, Ha & Caine-Bush (2009, 2011) and Ha et al. (2009) built instructional activities to promote self-efficacy and improve self-regulation skills such as goal setting and self-control. Pre and post tests, including dietary records, were used for data collection. The findings reported a 65% increase in fruit consumption and a 50% increase in vegetable intake (Ha & Caine-Bish, 2009). In the same group, intake of whole grains significantly increased (Ha & Caine-Bish, 2011). In a similar study, soft drink consumption decreased among college students while consumption of fat free milk increased among females and males changed their milk intake from 2% to 1%, as result of completing a college nutrition course (Ha et al., 2009). These studies indicate that college

nutrition courses are at minimum effective in developing students' level of self-confidence in making healthful food choices and likely to improve dietary habits. However, courses using a health outcome based approach vary in their ability to improve the longevity of students improved eating habits.

In a study of 979 college alumni required to take a health course during their degree program, those that completed the course were more likely to be aware of personal issues and engage in healthy lifestyle habits (Pearman, Valois, Sargent, Saunders, Drane, & Macera, 1997). Specifically, alumni were more aware of their own blood pressure and cholesterol levels, more likely to exercise, less likely to smoke, more conscious of their dietary fat intake, and overall consumed less fat, sodium, and cholesterol up to 25 years post graduation, than their counterparts who were not required to take a health course. However, another study found limited sustainability in the weight of college students after a first year health course (Matvienko, Lewis, & Schafer, 2001). While students with a high BMI reduced their calorie intake significantly during the course, the results disappeared within 1 year after completion. This suggests that some college level health/nutrition courses have the ability to promote long-term behavior change while others do not. This is typically an area problematic to study considering the difficulty of locating alumni resulting in low response rates.

Overall, the literature demonstrates that college nutrition courses can be effective in developing skills and self-efficacy. However, these improvements don't consistently translate into actual dietary change. The courses utilizing SCT likely represent a large portion of college nutrition education courses since many now use instructional methods that allow students to practice the application of nutrition concepts (Laska et al., 2012). However, practical knowledge is difficult to assess, which is likely why studies continue to use quantitative measures such as

pre and post tests to determine if a change has occurred. Inclusion of qualitative data would likely be helpful in determining specific aspects of the course that were most helpful to students. While there is a need to maintain the cognitive and practical aspects of nutrition education, there is also a need to consider the interdisciplinary trends of the two fields. The nutrition discipline has evolved to include macro level determinants, such as societal issues, but nutrition education has not. Higher education, specifically the community college sector, has adopted interdisciplinary education, which has yet to be considered in dietary change efforts. Following the trends of the fields may provide new opportunities for success in the influence of dietary choices and may improve the sustainability of those choices.

**Interdisciplinary Education.** Theorists and practitioners have tried to concisely define *interdisciplinary* work, however the nuances and complexities have generated a broad spectrum of understanding. Early definitions can be described simply as, more than one discipline contributing to a common subject of inquiry (Garkovich, 1982). Although straightforward in nature this definition carries an important subtlety, lack of unification of knowledge between disciplines. Attempts to fill the unification void describe interdisciplinary as “integration and even modification of the disciplinary subcontributions...” (Petrie, 1976, p. 9). Contributors within the disciplines are expected to not only integrate content and methodologies but to consider the contributions of other disciplines when refining their own. This describes a more collaborative process in which disciplines integrate ideas rather than simply providing independent insight.

**Learning communities.** Learning communities (LCOMs) are commonly used to describe informal learning among individuals with shared interests. The notion that people are social learners and learn best through interaction with one another and the social world, as

members of a community, has served as inspiration for formal curricular learning communities. LCOMs have theoretical roots dating back to the early 1900s but not until recently have they emerged as a trend for improving student learning and engagement in undergraduate education, particularly in the community college setting (Mikler, 2004). The Washington Center, a consortium dedicated to integrating interdisciplinary coursework into higher education, defines curricular learning communities as classes that are linked during an academic term, typically around an interdisciplinary theme, and enroll a common cohort of students. Learning communities provide students an opportunity to explore content through multiple perspectives, enhancing the learning process and improving both student awareness and engagement (Smith, 1991; Tinto, 2000). Therefore, a learning community that integrates nutrition with outside, but related, disciplines is likely to broaden a student's perspective of his/her food environment, providing a unique setting in which motives for eating can be examined (Goto & Schneider, 2009).

A general education nutrition course may be the only type of nutrition education a person is exposed to during their entire adult life. It is important these courses not only include the cognitive foundation of nutrition concepts but also help to motivate, engage, and allow students to develop a more broadened view of their food environment. This requires a behavioral change model that values the role of macro level determinants. Stealth interventions can provide a model for which interdisciplinary nutrition courses can be grounded to leverage both the societal level issues that influence dietary choices, which are often ignored in formal nutrition education, as well as the interdisciplinary trends of the nutrition field.



## **Stealth Interventions**

Stealth interventions describe an approach that emphasize an individual's process of motivation over the assumption that he/she is capable of rational decision making about his/her own health. Such approaches use a social cause or ideological value(s) to drive motivation for healthful behavior change. The identified social cause must share behaviors with obesity intervention efforts, such as eating healthy foods and/or improved physical activity, to improve the health of participants. However, from the participant's point of view, improvements in health (i.e. weight loss, improved energy, increased physical activity, etc.) related to the change are considered side effects rather than the focus of the process.

A study conducted by Stanford researchers is able to demonstrate the process of motivation used by stealth interventions (Robinson et al., 2003). In this particular study, adolescent African American girls were able to reduce their BMI, waist circumference, and hours spent watching television as a result of an indirect approach to improving energy balance. Specifically, researchers examined the feasibility and potential efficacy of an after school dance class as a stealth intervention approach to prevent weight gain among adolescent girls in low-income neighborhoods. The African American population typically has higher rates of body satisfaction, higher ideals of what is considered a healthy body weight, and lower incidence of eating disorders. The cultural acceptance of and desirability for fuller figures can make the implementation and effectiveness of obesity intervention strategies challenging. Therefore, researchers intentionally developed an intervention method that considered weight reduction obstacles within the African American population. For 12 weeks the recruited girls participated in an 2.5 hour after school dance program that provided a healthy snack, a 1 hour homework period, and 1 hour of moderate to vigorous cultural dance (Hip Hop, Step, or traditional African

dance). The purpose was to create an intervention program that was interesting, motivating, and culturally relevant to the girls and not obvious in attempting to halt weight gain. An active control intervention was created and followed the more traditional approach to obesity intervention efforts. The active control group requested that low-income African American families attend monthly lectures given by health professionals from the American Heart Association and the American Diabetes Association. The families also received newsletters targeting both parents and adolescent girls on methods to reduce risk for obesity, heart disease, and diabetes. Although the study was not designed to statistically examine the differences between the treatment and active control group, the outcomes of the study suggest the indirect treatment method was more successful. The girls who participated in the dance class reported practicing their dance routines an average of 3.9 days outside of the program and were found to have increased their physical activity by 13% in comparison to the active control group. The treatment group also reported a 23% reduction in the use of media and a 40% reduction in the amount of dinners consumed in front of the television. Overall, this study shows that an indirect approach to obesity intervention provides participants with motivation not typically seen in traditional methods. The intervention considered the process of behavior change and the environmental factors that influence motivation. From the perspective of the girls and their families, the reduction in BMI, waist circumference, and hours of television viewing became a side effect of the culturally based after school program.

**Process motivation.** Conceptually, the stealth intervention model stems from religious and social groups that are able to sustain healthful behaviors while resisting the pressure of social norms. A substantial amount of research has examined the healthful lifestyle behaviors of specific religious groups such as Seventh Day Adventists and Mormons (Chatters, 2000; Hawks

& Bahr, 1992; Levin, 1994; Wallace & Forman, 1998). Both of these denominations promote the adoption of healthy lifestyle choices such as a healthy diet, abstinence from alcohol and drugs, regular physical activity, and low risk sexual behaviors. Adoption of these lifestyle choices ultimately reduces morbidity and risk for future diseases, however improved health is not the primary motivation for adopting these behaviors. Seventh Day Adventists adopt a vegetarian diet based on their belief that eating and drinking should glorify God by preserving the health of the mind, body, and spirit. Mormons use the law of health, also known as Word of Wisdom, to guide their dietary choices, specifically favoring fresh foods and avoiding substances that may prevent the body and mind from experiencing clarity (Levin, 1994). Additionally, the motivations leading to the adoption and longevity of a vegetarian diet can be used as an example.

At face value the term *vegetarian* appears to only describe the non-meat containing diet of specific individuals. However, the suffix *arian* refers to “a person who advocates, supports, or practices a doctrine or set of principles” (Joy, 2010, p. 29), suggesting that a *vegetarian* is not only an individual who does not eat meat but chooses to do so based on a set of beliefs. While vegetarians were named over 2,500 years ago and held a common set of values, multiple studies have found two distinct motivating reasons today that individuals adopt a vegetarian diet; the desire to improve health and the concern for animal welfare (Hoek, Luning, Stafleu, & de Graaf, 2004; Lea & Worsley, 2001). In fact, research studies now label individuals as either health vegetarians or ethical vegetarians and have refined research to focus on the divergence of the two. Health vegetarians choose to limit their intake of animal products as a strategy to improve health and avoid future illness (Key, Appleby, & Rosell, 2006; Kim, Schroeder, Houser, & Dwyer, 1999) whereas ethical vegetarians limit the consumption of animal products to reduce animal suffering (Fessler, Arguello, Mekdara, & Macias, 2003; Whorton, 1994). Another notable

difference between the two is the level of commitment and sustained behavior. Health vegetarians often refer only to their dietary choices whereas ethical vegetarians view their habits as a lifestyle choice rather than a way of eating, suggesting a greater sense of commitment to their behaviors (Fox & Ward, 2008). Vegetarian diets also follow a trajectory, making changes and accommodations based on new beliefs and values. According to Fox and Ward (2008), many health vegetarians ultimately adopt ethical and environmental beliefs about food, which helps to solidify their commitment to a vegetarian lifestyle over time.

The stealth intervention model posits that these specific populations are not inherently stronger nor do they exhibit more self-discipline than others. Instead, the adoption of certain behaviors and the sustainability of those choices are directly related to the commitment to the social/ideological cause. Something about the movement is motivating enough for large populations to maintain certain lifestyle choices.

**Utilizing current social movements.** While social and ideological values such as religious beliefs and the ethical concern for animals have been proven to help sustain healthy behaviors, they are not necessarily ideals that are mainstream, thereby limiting their functionality in population based interventions. However, supporters of the stealth intervention model believe these examples do provide a framework, which can be harnessed into potential obesity intervention strategies. One method is to *piggyback* off of current social movements that share behavioral goals with obesity prevention strategies and follow the trends of American public interest.

Some social and ideological movements, such as environmental sustainability, include lifestyle habits consistent with approaches to improve dietary intake. An individual motivated to lessen their carbon footprint may chose to reduce their consumption of animal products, increase

intake of organic fruits and vegetables, and reduce dependency on oil by choosing alternative methods of transportation. Although these choices will likely improve overall health, an individual has chosen to adopt this new pattern of eating as a result of his/her motivation to become part of an environmental sustainability movement rather than his/her interest in improving personal health. Table 1 summarizes a list of popular social movements that could be used to target healthful behavior change among individuals and ultimately society.

Table 1

*Social and ideological movements and/or causes with behavioral goals that overlap with obesity prevention*

<b>Movements/causes</b>	<b>Individual-level behaviors</b>	<b>Community/societal changes</b>
<i>Environmental sustainability/climate change</i>		
Preventing global warming and climate change, sustainable agriculture, organic farming, slow food, eating locally (locavores), agrarianism, recycling/waste reduction, improving air quality, conserving water	Eat more fresh fruits and vegetables Eat less meat, particularly beef Eat less processed and packaged foods. Eat less food transported over long distances Less automobile use, more walking, bicycling, and mass transit use	Greater access to fresh fruits and vegetables through farmer's markets, community supported agriculture (CSA), home gardens, community gardens, local supermarkets, etc. Taxes/subsidies to reduce consumer prices of fruits and vegetables and increase prices of meat and dairy. Increased gasoline taxes/consumer prices. Greenhouse gas cap and trade/water taxes, resulting in increased costs of production for meat and dairy. Community design to increase walkability, bikeability, mass transit and reduce access to automobiles
<i>Food safety</i>		
Reducing risk of infectious diseases from food (e.g. <i>Escherichia coli O157:H7</i> . Bovine Spongiform Encephalopathy/mad cow disease) and potentially harmful additives and/or contaminants (e.g. toxic	Eat less meat, particularly beef, and less fast food restaurant food. Eat more organically and locally grown fruits and vegetables	Greater surveillance/inspections of meat and imported foods and food processing, increased food safety requirements, raising costs to consumers

(continued)

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additives in imported food)

**Movements/causes**

*Human rights/social justice*

Improving workers' rights, poor working conditions in fast food industry and suppliers (e.g. slaughterhouses, farm workers); food justice, increasing access to more healthful foods such as fresh fruits and vegetables in low-income areas; women's rights, families' rights; fair trade; reducing racial/ethnic and gender discrimination from stereotypes in media

**Individual-level behaviors**

Eat less fast food restaurant food.  
 Eat less meat. Eat more fruits and vegetables from farmers' markets, local farmers, CSA, following fair trade practices.  
 Watch less media to reduce exposure to negative racial/ethnic and gender stereotypes

**Community/societal changes**

Increased regulations to protect workers in slaughterhouses, meatpacking, fast food, etc., and resulting increases in consumer prices of meat, fast food. Boycotts of fast food restaurant chains for working conditions of their employees and suppliers. More farmers' markets and CSA providing greater access to fresh fruits and vegetables in low-income areas  
 Greater access to day care, preschool and after school programs (opportunities for physical activity, reduce screen time) to support and facilitate women and poor in education and employment

*Antiglobalization*

Farmers, labor unions, human rights groups, nationalists, etc. resisting corporate and cultural globalization and WTO and World Bank free trade policies

Eat more locally grown/domestically grown food. Eat less fast food and processed foods and beverages from multinational corporations.  
 Eat less imported foods

Trade barriers/tariffs, agricultural subsidies to reduce relative consumer prices of domestically grown produce; policies and public sentiment favoring greater consumption of locally produced food products and less availability and higher costs for highly processed and packaged convenience foods from other countries; boycotts of multinational food chains and fast food companies

*Animal protection*

Reducing inhuman treatment of animals during farming and slaughter

Less beef, pork, poultry, dairy, and fish consumption, more vegetarianism

Activist and consumer pressure and legislation to improve treatment of animals during farming and slaughter, resulting in increased production costs and consumer prices of meat and dairy

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<b>Movements/causes</b>	<b>Individual-level behaviors</b>	<b>Community/societal changes</b>
<i>Anticonsumerism</i> Reducing consumer culture and/or the influence of consumer culture	Less purchase and consumption of heavily advertised and marketed fast food and snack foods/convenience foods Less television watching and other screen media use	Activist and community pressure and legislation to reduce advertising and marketing of foods to children in schools, communities, and media. School and community-based programs and campaigns to reduce screen time and other exposure to marketing

*Note:* Descriptive note. Adapted from “Stealth Interventions for Obesity Prevention and Control: Motivating Behavior Change” by T.N. Robinson, p. 323, as published in “Obesity Prevention: The Role of Brain and Society on Individual Behavior” edited by L. Dube, A. Bechara, A. Dagher, A. Drenowski, J. LeBel, P. James, & R.Y. Yada, Copyright 2010 by Elsevier Inc. Adapted with permission.

Incentives related to a social or ideological movement/cause, may also provide long term motivation for behavior change. For example, substantial research has been conducted on the concept of identity formation in the recruitment and participation in movements (Friedman & McAdam, 1992; Shirky, 2010; Snow, 2001). When a person selects to adhere to a certain set of beliefs and values, practicing those beliefs and values differentiates the individual from mainstream members of society (personal identity) and declares them a member of specific community (group identity). Additionally, an individual develops a public identity, since there is often a desire for certain public perception. Identity formation has been associated with sustained behavior change. With an identity linked to a social movement/cause an individual feels internal pressure to adhere to personal beliefs and values that are consistent with how he/she desires to be portrayed. Additionally, an individual may feel pressure to representatively behave in ways that are descriptive of his/her broader community and to maintain a certain public perception (Robinson, 2010a).

Social movements also provide an opportunity for individuals to engage in social interaction and membership. This helps individuals build a network, share ideas, and build self-confidence as a member of a community/society, all of which ultimately improves motivation (Shirky, 2010). Intrinsic motivation is rewarded through group membership and further helps to sustain healthful behavior change (Lave & Wenger, 1991). It has also been suggested that membership helps to develop a collective identity, which builds a level of social responsibility (Robinson, 2010a). Unveiling an individual's potential as a member of a social community allows the individual to understand the value of the movement/cause beyond him/herself and as a catalyst for social change. This is just another way in which social movements may encourage greater commitment to behavior change in comparison to health outcome based approaches. Due to the novelty of the stealth interventions limited research exists. However, an early study has demonstrated the utility of the stealth intervention model in relation to dietary behaviors.

Stanford researchers tested the effects of the stealth intervention model in an institution of higher education to promote healthful behavior change among college students. Heckler et al. (2010) used a quasi-experimental design to investigate the effects of a *Food and Society* course on student's dietary habits and values in comparison to courses focusing on health messages. The *Food and Society* course emphasized social issues related to food such as environmental sustainability, animal rights, labor issues, and government policies rather than teaching health issues as they pertain to food and dietary habits. Researchers collected quantitative pre and post data on students' eating habits and values in the *Food and Society* course and three comparison courses (all health courses emphasizing a health related message) using a Food Frequency Questionnaire. While the study did not find any significant differences in the eating habits and values between the *Food and Society* course and comparison courses, there were significant



within group findings. Students enrolled in the *Food and Society* course increased their vegetable intake and reduced their consumption of high fat dairy significantly more so than in the comparison courses. Additionally, the students enrolled in *Food and Society* reported an increased belief in the importance of the environment, animal rights, and a healthful diet than students enrolled in any of the comparison courses. The intervention targeted energy balance but not in the traditional way of educating individuals about health outcomes associated with poor eating habits and lack of exercise. Currently, this is the only empirical study to suggest that educating individuals on social issues related to food may be more impactful in changing behavior than traditional approaches focusing on health outcomes.

### **Summary**

The most commonly employed behavior change models either represent outdated science or do not consider the role of societal level issues in determining what an individual chooses to eat. Unfortunately, formal nutrition courses offered at institutions of higher education are no different. Formal nutrition education continues to utilize a health outcome based approach, which although has shown some success, confines the nutrition discipline to issues of personal responsibility. Studies have also been limited to 4-year institutions where interdisciplinary trends have yet to be seen. Additionally, the continued emphasis on purely quantitative methods has made it difficult to identify specific aspects of college courses that are either effective or ineffective in influencing dietary choices. Ultimately these factors undermine the interdisciplinary nature of the field and the trending concerns of health professionals and the American public. As U.S. obesity and chronic disease rates continue to rise, new approaches are needed that are capable of reaching large populations and produce lasting behavior change. Stealth interventions provide a new and innovative framework, which includes what most dietary

behavior change approaches lack. Stealth interventions consider macro level determinants in dietary decisions, an individual's process of motivation, and are inherently interdisciplinary in nature. However, the research is very limited and further exploration is needed to examine the role of social/ideological values in food choice motives, particularly in comparison to traditional health outcome based approaches.

### Chapter 3: Methods

The purpose of this study was to examine the influence an innovative learning community (LCOM), focused on societal level issues related to environmental sustainability, has on students' motives for dietary choices. The following research questions are considered.

RQ 1: Is there a significant difference between the personal health food choice motives of students who completed the *Food for Thought* LCOM and students who completed a non-integrated nutrition course?

RQ 2: Is there a significant difference between the ethical food choice motives of students who completed the *Food for Thought* LCOM and students who completed a non-integrated nutrition course?

RQ3: What aspects of the learning community have the most influence on students' motives for dietary choices?

#### Research Design

Most studies researching nutrition education use quantitative methods to explain the effects of educational programs on student knowledge, behavior, motives, and/or dietary choices (Abood et al., 2004; Ha & Caine-Bish, 2009, 2011; Ha et al., 2009; Matvienko et al., 2001; Mitchell, 1990; Pearman et al., 1997; Poddar et al., 2010). These studies are typically outcome based using either experimental or quasi-experimental research designs to measure dietary change. While such purely quantitative approaches are capable of identifying causal findings and have been successful in generalizing results to larger populations, these studies have been unable to identify specific aspects of nutrition education that most influence motives for eating, from the student perspective. Consequently, this lack of qualitative data limits the ability of a

study to inform actual nutrition education practice. Therefore, in an effort to more comprehensively examine the role of nutrition education in developing motives for healthy eating and to improve the applicability of research findings to the field, a mixed methods approach should be considered (Bryman, 2008).

This study employed a two-phase, sequential mixed methods approach to examine the influence the *Food for Thought* LCOM had on student motives for dietary choices. More specifically, this study used an exploratory design with a comparative survey component and a secondary web-based, asynchronous interview process to capture qualitative data. The purpose of exploratory research is to gain familiarity of an undefined area (Bryman, 2008). An exploratory design provided an opportunity to gain in-depth insight into the various aspects of interdisciplinary nutrition education that are most effective in developing motives that initiate dietary change. The first phase of the study was designed to compare the influence of ethical concern and personal health motives of LCOM participants to a comparison group. This was accomplished by quantitatively measuring the self-reported motives of students enrolled in the learning community *Food for Thought* and those enrolled in a non-integrated nutrition course. While these findings are useful in explaining the level of importance ethical and personal health issues have on dietary choices, they do not adequately consider the interdisciplinary and collaborative nature of an LCOM and the impact it may have on governing what students chose to eat. Therefore, a secondary phase used a two round, web-based asynchronous interview process to capture qualitative data. This interview process explored students' experiences of the LCOM to gain in-depth insight into specific aspects such as course content, learning experiences, instructor approaches, etc., that may influence motives for dietary choices. Overall, this design

best served the intent of this research since it provided a more comprehensive exploration of interdisciplinary nutrition education, as it relates to student motives for eating.

### **Sources of Data**

**Target Population.** Data was collected from students enrolled in the LCOM and from students enrolled in two sections of a non-integrated nutrition course at XYZ College during the Spring 2013 semester. XYZ College is a comprehensive community college, offering academic courses and programs that satisfy transfer requirements to four-year institutions and vocational training and technical programs for the development of workplace skills. *The Food for Thought* LCOM was specifically targeted for two main reasons. First, it was a groundbreaking interdisciplinary LCOM that includes a nutrition course. Second, it used the theme of environmental sustainability, which is consistent with the conceptual model of stealth interventions and can therefore impact motives for dietary choices. Third, it is offered at a location close in proximity to the researcher, which reduced travel, time, and expenses. Lastly, it is representative of the direction LCOMs may take at XYZ College and possibly other colleges within the same system. Students enrolled in non-integrated sections of a general education nutrition courses were used as the comparison group in this study. To accurately compare the food choice motives of students enrolled in an LCOM versus a non-integrated nutrition course, variability between the sections was limited. Therefore, only sections offered at XYZ College were used in the study.

**Sample.** In order to participate in the study, students must have been enrolled in either the *Food for Thought* LCOM or one of the selected non-integrated nutrition sections. Participating students did not need to meet any criteria other than being enrolled during the

Spring 2013 term. Below is the catalog description and the course objectives for all Nutrition 101 courses offered at XYZ College.

Catalog Description: This course examines the science of nutrition. The course develops the student's understanding of macro and micronutrients and the role they play in dietary intervention of various disease states. This course also explores the role of nutrition throughout the life span and the effects of exercise on overall wellness.

Learning Objectives: Upon completion of the course the student will be able to do the following:

1. Evaluate the value of media claims by comparing and contrasting scientific journals and research to electronic and print materials.
2. Analyze and evaluate the various anatomical as well as physiological aspects of the organ systems within the body.
3. Assess the value and importance of each essential nutrient as it relates to optimal health.
4. Identify the individual nutritional needs of individuals from conception to old age.
5. Apply nutritional diagnosis and prescription to various problems and maladies that occur in human nutrition and health.
6. Analyze the pathology of diseases caused by poor lifestyle and implement strategies of nutritional intervention to assist in stabilizing disease condition or state.
7. Identify the value and role physical activity and exercise play in overall wellness and disease prevention.

8. Describe current issues related to food safety and the global food supply.
9. Evaluate his/her own personal dietary and exercise patterns and develop an appropriate plan to improve wellness. (Norman, 2009)

**LCOM.** The *Food for Thought* LCOM was a four-course learning pathway that integrated the four distinct disciplines of Nutrition, Biology, Environmental Science, and English. Specifically, the LCOM consisted of the following courses: Topics in Biology (BIOL 115), English Fundamentals (ENGL 098), Environmental Science (ENVS 101), and Nutrition and Foods (NUTR 101), all individually taught by an expert instructor. A cohort of 24 students enrolled in all four courses concurrently. Students attend all four courses, twice per week for the 18 week spring term. During that time they completed assignments and assessments created by each instructor for each course, as well as participated in interdisciplinary learning experiences that were designed to focus on the interdisciplinary theme of environmental sustainability. The theme provided students an opportunity to explore issues associated with the ability of humans to sustain our species, and the planet, into the future. Topics used to achieve the theme include reproduction, food production agriculture, food technology and organics, water, shelter, and the availability and distribution of resources. Each of the four courses maintained the integrity of their own discipline by following the course objectives set in the respective course outline of record. Therefore at the completion of the course, students enrolled in the LCOM should have learned and developed at minimum, the same skills as if the courses were taught in isolation.

The nutrition section participating in the LCOM taught the standard nutrition curriculum and followed the prescribed course outline of record. However, this particular section also capitalized on the environmental sustainability theme by including topics such as factory farming, industrialized food, sustainable agriculture and organics, genetically modified foods, and

commodity crops. These societal-level topics not only follow the recent trends of the nutrition field but also extend nutrition education beyond the traditional individual skill based approach. Therefore, students enrolled in the LCOM were expected to receive a different nutrition education experience as compared to those students enrolled in a non-integrated general education nutrition course.

All students enrolled in the nutrition section of the LCOM were invited to participate in both phases of the study. This particular nutrition section was taught by the researcher of the study who was one of the four faculty involved in the LCOM.

***Non-integrated nutrition course.*** Nutrition courses offered at XYZ College are individually focused, targeting individual behavior and using health concerns as motivation for healthful dietary change. Students enrolled in the non-integrated nutrition sections were considered for participation for the comparative survey phase of the research. Nutrition sections were required to meet the following criteria: (a) offered at XYZ College to ensure the same course content was used; (b) delivered in a face to face format; (c) offered as a full term course (as compared to short term, accelerated course); and (d) taught by a single instructor, other than the researcher.

***Sampling plan.*** In an effort to ensure validity, the non-integrated nutrition sections selected for the comparison group resembled, as closely as possible, the nutrition section that participated in the LCOM. However, employing sections for the comparison group that were also taught by the researcher was not appropriate. This is because the researcher often includes some discussion of ethical food related issues in the coursework of regular nutrition sections, which would have influenced the outcome of the study. During the spring 2013 semester, XYZ College offered 10 sections of Nutrition 101, excluding the section participating in the LCOM.



Using the previously mentioned criteria, two non-integrated sections of Nutrition 101 were identified as appropriate and were taught by a single faculty member. While the comparative sample did need to meet specific criteria, convenience sampling was used. Convenience sampling was best suited to ensure the comparison sections closely resembled the section participating in the LCOM to reduce variability and ensure the study's validity.

### **Data Collection Strategies & Procedures**

To effectively explore the influence the LCOM had on student motives for dietary choices, the study employed data collection strategies that efficiently and correctly identify student's actual motives in addition to considering the aspects of the LCOM that students perceived to have some level of influence on those motives. Therefore, a self-completed food choice motive questionnaire and a web-based, asynchronous interview process were best suited to serve as the primary data collection strategies in this study. All data collection took place during the final two weeks of the course, to ensure student motives and secondary responses were an accurate reflection of the course and/or entire LCOM experience.

**Comparative survey phase.** The use of a self-completed questionnaire provided a convenient and efficient way for students to reflect on the motives underlying their food choices. At the end of the spring term students enrolled in the LCOM and the non-integrate sections were recruited to complete the online food choice motive questionnaire. Students were invited to participate in the research study through a printed letter distributed in class (Appendix A & B). Additionally, the letter was posted online in the course shell of the learning management system, which automatically sent a notice to each student's college email account. The questionnaire was created and hosted using the online survey software tool *Qualtrics*. Personalized links to the questionnaire were emailed directly to students' college email accounts. Students had one week

to complete the questionnaire and received one follow up notification during that time. A catered free lunch from a local, sustainable restaurant was provided following completion of the survey as an incentive to participate in the comparative survey portion of the research. Additionally, a thank you email was sent to students who completed the survey.

Although the data collected from the first phase compared the food choice motives of students enrolled in the LCOM to students enrolled in the non-integrated sections, the questionnaire was unable to collect the additional information needed to explore the influence the LCOM had on such motives. This type of data collection required more in depth, open-ended questions specific to the *Food for Thought* LCOM. Therefore, a secondary phase, using a web-based, asynchronous interview process, was employed to relate the findings of the comparative questionnaire to the educational practices of the LCOM.

**Web-based interview phase.** Students who volunteered to complete the secondary interview process were encouraged to have first completed the motives questionnaire to help them become familiar with the topics and terminology used in the open-ended interview questions. However, it was not required. Students also had the option of completing only the first comparative phase since the data from the comparative survey phase was not used to develop the secondary interview phase. Therefore, the comparative survey phase did not impact the protocol for the secondary phase. Students enrolled in the LCOM were informed of the web based interview in the their invitation announcement used for the comparative survey portion of the study. As in the comparative survey phase, *Qualtrics* was used to create and host the 2 round, open-ended and web based interview process. The interview was entirely asynchronous and all data was collected electronically through a link provided to the students. Personalized links were sent directly to the students' college email accounts with a reminder email sent twice during the

two week time period. As incentive, all students earned extra credit for participating in this phase of the research. For those who didn't want to participate in the research, a comparable extra credit option was provided.

### **Instruments & Procedures**

For the purpose of this study, the Food Choice Questionnaire (FCQ) and the Ethical Food Choice Motives (EFCM) supplement were chosen to create the most comprehensive tool to investigate the factors governing food choices. To explore the role the LCOM had in developing or influencing such motives open-ended, topic based interview questions were used.

**Comparative questionnaire.** As identified in the literature, a variety of health and non-health related factors have been found to influence dietary choices (Larson & Story, 2009; Nestle et al., 1998). However, few tools actually integrate the wide range of determinants, thereby limiting their appropriateness for this study. Steptoe, Pollard, and Wardle (1998) constructed a comprehensive Food Choice Questionnaire that effectively measures the perceived importance of a variety of health and non-health related factors among adults and was therefore chosen for this study.

A preliminary FCQ was created based on the existing literature and expert opinions of nutritionists and health psychologists, establishing content validity. This generated a 68 item preliminary questionnaire, which was completed by 358 adults. Factor analysis was used to reduce the variables down to nine categories that most frequently govern food choices. As a result, the 36 item FCQ was created including the domains *health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern*. Respondents endorse the statement "It is important to me that the food I eat on a typical day..." for each item by selecting between four responses: not at all important, a little important, moderately important,

and very important. The instrument has been extensively tested for both validity and reliability. Content validity was established by an extensive literature review as well as through consultations with nutrition and health psychology professionals. Convergent validity of the actual survey items was determined by comparing a sample of adult responses to psychological tests evaluating the same domains. Additionally, a test and retest protocol was used to establish reliability and internal consistency. The author was contacted via email requesting permission to reproduce and adapt the questionnaire for use in this study. Reproduction and adaptation of the questionnaire was approved (Appendix C).

Although the FCQ is comprehensive in the range of categories it includes, the ethical concern domain is underrepresented and does not reflect the literature on ethical food choices (Lindeman & Väänänen, 2000). In large populations ethical concern is not usually ranked as the most important in determining food choices. However, in certain subgroups and/or during trends of sustainability and organic food production this domain may override others in governing what people decide to eat. Therefore, the EFCM tool was added to supplement the ethical concern domain. The EFCM instrument expanded the FCQ's ethical concern category adding three distinct domains: ecological welfare (including animal welfare and environmental protection), political values, and religion. The EFCM supplement was constructed using existing literature on vegetarianism and ethical food choice along with qualitative data from previous studies examining political and religious reasons for food selection. An initial 16 item (13 new and three original FCQ items) questionnaire was administered to 281 individuals. A factor analysis was used to construct the final 11 item EFCM instrument, which was then verified using a confirmatory factor analysis in a secondary study of 125 individuals. Additionally, the validity of the new scale items were determined by comparing participant responses to their attitude

strength in the areas of politics, religion, animal welfare, and environmental protection, as measured by the King and Hunt's Religiosity- Salience-Cognition scale and a test-retest was used to establish reliability. The EFCM supplement can be used for research without permission from the authors (Appendix D). The addition of the EFCM supplement added eight items to the FCQ, creating a 42 item questionnaire for the use of this study (Appendix E).

**Procedures.** Students completed the food choice motives questionnaire via the online survey tool *Qualtrics*. A personalized link to the online questionnaire was emailed to students' college email accounts. Students within the LCOM were reminded that they may choose to participate in only the comparative survey portion of the research however, the survey phase was encouraged to be completed prior to participating in the secondary interview phase. Upon entering the *Qualtrics* link, students were provided informed consent including the expectation that the survey process would take approximately 5-10 minutes to complete and that they may opt out of the questionnaire at any time. Students were prompted to provide demographic data such as age, gender, and ethnicity before completing the motives portion of the questionnaire. Students were not required to answer previous questions before moving on to the next. This ensured that students could deny answering a question should they choose to.

A pilot test was conducted to ensure seamless distribution of the online survey. The instrument was developed in and delivered through the online survey platform *Qualtrics*. A personalized link was sent to a group of doctoral students/colleagues to test for any error or online compatibility issues. This pilot test was also used to confirm that all data collected would be reported back to the researcher as entirely anonymous.

**Web-based, asynchronous interview.** The web-based interview consisted of three categories of questions to collect data from the student perspective (Appendix F). The categories

included the overall experience of being enrolled in the *Food for Thought* LCOM, experiences with how nutrition information was learned, and the aspects of the LCOM that influenced motives for dietary choices. Table 2 includes the open-ended questions, organized by these categories.

Table 2  
*Categories and questions used in the web-based interview phase*

Category	Question
Overall Experience	Describe your overall experience of being a student enrolled in this LCOM. Do you feel that your LCOM experiences have in any way, positive or negatively, impacted your understanding of nutrition? Please explain.
Experience of Nutrition Education	Do you feel that your experiences in the Biology, Environmental Science, or and/or English courses have in any way assisted with your understanding of nutrition? Please explain. Do you feel that your LCOM experiences have in any way, positively or negatively, impacted your feelings about nutrition and foods? Please explain Before enrolling in the LCOM, how you would describe the motives behind selecting the food you ate?
LCOM and Motives	Do you feel any of these motives have changed as a result of being a part of the LCOM? If so, how? If not, why not? Specifically, what aspects of the LCOM had the greatest impact on your reasons for choosing certain foods? If you did not experience a change in the reasons you eat certain foods, why do you think that is?

To ensure the questions were straightforward and appropriate for use in the study, content validity will be established through consultation with a content expert in both health/nutrition and education.

**Procedures.** A personalized link to the web-based interview was emailed to students' college email accounts. Upon entering the *Qualtrics* link, students were provided informed consent including the expectation that the interview process would take approximately 20-30 minutes to complete, that they may opt out of the interview at any time, and that they may receive a second follow up interview. The interview questions were organized according to the three categories previously described to help students organize their thoughts and responses. A transition sentence was provided at the end of the each category to inform the student of the next topic. Students were not required to answer previous questions before moving on to the next. Upon analysis of the initial responses the researcher chose to conduct a secondary follow up interview with clarifying questions to further explore various aspects of the LCOM potentially impacting food choice motives. For example, participants' responses were not very descriptive for question three: Do you feel that your experiences in the Biology, Environmental Science, or and/or English courses have in any way assisted with your understanding of nutrition? Therefore, the following probing question was given.

Probe: Many of you mentioned that the other courses in the LCOM impacted your level of understanding of nutrition. Could you please describe in detail how so? For example, was it a particular assignment, a film, something another instructor said that resonated with you, etc?

### **Human Subjects Considerations**

This study qualified as exempt research, under exemption category 45 CFR46.101(b)(2) in Pepperdine's Internal Review Board (IRB) Manual, because the data collection strategies obtained and recorded responses in a manner in which the participants could not be identified, and because the research posed minimal risks to participants. Approval to conduct the study was

granted by Pepperdine's Graduate and Professional Schools (GPS) IRB and XYZ College's Research Office in May 2013. The GPS IRB approval notice is found in Appendix G and XYZ College's approval in Appendix H.

Why a person chooses to eat the foods he/she does can be a sensitive issue. Therefore, one possible risk that may arise from students reflecting on the motives behind their dietary choices is the feeling of guilt, shame, and/or embarrassment. Students may also fear being judged based on their survey responses or worry their responses may have a negative impact on their grade or standing in the class. Unfortunately, it is difficult to reduce the possibility that a student participant may feel uncomfortable when reflecting on the reasons why he/she chose to eat the foods he/she does or reflecting on various aspects of a course. Regardless, students were reminded in the invitation/informed consent letter that although the questions asked inquire about personal dietary choices and experiences, there are no right or wrong answers, only their own personal opinion. Additionally, they were informed that no judgment will be made on any of the provided responses nor will the individual be identifiable to the researcher. The invitation/informed consent letter additionally informed students that answers to either the questionnaire or interview would not in any way impact their grade or standing in any of the four courses participating in the LCOM or in the comparison non-integrated nutrition sections. In addition, students may have concern about the anonymity risks associated with online data collection. To minimize this risk, the online survey tool *Qualtrics* was used for all data collection. *Qualtrics* uses a high-end firewall system, encrypts data, and stores it on a secure server under password protection. The platform also assigns random identifiers prior to the researcher seeing responses. Another foreseeable risk of participation in this study is the imposition of participants' time. However, the anticipated time was communicated prior to



consent and the incentive of a free lunch and/or extra credit after completion of the questionnaire and/or interview process was used to mitigate this risk.

**Informed consent.** Informed consent was provided in the invitation for participation letter given to students before data collection. Two letters were created, one including only the comparative phase of the study, given to the non-integrated sections, and the other including both the comparative and secondary phase, given to the students enrolled in the LCOM. Students were provided with information regarding the study and their rights as participants, but did not sign an official informed consent form. A signed consent form would have been the only record linking subjects to their individual questionnaire responses, which was the principle risk in the breach of confidentiality.

**Anonymity and data reporting.** Complete anonymity was kept during both phases of the study. Through *Qualtrics*, all collected responses were tagged with coded identifiers, stripped of IP addresses, and were kept under password protection. This ensured the researcher was not able to link answers to specific individuals nor be able to identify which students participated in the study. Only the researcher had access to the data collected. During the data analysis process a doctoral level colleague assisted the researcher. However, only excerpts of data were seen to establish intra-related reliability of the coding process for the qualitative data captured.

All reported findings remained anonymous. Survey data is reported in aggregate while individual student responses from the secondary phase have been used to exemplify areas of interest. Any individual responses used have been kept anonymous using a label such as *Student 1, Student 2, Student 3, etc.*

## Analysis Process

Data analysis was determined by considering the source(s) of data and the research question it was being used to address. Table 3 describes the analysis for both the quantitative and qualitative data captured.

Table 3  
*Analysis according to research questions*

Research Question	Sources of Data	Data Analysis
1. Is there a significant difference between the ethical food choice motives of students who completed the Food for Thought LCOM and students who completed a non-integrated nutrition course?	Ethical domain of the online food choice questionnaire	ANOVA (t-test)
2. Is there a significant difference between the personal health food choice motives of students who completed the Food for Thought LCOM and students who completed a non-integrated nutrition course?	Health, natural content, and weight control domains of the online food choice questionnaire	ANOVA (t-test)
3. What aspects of the learning community have the most influence on students' motives for dietary choices?	Open-ended, web-based interview responses	Textual Analysis to code for topics/themes

**Quantitative data.** The data collected from the online questionnaire was used to quantitatively compare the ethical and personal health food choice motives of students enrolled in the *Food for Thought* LCOM to the students enrolled in the non-integrated sections.

Descriptive statistics were used to describe participants' demographics and provide cross tabulation reports of the survey answers. There was insufficient data to run a chi-square analysis using the level of importance as an attribute. Therefore, participants' responses were weighted on a scale to produce a numerical value of importance. A t-test, a form of analysis of variance, was used to analyze the data and answer the corresponding research questions. The analysis software program Number Cruncher Statistical System (NCSS) was used to run the statistical analysis. This analysis made it possible to interpret whether or not interdisciplinary nutrition education impacts the motives governing dietary choices.

**Qualitative data.** Qualitative data captured during the secondary interview phase of the study was used to support the findings of the survey phase and to identify aspects of the *Food for Thought* LCOM that had the most influence on students' motives for dietary choices. Textual analysis was used to code for topics and identify themes, which were used to interpret the data and answer the corresponding research questions (Saldaña, 2012). The electronic qualitative analysis tool *HyperRESEARCH* was used to guide and document the process. *HyperRESEARCH* records and shows the codes applied, providing accuracy in the researcher's interpretation of the data. Nine source files were uploaded to *HyperRESEARCH* representing the seven initial and two probing questions used in the interview process. Each interview question, including the probing questions, were set up as individual case files. Multiple coding cycles were used to organize and analyze the interview responses. Initial cycles focused on a descriptive method using topical codes to describe participants' responses, particularly those related to the interdisciplinary educational experience. This created a categorized inventory that was then used during subsequent cycles to identify themes in the data. A priori codes were applied to responses describing food choice motives. The a priori codes include the food choice determinants

determined by the literature review: individual, physical, social, and macro level. After completion of the iterative coding process, the coded data was reviewed and analyzed for themes to further interpret the data and answer the research questions (Saldaña, 2012). A doctoral level colleague reviewed the codebook and operational definitions to verify that codes were applied consistently, establishing inter-rater reliability.

### **Means to Ensure Internal Validity**

The research approach and design, data collection strategies, instruments, and data analysis all contributed to the study's internal validity. Quantitative data alone is static and cannot be directly linked to any specific aspect of interdisciplinary education. Qualitative inquiry can be too subjective as it portrays opinion and perceptions but allows for a more realistic and social view of the research area. Therefore, using a mixed methods approach provided a richer view of the influence personal health and ethical concern may have on motives for dietary choices. The exploratory design is best suited for this topic since little is known about the impact of interdisciplinary nutrition education, particularly on food choice motives.

Data collection strategies and instruments were appropriate for the data they were trying to capture. Motives were self-reported using the FCQ and EFCM supplement, both known and used instruments that have been verified as valid and reliable. The interview phase was best suited to gain deeper insight into student perspective, providing the participants with opportunity to explain their experiences in their own words. The interview phase employed a content expert to establish content validity of the interview questions.

The data obtained from both phases were analyzed using appropriate methods. Considering the research questions, the data collected, and the number of participants, a t-test, a form of analysis of variance was used to analyze the survey data. Textual analysis was used to

interpret the qualitative interview data. An iterative coding process was used and *HyperRESEARCH* was employed to document the process, providing intra-rater reliability. *HyperRESEARCH* was used to document the codes, which provided greater consistency between iterations. This created reliability and accuracy in the interpretations of the data. Additionally, a colleague reviewed the coding process to establish inter-rater reliability.

### **Reporting Findings**

The findings are reported and organized in Chapter 4 according to the phase of the research study. This includes descriptive information, statistical data and analysis results, themes resulting from textual analysis, and excerpts used to exemplify areas of interest. The results have been interpreted to draw key findings about the role of personal health and ethical concern in governing food choices and the effects of interdisciplinary learning in nutrition education in an effort to contribute to nutrition education practice.

## Chapter 4: Results

This chapter presents the results of the comparative survey phase and the secondary interview phase. The comparative survey phase employed a web based survey to compare the motives of students enrolled in the *Food for Thought* LCOM to students enrolled in a non-integrated nutrition course. The intent of this phase was to address research questions one and two.

RQ 1: Is there a significant difference between the personal health food choice motives of students who completed the *Food for Thought* LCOM and students who completed a non-integrated nutrition course?

RQ 2: Is there a significant difference between the ethical food choice motives of students who completed the *Food for Thought* LCOM and students who completed a non-integrated nutrition course?

The survey responses are reported quantitatively to provide a measurable comparison between the LCOM and the non-integrated group. Mean ratings are used to compare the importance of various domains and a cross tabulation of survey questions is provided to show a more detailed view. To find whether a significant difference exists, ethical and personal health food choice motive responses were analyzed using an independent samples t-test.

The secondary phase employed a web based asynchronous interview to gain insight into the role the *Food for Thought* LCOM played in students' motives for dietary choices. Specifically, this phase was used to address research question three.

RQ3: What aspects of the learning community have the most influence on students' motives for dietary choices?

The data was analyzed qualitatively through an iterative coding process to identify themes as they relate to interdisciplinary nutrition education and food choice motives. A narrative analysis is used to discuss topics and themes generated from the interview responses.

### **Comparative Survey Results**

At the completion of the Spring 2013 academic term, students enrolled in the *Food for Thought* LCOM and students enrolled in the two selected sections of a non-integrated nutrition course were distributed a 42 item food choice motive survey. The survey was administered via the online survey tool *Qualtrics* for self-completion. The response rate and demographics of the LCOM and non-integrated survey participants are discussed followed by a descriptive analysis of the food choice motives survey and the t-test results addressing research questions one and two.

**Participant response and demographics.** The curriculum class cap for the LCOM was held at 24 students. With a 12.5% attrition rate, 21 students completed the LCOM therefore reducing the potential number of participants from the original enrollment number. Of the potential participants, 13 completed the survey phase. Two sections of a non-integrated nutrition course were used to serve as a comparison group. Due to the fact that these sections were not part of a learning community they were allowed a higher class cap of 40 students per section. However, these sections combined experienced a 14% attrition rate resulting in 69 total potential participants. Of these potential participants 60 students completed the survey. This resulted in a combined total of 73 completed surveys. Table 4 provides a summary of the demographics of both LCOM and non-integrated survey participants.

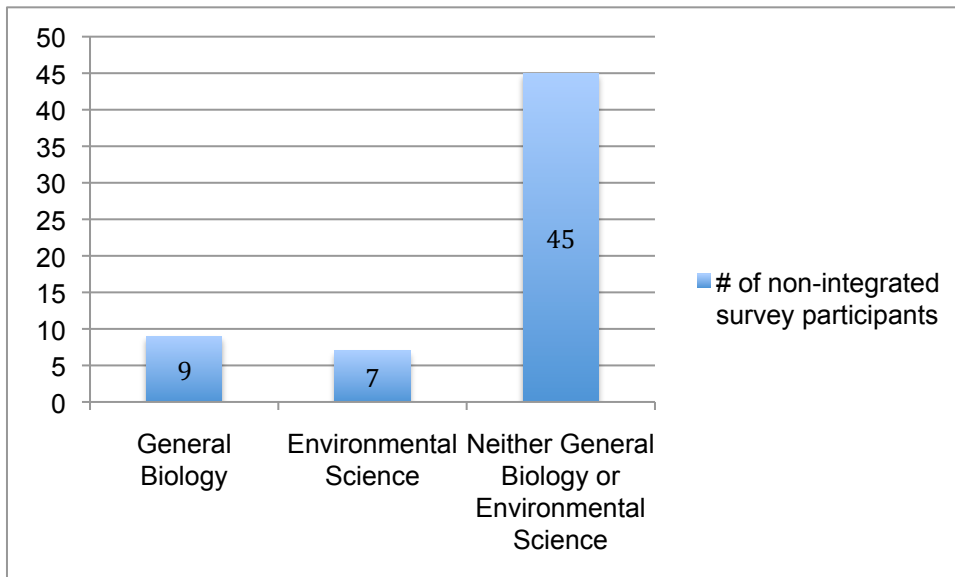
Table 4  
*Demographics of Survey Participants (N=73)*

Characteristic	LCOM N=13 n (%)	Non-integrated N=60 n (%)
Age		
18-24 years	13 (100%)	41 (68%)
25-34 years	0	9 (15%)
35-44 years	0	4 (7%)
45-55 years	0	5 (8%)
55-64 years	0	1 (2%)
Gender		
Male	7 (54%)	20 (33%)
Female	6 (46%)	40 (67%)
Ethnicity		
White	2 (15%)	21 (35%)
Hispanic or Latino	9 (69%)	22 (37%)
Black or African American	0	4 (7%)
Native American or American Indian	0	0
Asian/Pacific Islander	2 (15%)	8 (13%)
Other	0	5 (8%)

All of the LCOM survey participants were between the age of 18-24 years and the majority of Hispanic or Latino decent. The participants in the non-integrated sections were more diverse both in age and in ethnicity. The LCOM group had almost as many female participants as males however, the respondents from the non-integrated sections were predominately female.

The non-integrated students were additionally asked to report whether or not they had completed a college level General Biology and/or Environmental Science course, which may or may not have provided a similar educational experience to the LCOM. Figure 1 shows the distribution of additional courses taken.





*Figure 1.* Courses completed by non-integrated participants. This figure illustrates the number of participants that completed General Biology, Environmental Science, or neither.

The majority of students reported having never completed either Biology or Environmental Science.

**Food choice motives.** The food choice motives portion of the survey combined Steptoe et al., (1995) Food Choice Questionnaire with Lindeman and Väänänen’s (2000) Ethical Food Choice Motives (EFCM) supplement. As a result, the survey measured the domains *health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern*. Within the survey, multiple scale questions were used to measure the same domain, insuring internal reliability. For example, six different questions measured the importance of personal health in making food choices. Participants were asked to endorse the statement “It is important to me that the food I eat on a typical day...” for each item by selecting between four responses: not at all important, a little important, moderately important, and very important. Responses were scored 0 to 3 respectively. The mean ratings for each response were averaged and organized by domain. The comparison of the LCOM and non-integrated mean ratings are reported in Figure 2.

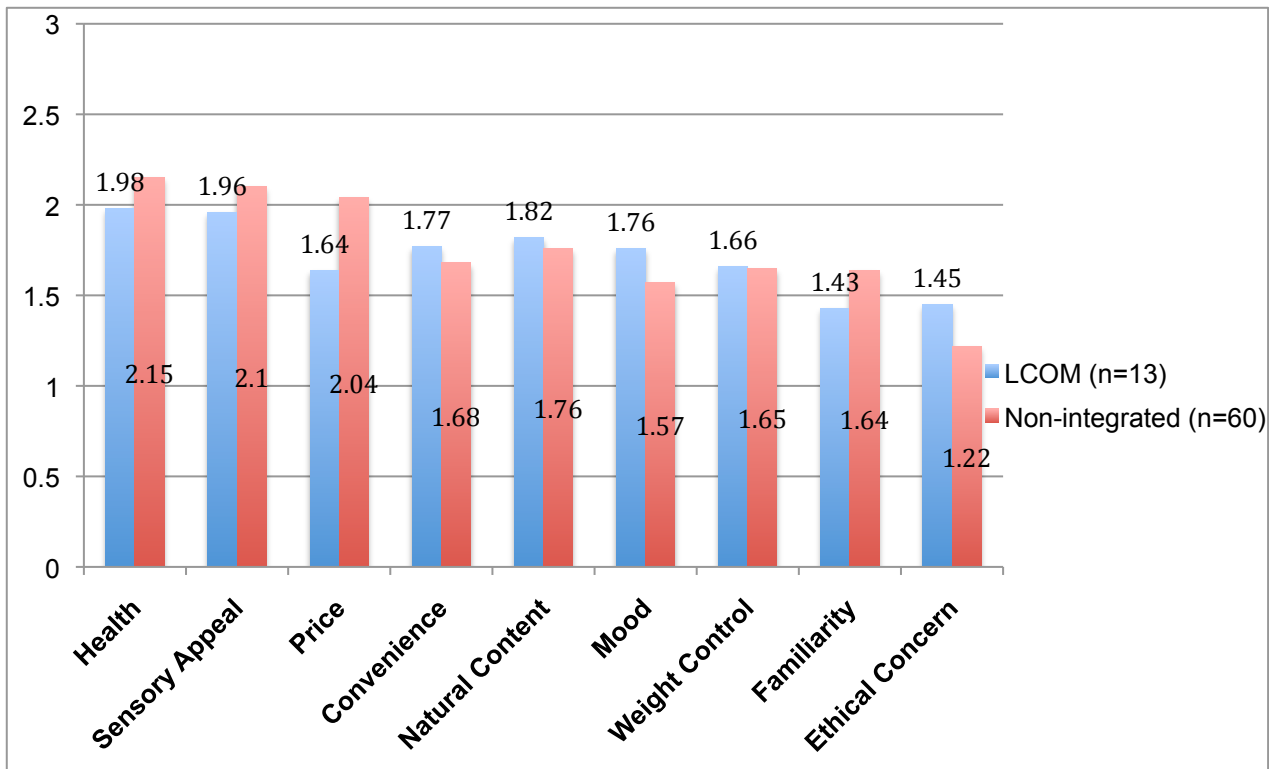


Figure 2. Mean ratings of Food Choice Questionnaire domains. This figure illustrates the mean ratings of each domain as reported by LCOM and non-integrated participants (N= 73).

The mean ratings for all domains fall in the center of the scale (between 1.22 and 2.15), indicating that all constructs were either *a little important* or *moderately important* in determining survey participants dietary choices. Despite the central tendency, particular domains appear more influential than others and some differences exist between the two groups.

According to the data, the *health* and *sensory appeal* domains influence the dietary choices of survey participants the most, regardless of the type of nutrition education received. The non-integrated participants' mean rating is slightly higher for both domains, indicating that concerns related to personal health and sensory influences (i.e. taste, texture, appearance, etc) are *moderately important* to the students who completed a traditional non-integrated nutrition course and *a little important* to those who completed the LCOM. The data also reports that *ethical concern* is the least important construct influencing the dietary choices of survey participants.

However, the mean ratings show this construct has some influence over food choices because the mean rating values are above 1, indicating that ethical concerns related to food are *a little important*. The difference in mean ratings indicates that *ethical concern* is more important to the students who completed the interdisciplinary LCOM. However, the largest difference between the LCOM and non-integrated survey participants is seen in the *price* domain. The cost and value of food influences the dietary choices of students who completed the non-integrated nutrition course more so than the LCOM participants.

While the mean ratings provide a summary comparison of the food choice motives, they are unable to provide a detailed view of specific dietary influences. Therefore, a cross tabulation report was used to show the rating frequencies of the LCOM participants and non-integrated participants in an effort to provide a more granular comparison of personal health and ethical food choice motives.

***Personal health results.*** For the purpose of this study, responses to the *health, natural content*, and *weight control* domains were combined to evaluate the food choice motives pertaining to personal health. All three of these domains are supported by the literature to be individual level determinants (Glanz et al., 1998) impacting personal health. The *health* domain measures concern for the overall nutritional value and health impact of food while the *natural content* domain and weight control domain measure quality and quantity of food, respectively. The rating frequencies for the domains related to personal health are presented in Table 5.

Table 5  
Rating Frequencies of Food Choice Motives Related to Personal Health (N=73)

<b>It is important to me that the food I eat on a typical day:</b>	n	Not at all important	A little important	Moderately important	Very important
is high in fiber					
LCOM	13	1 (8%)	7 (54%)	4 (31%)	1 (8%)
Non-integrated	59	5 (8%)	21 (36%)	18 (31%)	15 (25%)
is nutritious					
LCOM	13	0	3 (23%)	4 (31%)	6 (46%)
Non-integrated	60	0	9 (15%)	23 (38%)	28 (47%)
contains lots of vitamins and minerals					
LCOM	13	0	5 (38%)	5 (38%)	3 (23%)
Non-integrated	60	0	14 (23%)	23 (38%)	23 (38%)
is high in protein					
LCOM	13	1 (8%)	1 (8%)	7 (54%)	4 (31%)
Non-integrated	60	3 (5%)	11 (18%)	23 (38%)	23 (38%)
keeps me healthy					
LCOM	13	0	2 (15%)	5 (38%)	6 (46%)
Non-integrated	60	1 (2%)	9 (15%)	20 (33%)	30 (50%)
is good for my skin/teeth/hair/nails etc					
LCOM	13	0	4 (31%)	3 (23%)	6 (46%)
Non-integrated	60	1 (2%)	8 (13%)	24 (40%)	27 (45%)
contains no additives					
LCOM	13	1 (8%)	4 (31%)	5 (39%)	3 (23%)
Non-integrated	59	7 (12%)	19 (32%)	22 (37%)	11 (19%)
contains natural ingredients					
LCOM	13	1 (8%)	3 (15%)	4 (31%)	5 (38%)
Non-integrated	59	4 (7%)	16 (27%)	21 (36%)	18 (31%)
contains no artificial ingredients					
LCOM	13	2 (15%)	3 (23%)	3 (23%)	5 (39%)
Non-integrated	60	5 (8%)	20 (33%)	20 (33%)	15 (25%)
is low in calories					
LCOM	13	3 (23%)	4 (31%)	4 (31%)	2 (15%)
Non-integrated	60	12 (20%)	19 (32%)	20 (33%)	9 (15%)
is low in fat					
LCOM	12	1 (8%)	4 (33%)	5 (42%)	2 (17%)
Non-integrated	59	8 (14%)	15 (25%)	24 (41%)	12 (20%)
helps me control my weight					
LCOM	13	2 (15%)	3 (23%)	4 (31%)	4 (31%)
Non-integrated	60	6 (10%)	16 (27%)	20 (33%)	18 (30%)

Almost half of the LCOM and non-integrated participants reported *nutritious* food, food that keeps them *healthy*, and food that improves *skin/teeth/hair/nails/etc* as *very important*,

indicating that these are the most important health motives that dictate their daily food choices. Both groups also placed a similar level of importance on selecting foods that help control their weight. Sixty-nine percent of LCOM students reported that choosing foods that help them control body weight was moderately to very important as compared to 63% of non-integrated participants. These findings imply that after completing their respective courses, participants almost equally value the ability of food to influence internal/physical health and their physical appearance.

Although the data doesn't report many differences between groups, the most noticeable difference was the importance placed on fiber containing foods. One quarter of the non-integrated participants reported fiber content was very important in determining what to eat while only 8% of LCOM participants reported the same.

Another noticeable difference was found in the importance of food not containing artificial ingredients. Thirty-nine percent of LCOM participants rated the lack of artificial ingredients as *very important* compared to 25% of the non-integrated group. The importance of artificial ingredients was measured in the *natural content* domain along with the importance of foods containing natural ingredients and no additives. Considering the data presented in the *natural content* domain, LCOM participants overall placed a greater value on the quality of foods in comparison to the non-integrated group.

***Ethical concern results.*** Five macro level issues are measured in the *ethical concern* domain. These include environmental sustainability, animal rights, human rights, political values, and religious beliefs. Motives related to ethical concern are represented in Table 6 and the findings are reported according to these five social issues.

Table 6  
Rating Frequencies of Food Choice Motives Related to Ethical Concern (N=73)

<b>It is important to me that the food I eat on a typical day:</b>	n	Not at all important	A little important	Moderately important	Very important
has been prepared in an environmentally friendly way					
LCOM	13	1 (8%)	4 (31%)	7 (54%)	1 (8%)
Non-integrated	59	12 (20%)	15 (25%)	19 (32%)	13 (22%)
has been produced in a way that animals have not experienced pain					
LCOM	13	2 (15%)	3 (23%)	5 (38%)	3 (23%)
Non-integrated	60	15 (25%)	15 (25%)	15 (25%)	15 (25%)
has been produced in a way which has not shaken the balance of nature					
LCOM	13	2 (15%)	4 (21%)	3 (23%)	4 (31%)
Non-integrated	60	12 (20%)	18 (30%)	19 (32%)	11 (18%)
has been produced in a way that animals' rights have been respected					
LCOM	13	2 (15%)	2 (15%)	4 (31%)	5 (38%)
Non-integrated	60	13 (22%)	11 (18%)	20 (33%)	16 (27%)
is packaged in an environmentally friendly way					
LCOM	13	2 (15%)	5 (38%)	3 (23%)	5 (23%)
Non-integrated	59	9 (15%)	16 (27%)	19 (32%)	15 (25%)
comes from a country I approve of politically					
LCOM	13	5 (38%)	3 (23%)	3 (23%)	2 (15%)
Non-integrated	60	27 (45%)	21 (35%)	7 (12%)	5 (8%)
comes from a country in which human rights are not violated					
LCOM	13	2 (15%)	3 (23%)	3 (23%)	5 (38%)
Non-integrated	60	21 (35%)	16 (27%)	12 (20%)	11 (18%)
is in harmony with my religious views					
LCOM	13	5 (38%)	3 (23%)	3 (23%)	2 (15%)
Non-integrated	60	31 (52%)	11 (18%)	11 (18%)	7 (12%)
has been prepared in a way that does not conflict with my political values					
LCOM	13	6 (46%)	2 (15%)	3 (23%)	2 (15%)
Non-integrated	59	36 (61%)	9 (15%)	11 (19%)	3 (5%)
has the country of origin clearly marked					
LCOM	13	4 (31%)	2 (15%)	3 (23%)	4 (31%)
Non-integrated	60	20 (33%)	18 (30%)	16 (27%)	6 (10%)
is not forbidden in my religion					
LCOM	13	8 (62%)	2 (15%)	1 (8%)	2 (15%)
Non-integrated	58	33 (57%)	12 (21%)	6 (10%)	7 (12%)

*Environmental sustainability.* Four questions measured the importance of environmental sustainability in governing food choices. Ninety-three percent of LCOM participants reported that it is important to them, to some degree, that their food is prepared in an environmentally friendly way compared to 79% of non-integrated participants. However, more of the non-integrated participants responded that it was *very important* to them. Both groups equally value

the packaging of food, namely the environmentally friendliness of the package itself and the country of origin labeling.

*Animal rights.* Two questions focus on animal rights issues. The majority of both LCOM and non-integrated participants reported it is important, to some degree, that their food has not caused animal suffering and that animals' rights have been respected. However, more LCOM participants than non-integrated participants rated these issues as being moderately or very important.

*Human rights.* One question involved human rights. Eighty-four percent of LCOM participants state it is important to them that their food comes from a country in which human rights are not violated. Most of the non-integrated participants also value human rights however, not to the same degree as the LCOM participants.

*Political values and religious beliefs.* Two questions focus on political and religious values. Both LCOM and non-integrated participants rated political values and religious beliefs as the least influential ethical concern issues. However, the data does show that both groups value political issues slightly more than religious beliefs.

According to the data, ethical concerns with the most influence on LCOM participants' dietary choices are related to environmental sustainability and animal and human rights. The non-integrated participants also value these social issues however, not to the same level of importance.

#### ***Analysis of differences.***

Thirteen LCOM students participated in the comparative survey phase. This resulted in an insufficient sample size to use a Chi-Square analysis to test for differences in the ethical concern and personal health related domains between the two groups. Therefore, the importance

scale, used by participants to endorse each survey statement, was weighted to create a sum (mean rating) for each domain. A zero was assigned to the *not at all important* responses while *a little important*, *moderately important*, and *very important* were assigned the values 1, 2, and 3 respectively. Table 7 presents the mean ratings of the analyzed domains.

Table 7  
Mean Ratings for Personal Health and Ethical Concern Domains

Domain	n	Minimum	Maximum	Mean Rating
<i>Personal Health</i>				
LCOM	13	0	3	1.82
Non-integrated	60	0	3	1.85
<i>Ethical Concern</i>				
LCOM	13	0	3	1.45
Non-integrated	60	0	3	1.22

An independent-samples t-test was conducted to compare the personal health and ethics based food choice motives of LCOM and non-integrated participants. The level of significance was set at  $\alpha = 0.10$ . More than one domain in the food choice motives questionnaire measured personal health. Therefore, the *health*, *natural content*, and *weight control* domains were analyzed since they all measure the quality and/or quantity of food. There was not a significant difference in the personal health related food choice motives of LCOM participants ( $M = 1.85$ ,  $SD = 0.57$ ) and non-integrated participants ( $M = 1.93$ ,  $SD = 0.57$ ) conditions  $t(71) = 1.99$ ,  $p = 0.66$ . Specifically, the results show that students placed value on food qualities that improve health regardless of the type of nutrition education they received.

Nine questions in the *ethical concern* domain were used to evaluate the influence of ethical food choice motives. There was not a significant difference in the ethical concern food choice motives of LCOM participants ( $M = 1.45$ ,  $SD = 0.87$ ) and non-integrated participants ( $M = 1.22$ ,  $SD = 0.72$ ) conditions  $t(71) = 1.99$ ,  $p = 0.32$ . Specifically, the results show that



regardless of the type of nutrition education received students believe that ethical concern issues are *a little important* when making dietary choices.

Overall, the LCOM and non-integrated participants rated all nine of the domains in the center of the scale, revealing that dietary decisions are made from various motives including individual, social, physical, and macro level determinants. Although cross tabulation reports showed some variation in the personal health and ethical concern motives between groups, neither is statistically significant. A secondary web-based interview phase was conducted to provide qualitative data on the impact of the *Food for Thought* on dietary motives.

### **Web-based Interview Results**

At the completion of the survey phase, LCOM students were recruited to participate in the secondary interview phase. Students were encouraged to complete the initial survey first, to become familiar with the terminology used in the interview process; however, it was not a requirement for participation. The web-based interview was conducted asynchronously using the online survey tool *Qualtrics*. The participants responded to a series of open-ended questions related to overall experience of the LCOM, experience with nutrition education, and changes in food choice motives. These questions were analyzed to address research question three: What aspects of the learning community have the most influence on students' motives for dietary choices? Upon completion the researcher reviewed the responses and posed two probing questions to gain clarification and additional insight into student perceptions. The probing questions were also delivered using *Qualtrics*. A total of 12 students participated in the initial interview and eight responded to the probing questions. Since the online interview was designed to be completely anonymous, the responses to the probing question that followed the initial set of interview questions were unable to be linked to the participants' previous responses. Therefore,

the students that responded to the initial set of interview questions are referred to as Student 1, 2, 3, etc and those who responded to the probing questions are referred to as Student A, B, C, etc.

The electronic qualitative analysis tool *HyperRESEARCH*, was employed to guide and document the analysis process. A priori codes, determined by the literature, were used to analyze students' perceived food choice motives. Specifically, these include individual, physical, social, and macro level determinants. An iterative coding cycle was used to identify topics described by the participants pertaining to their experiences with interdisciplinary nutrition education as it relates to their food choice motives. These topics were analytically coded for themes based on trends in the data. A list of codes and corresponding operational definitions can be found in Appendix I. A narrative analysis is used to present the findings here.

**Self-reported Food Choice Motives.** Participants were asked to retrospectively describe their food choice motives prior to enrolling in the *Food for Thought* LCOM. This served as a baseline to help evaluate subsequent questions regarding whether or not there were changes in the self described dietary motives and how such motives may have been impacted by participation in the LCOM. A priori topical codes were applied to the data pertaining to food choice motives. Codes were based on the established categories of food choice determinants as described in the literature and as discussed in Chapter 2. The categories include individual, physical, social, and macro level determinants. Table 8 provides the operational definitions of these determinants. Themes related to aspects of the LCOM that most influenced food choice motives were generated based on trends in the data and are also included in the narrative.

Table 8  
Operational definitions of a priori codes for food choice motives

Topical Code	Operational Definition
Individual level	Personal preferences, demographics, and/or food related knowledge that impacts what a person

*(continued)*

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Physical level	chooses to eat The location, convenience, accessibility, and/or cost of food that impacts what a person chooses to eat
Social level	Relationships with family, friends, co-workers, peers, that provide accountability for food choices, a sense of familiarity, or a feeling of pressure/guilt to eat a certain way
Macro level	Cultural norms, agricultural policies, food marketing, and social movements that may impact what a person chooses to eat

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**Individual.** When LCOM participants were asked to describe the reasons behind their dietary choices prior to the *Food for Thought* LCOM, the majority reported one of three individual level determinants; taste/appetite, perceived nutrition knowledge, and concern for personal health.

*Taste.* The majority of participants reported taste and/or appetite predominately dictated their food choices. This is consistent with the literature since research shows that regardless of gender and age taste remains the leading predictor of dietary choices (citation). Quotations below exemplify this data.

Student 4: I ate whatever I wanted.

Student 11: Before enrolling in the LCOM I chose foods based on taste and familiarity...taste was always the most important thing and I rarely referred to the nutrition facts panel.

Student 12: I basically bought food that tasted good. I was more interested in the taste than where it came from or how it was grown. As long as it tasted good I was happy.

*Knowledge.* Comments were also made inferring that previous dietary decisions were made based on perceived level of knowledge of food and health. Some participants stated they

made decisions based on what they thought was healthy and after taking the LCOM realized they were making choices based on misinformation. For example:

Student 7: I did not understand all the science that has been brought into food, whether it was good or bad. That being said, I ate a lot of foods that I thought were healthy but they were actually bad in the long run.

Student 10: Before this semester I thought I knew what was good and what was bad for me. I was totally wrong about my nutrition facts prior to this course. I've always had goals of losing weight but always wondering what I was doing wrong.

*Concern for personal health/weight.* Participants also reported they previously considered the calorie content of foods in determining what to eat. This implies that personal health and/or weight control may have played a role since the nutritional value/content of the food was considered.

Student 1: Before the LCOM I would just check the calories on a food item. If it had too many I thought it was bad for me. I was not sure about the nutrients or how the food would affect my body in the long run.

Student 7: I basically had a view of calorie counting.

After completing the LCOM, participants described how their dietary motives changed. All of the participants stated that personal health now plays a very influential role in their daily food choices. The specific personal health issues described by participants include the desire to reduce illness/disease, to physically feel better, and to see physical changes in body/weight.

*Prevent illness/disease.* The desire to prevent illness through dietary measures is a food choice motive not reported by participants prior to taking the course. Some students commented on the desire to improve health while others described new dietary habits, which demonstrate the personal health motive. For example:

Student 8: I do not consume food until I can't breathe. Rather, I consume food to provide nourishment to my body and to be healthy.

Student 12: It has made me realize I need to eat healthier in order to avoid certain health risks that run in the family.

Student E: I now know what I am putting in my body and how it is going to affect me in the long run.

*Desire to physically feel/look better.* Although the purpose of this study was to explore the intent behind dietary decisions, some participants described actual dietary changes made as a result of taking the LCOM. These examples demonstrate the influence of personal health, specifically the desire to feel better physically.

Student C: Before this class I ate without question or thought and I had digestive issues regularly and for some reason thought it was just normal like many other people think it is. Now, I can look at a label or a choice of food and know almost exactly what effect it will have on my body and why. For example, I cut out milk about 90 percent because I now know the lactose in the milk is what gives me aches and gas. I also cut down on beef and processed foods. I feel much healthier now, so yes; health is a reason why I changed my diet.

Student F: I like to feel more energized and I want to live a full and healthy life. I also liked the changes I have seen in my body after making the correct food choices.

Student G: I felt the difference when I cut out many foods containing high fructose corn syrup. I feel better.

*Knowledge.* Many participant responses described dietary changes made as a result of increased awareness of food and health. The desire to select certain foods over others for the purpose of improving personal health is a result of the increased level of nutrition understanding. Although the level of understanding was not measured in this study, participant responses describe that it was the improved knowledge of food and health that resulted in personal health becoming a priority in dietary decisions.

Student 1: The LCOM has impacted my feelings about food in positive and negative ways. I feel like now I have no excuse to eat poorly because I have a lot of knowledge about what is good for me and what is not. I check everything now. I know what to look for on the ingredient

label or just by asking how it was cooked. I feel like I have a full understanding and I am a healthier person now because of it.

Student 10: My family loves to eat and their choices of food aren't healthy so these classes gave me knowledge to know that the stuff we have at the dinner table was affecting us in a negative way. Now that I have better knowledge of nutrition I can help my parents with their high blood pressure and my mom's breast cancer. It amazed me to know that if you switched up your diet to something other than the SAD [standard American diet] we can lower the risk of these health problems that my parents are being affected by.

Student 11: I have learned that many healthy alternatives still have a great taste, so taste no longer leads me to unhealthy choices. I have become much more aware of the meaning behind the nutrition facts panel and how different ingredients effect my body. I now pay much more attention to foods containing certain ingredients and avoid those products. New foods with new names no longer scare me, now that I have the knowledge of their nutritional benefits.

**Physical.** In the literature, physical level determinants refer to the location, convenience, accessibility, and cost of food. In this study, participants reported both convenience (i.e. little to no preparation, minimal cooking, close proximity, etc) and low cost as motives for their dietary habits.

Student 2: My choices were unhealthy, poor, and lazy. I basically ate only the foods I could cook fast or were made for me (fast food).

Student 8: Before enrolling in the LCOM I would look for the cheapest food and where it was prepared the fastest.

When physical level determinants such as convenience and cost of food dictate how one eats it often results in poor dietary habits. Cheap, ready to eat food is often massed produced and void of significant nutritional value (Nestle et al., 1998). Although this study did not employ a dietary recall to confirm the dietary habits of the participants, the self reported physical level determinants imply that these particular students were very likely selecting poor quality foods prior to enrolling in the LCOM. The interview results show that after completing the LCOM

cost is not as important as it was prior to enrolling in the course. This is exemplified by the dietary changes volunteered by interview participants.

Student 5: I don't buy junk food or processed food and if I do it has to be organic.

Student 8: I don't look for cheap foods and I focus more on the quality of the food I am consuming.

***Social.*** Social level determinants consider an individual's relationship with family, friends, and co-workers, and the influence such relationships have on his/her food choices. This may result in pressure to eat a certain way, an increased or decreased level of accountability, or may prompt a desire for familiarity. Only one social level determinant (familiarity) was initially reported, indicating that prior to enrolling in the LCOM, social factors did not have much influence on the participants' food choices.

Student 11: Before enrolling in the LCOM I chose foods based on taste and familiarity. I ate things that I ate all of my life and never questioned them. I would never eat anything that had an unfamiliar name or smell to it.

Participants' social food choice motives changed upon completion of the LCOM. Some participants shared a desire to help their family with dietary changes, which was often described in the context of gaining newfound nutrition knowledge. However, others found the interaction with their peers provided a sense of accountability that influenced more healthful dietary choices.

Student 3: Naturally the LCOM students get to know each other well because of all the time we spend in class together. Which meant we discussed nutrition with each other and would always bring up nutrition when we ate unhealthy lunches during break, making each other feel bad with nutrition facts for choosing those foods. It was more like joking with each other about it. So now, I eat more health foods.

***Macro.*** Macro level motives refer to societal issues and concerns related to food and food production methods. None of the interview participants reported any macro level issues

prior to enrolling in the LCOM. However, the majority of participants described specific societal level issues as a result of completing the LCOM. These include concern for the health of the environment, concern for animal rights, and frustration with industry control.

*Concern for environmental health.* Students in the LCOM described an increased awareness of environmental sustainability as well as an increased level of concern for the environmental impact of their dietary choices.

Student 12: Before taking these classes, I ate what I liked and did not know where it came from nor did I care. But now I do care and I know where it comes from, how far it has traveled, and what is being done to foods (i.e. pesticide usage, genetic engineering, etc.).

Student A: Genetically modified organisms are another reason I chose the foods I eat now. GMOs are hazard to our earth and are one of the reasons for global warming. Global warming should be publicized and taught more in classes, to take quick steps towards stopping global warming before it is too late.

Student C: Moral reasons have changed what I choose to buy and what my family chooses to buy. Hopefully one day we can completely switch to organic and local.

Student D: Some of the lessons and videos went into detail about the morals of animal processing and the effect on the environment. These were all things that I never previously thought of and now that I have the knowledge I am utilizing it.

*Concern for animal rights.* Interview participants described the impact of raising and slaughtering animals for food on their dietary choices, overall expressing a dislike for the factory farming business. These findings are consistent with the frequency reports of the ethical concern domain in the comparative survey phase which reported participants value the treatment of animals and made dietary choices accordingly.

Student C: ...moral reasons are also a reason I make certain choices. My parents are from Mexico and so in our household there is a lot of dairy, beef, and meat as part of everyday meals. I always inform them of what I learn in nutrition about factory farms, growth hormones, and antibiotics but they



are older and it seems they will not change their habits. I try to convince them to buy from farmers markets or organic food but it seems they do not find it convenient and they don't like paying extra for chicken or beef. However, with my refusal to eat beef or chicken everyday they seem to eat more vegetables because I eat more fruit and vegetables now...

Student E: The social aspects of food production just gave me a little bit more of an incentive to change my eating habits because I was shown how these animals are being processed.

*Frustration with industry control.* Other macro level issues reported by participants include the political aspects of food production. Participant comments demonstrate frustration with the lack of political transparency and an overall dislike of industry control. Political values were measured in the comparative survey phase, however the questions were not related to the issues commented on here.

Student F: I don't like Monsanto and how they are controlling the food industry. It is unfair and unhealthy for people to now know what they are consuming on a daily basis.

Student H: I wanted to change for health reasons but I also disagree with corporations like Monsanto and don't want to buy from them.

Overall, participants reported mainly individual level determinants as the reasons behind their dietary choices prior to enrolling in the LCOM, namely taste and appetite. This is consistent with the literature since research reports it is often taste and perceived level of knowledge that drive individual food choices (Glanz et al., 1998; Kennedy et al., 1996; Lloyd et al., 1995; Nestle et al., 1998). None of the interview participants reported any macro-level determinants prior to enrolling in the LCOM. This indicates that ethical concern related to issues such as food production methods, environmental sustainability, human and animal rights, etc., had little to no influence over dietary choices prior to taking the course. Participant responses revealed a shift in individual level motives. As a result of completing the LCOM, students

reported a new focus on personal health and the desire to prevent future illness as well as improve their weight/physical appearance. This is consistent with the findings from the comparative survey data. Additionally, participants developed a sense of environmental concern, which did not previously exist, or was not described, prior to enrolling in the LCOM. This data shows that participation in the *Food for Thought* LCOM resulted in the development of ethical concern food choice motives. Students were asked to comment on the specific aspects of the LCOM that most influenced their food choice motives to gain a greater understanding of the role of interdisciplinary nutrition education.

**Aspects of the LCOM influencing dietary motives.** In an effort to make the findings of the study useful for actual practice, it was necessary to explore the aspects of the LCOM that participants believed impacted their dietary choices the most. Participants overwhelmingly reported that the content covered in the LCOM had the greatest impact, describing specific topics that now help govern their dietary choices. Additionally, participants described films and assignments that resonated with them and help initiate dietary change.

**Course content.** Almost all of the interview participants described an aspect of the course content that impacted them and their motives for dietary choices. Participants described specific topics discussed in class, the logic used by instructors to explain the content, and the integration of content as beneficial and influential.

**Specific topics.** The topics described by participants as most influential to their food choice motives include personal health, unveiling of the truths surrounding food (i.e. ingredients used), the environmental impact of food choices, and genetically modified organisms (GMOs). Participants' statements below demonstrate that their understanding and appreciation of health

and nutrition concepts improved as a result of completing the LCOM, specifically the nutrition section.

Student 4: The fact that the nutrition course told us exactly what is in our foods had a lot to do with it.

Student 5: The aspects of the LOM that had the greatest impact on me were how 'unhealthy' eating can affect my body and health. Also, I learned how eating healthier benefits my body and me.

Student 6: The biggest impact while taking the course was learning how much to consume.

Student 8: I have cut out at least 90 percent of the processed foods I used to eat because of how unhealthy it is and because it does not provide any healthy nourishment.

Student 12: The GMO topic affected me because there are too many negative effects that are health related. I would like to live a healthy life as long as possible.

Although for the purpose of this study students' level of knowledge was not evaluated, participants clearly completed the course with a perceived improved level of nutrition understanding. It is also evident that not only has the increase in knowledge resulted in a desire to eat more healthful foods it has initiated actual behavior change.

Interview participants also described becoming more aware of the food they eat, how it is produced, who is involved, and how it impacts the environment. Some of the participants were surprised of the reality of food production and became willing to take action and change their own dietary choices. The comments below also suggest that participants may have developed a greater sense of responsibility and/or citizenship, which may drive their dietary decisions.

Student 7: Learning about high fructose corn syrup and corn fed beef were some of the biggest wake up calls for me. I did not know how many products contained corn syrup and I did not know that cattle were being fed corn, which is not natural. I felt like I had been tricked and I was eating and drinking things that were engineered. These aspects helped me change

because I saw the negative impact engineered and unnatural foods have on my body and the environment.

Student 10: From GMOs not being labeled in our foods to the uncertainty if GMOs are a health risk for us to even taking away farmers rights to planting their own seeds is outrageous to me. This made me want to change the way I am living and with the knowledge I've learned this semester I have already started to choose my foods wisely when I'm at the grocery store...I feel like these classes I took this semester will be beneficial not just in school, for a letter grade, but actually help me to be a better person because of what I've learned in environmental science and nutrition. I now know what is good for me and the types of food out there that is being made can be detrimental to our planet.

Student 12: ...and completing the ecological footprint assignment affected me because the environment is effected so much from my lifestyle. Certain foods at the supermarket have traveled hundreds, if not thousands, of miles to get to the supermarket. This means that vehicles using gas are being used to transport the goods causing more air pollution in the atmosphere. Now I am a little bit picky of what I buy.

Student 13: I take nutrition more seriously now by watching what I eat and the source of the products I consume in order to reduce my ecological footprint.

*Logical/moral arguments related to food.* Participants' comments demonstrate that the LCOM presented logical/rationale arguments related to food, which made it more credible to students, rather than striving for an emotional response. The credibility was valued by students in a way that promoted dietary change.

Student 3: I would say the Nutrition course and Environmental Science impacted me the most in the case of what foods I now choose. Environmental Science gave a lot of information on the connection between food industry and globalization, for example Monsanto. Nutrition gave lots of information on nutrients in food, why certain foods were bad for digestion, how food is prepared and would always provide alternatives to certain foods. These classes gave logical reasons to change the way we eat and also provided moral reasons to do so.

Student 8: I have cut out a large portion of the meat I once ate and I am working on becoming a vegetarian. I know how unhealthy too much red meat is but the biggest impact is how inhumanely the animals and workers are treated to make the majority of our foods.

*Integration.* According to participants, the interrelatedness of the content helped show various perspectives on the same topic. This broadened the view of the course material, which provided new perspectives on food. Additionally, the integrated content provided various perspectives on food, which allowed students to identify with the view that was most meaningful to them.

Student 8: We learned about nutrition and not only that but how what we eat is made and why food is made the way it is. Also, on how it affects everything around. I now understand where I stand in my ecological footprint and how that directly affects and decides what I consume.

Student 10: Environmental Science re-visited some of the same topics and movies from nutrition, so I had repetition of lessons. The repetition allowed me to grasp the understanding on a deeper level. In English, we had multiple papers to write based on nutrition topics. When I wrote the information down on paper, I recalled lessons that I thought I had forgotten. Overall, I think the repetition of all four classes really made me remember and utilize the information, instead of briefly grazing over the topics.

Student 11: With all of the perspectives, I was able to choose which I felt suited me.

Student 13: It was cool that some subjects overlapped into different courses and we got to see different points of view on certain topics. For example, we got to go over the topic of GMOs from a nutritional, biological, and environmental point of view. Then we had to write about defending our personal point of view in English.

Student A: We were able to see the same topic from different points of view with the different classes. For example GMOs, nutritionally we learned the health effects, biologically we learned how they could be helpful, and environmentally we learned how the use of them affects the world around us.

*Films/Assignments.* According to participants, the documentaries shown in class and the assignments created by the LCOM instructors shed new light on nutrition related topics as well as provided *proof* of dietary change. The films allowed students to identify with individuals who

have made dietary changes and allow them to witness the effects of food. The assignments provided opportunities to voice opinions and self reflect the impact of personal dietary choices.

Student 1: The greatest impact was when we watched the film *Forks Over Knives* and it showed how people's lives changed with just a diet change. It really shows how switching to a plant based diet can help a person's health.

Student 10: Some of the documentaries such as *Food In* opened my eyes to the world that exists now that I was totally unaware of.

Student 11: The English class helped because on multiple occasions we wrote essays based on nutrition topics. By continuously writing about the topic I was able to grasp a better understanding of it and voice my opinions.

Student 13: The movies played a big part because I got to see people interviewed and witness for myself the effects these foods have on people.

Student 12: I think GMOs and the Ecological Footprint Assignment had the greatest impact on my reasons for choosing certain foods...and completing the ecological footprint assignment affected me because the environment is effected so much from my lifestyle.

According to participants, the *Food for Thought* LCOM provided compelling interdisciplinary content in a way that motivated students to consider making dietary changes. Participants responded viscerally when the truths about food and food production methods were examined, influencing where participants shopped and the types of foods they purchased. Participants also became more invested in possible dietary change when logical arguments were provided, self-reflective assignments given, and changes could be witness for themselves. Overall, the web-based interview provided significantly more insight into the role interdisciplinary nutrition education might play in the development of food choice motives.

### **Key Findings**

The analysis of the quantitative comparative survey phase and the qualitative web based interview phase resulted in notable findings that contribute to the understanding of food choice

motives and interdisciplinary nutrition education. Responses to the comparative survey tended to produce ratings towards the center of the scale. Mean ratings for all measured domains fell between *a little important* and *moderately important*, revealing various determinants that influence dietary choices. According to the survey data, both groups valued foods that support personal health, including physical aspects of health such as weight and the quality of hair/skin/teeth/nails, regardless of the type of nutrition education received. Both groups reported ethical issues related to food were *a little important* when making dietary decisions. Results of the statistical analysis showed there was no significant difference based on the type of nutrition education received. However, responses from the interview phase showed that topics such as ingredient use, food production methods, environmental sustainability, and animal processing for food influenced the development of food choices among the LCOM participants. Additionally, data from the interview phase revealed students developed a greater sense of social responsibility, indicating that the *Food for Thought* LCOM provided a rich educational experience that exceeded influence of dietary choices. Chapter 5 will summarize the results in the context of significance to interdisciplinary nutrition education, food choice motives, and possible behavior change. The limitations of the research will be discussed as well as suggestions made for future research.

## Chapter 5: Research Study & Conclusions

Presently, 68% of Americans are overweight and 34% obese, making the United States the most overweight developed country in the world (CDC, 2009). The dietary choices a person makes largely defines his/her health. Diets high in animal products, refined carbohydrates, and low in vegetables, fruits, and omega-3 fats are directly related to the country's two leading causes of death, heart disease and cancer (Van Horn et al., 2008; Vay Liang et al., 2004). Obesity and obesity related diseases have become one of the leading public health concerns. As a result, nutrition education and intervention strategies have been studied extensively.

Most current dietary intervention strategies are health outcome based, employing conceptual models that target perceived risk and benefit (Baranowski et al., 2003; Nestle et al., 1998). These approaches vary in effectiveness and typically don't result in lasting behavior change. Furthermore, they do not reflect the dynamic nature of the nutrition field. Health professionals are becoming more aware of the impact of food quality on personal health. In doing so, the nutrition field has gained an appreciation for the relationship between agricultural policies, sustainable farming, and food quality (Billig & Wallinga, 2012). Unfortunately, dietary intervention approaches have not integrated these types of macro level issues, which research suggests could influence dietary change.

College level nutrition courses provide a viable opportunity to link health based education with the current social issues of the nutrition field. Research supports that interdisciplinary nutrition education could serve as an innovative and effective framework used to promote lasting dietary change (Robinson et al., 2003; Robinson & Sirard, 2005; Robinson, 2010a). Additionally, interdisciplinary education follows the academic trends seen in institutions



of higher education. Unfortunately, there are few examples of interdisciplinary nutrition education that have been researched.

The purpose of this study was to examine the influence a college level interdisciplinary learning community, which focused on social food related issues, had on students' food choice motives and nutrition education experience. Specifically, this study addressed three research questions:

RQ1: Is there a significant difference between the personal health food choice motives of students who completed the *Food for Thought* LCOM and students who completed a non-integrated nutrition course?

RQ2: Is there a significant difference between the ethical food choice motives of students who completed the *Food for Thought* LCOM and students who completed a non-integrated nutrition course?

RQ3: What aspects of the learning community have the most influence on students' motives for dietary choices?

This study can inform actual nutrition education practice. The ability of macro level issues such as environmental sustainability to influence dietary motives is newly researched. Learning communities is a developing area of college education and this study can provide additional perspective on how it can be used to initiate behavior change.

### **Summary of Conceptual Support**

This study examined food choice motives through the perspective of societal level issues and interdisciplinary nutrition education. While individuals are largely responsible for the foods they consume there are various factors that influence what a person chooses to eat. The literature categorizes these determinants as individual, physical, social, and macro level (Larson & Story, 2009). Individual level determinants refer to food preferences, knowledge, and demographic

factors. These particular determinants have undergone extensive research and are believed to be the most influential in governing what an individual chooses to eat (Nestle, 1998). Social influences of dietary choices include eating in the presence of others, social support, and can contribute to accountability (De Castro, 1995; Peterson et al., 1994). Physical level determinants such as price, location, and convenience of foods are typically not the focus of nutrition education research since these factors are predominately dictated by political issues and accessibility rather than personal choice (Nestle et al., 1998). Macro level issues have become a new and exciting area of research since they reach beyond personal responsibility and preferences. In the last decade, health professionals and consumers have become increasingly aware of the political and social movements related to food (Billig & Wallinga, 2012). These include but are not limited to environmental sustainability, animal protection, and human rights movements. Conceptually, the belief that macro level issues can influence dietary choices is consistent with the stealth intervention model.

Coined by Stanford researchers, the stealth intervention model posits that healthful behavior change is a side effect of adopting a social/ethical belief (Robinson et al., 2003; Robinson & Sirard, 2005; Robinson, 2010a). For example, the behaviors associated with the environmental sustainability movement are consistent with healthy lifestyle choices. Behavior changes may emphasize a plant-based diet, consumption of local/organic foods over industrialized food items, and walking/biking instead of driving. Belief in a social/ideological movement has also been shown to result in lasting behavior change since individuals that adhere to a set of beliefs are often able to resist straying from their lifestyle regardless of opposing social norms. Therefore, the stealth intervention model when applied to formal nutrition education may serve as a powerful framework to initiate and sustain dietary change.

Presently college level nutrition courses teach the role of diet in disease prevention, self-assessment, and goal setting techniques to educate and assist in the dietary change process (Pearman et al., 1997). While empirical studies show this type of nutrition education can be effective it does not leverage the interdisciplinary trends of the nutrition field or utilize the emerging curricular trends of higher education (Ha & Caine-Bish, 2009, 2011; Ha et al., 2009).

Learning communities (LCOM) have shown to be an effective curricular approach to promote intersectional thinking and learning. Learning communities are linked classes during an academic term that are typically designed around an interdisciplinary theme. They promote student collaboration, engagement, and learning through a variety of different perspectives (Mikler, 2004). In the case of this study, the *Food for Thought* LCOM centered on environmental sustainability and food production methods. Therefore, it provided an opportunity for the framework of the stealth intervention model to be applied to formal interdisciplinary nutrition education.

## **Methods**

Most studies researching college level nutrition education depend heavily on quantitative methods. A purely quantitative approach limits the ability to gain in depth insight from the student perspective and also limits a study's ability to inform actual nutrition education practice. Therefore, this study employed a two-phase, sequential mixed methods approach to examine the influence of interdisciplinary nutrition education on student motives for dietary choices.

**Comparative survey phase.** A self-reported questionnaire was used to quantitatively compare the personal health and ethical concern based food choice motives of students in the *Food for Thought* LCOM to students in a non-integrated nutrition course. The questionnaire combined the Food Choice Questionnaire (Step toe et al., 1995) and Ethical Food Choice Motives

supplement (Lindeman & Väänänen, 2000) because they provide a comprehensive range of food choice categories and have been established as valid and reliable. This resulted in a 42-item food choice questionnaire including the domains *health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern*. Respondents endorsed the statement “It is important to me that the food I eat on a typical day...” for each item by selecting between four responses: *not at all important, a little important, moderately important, and very important*. The food choice questionnaire was delivered and administered using the online survey tool *Qualtrics*.

**Web-based interview phase.** A web-based interview was used to gain more meaningful insight into the impact of interdisciplinary nutrition education on food choice motives. The interview questions were categorized into three areas: experiences of being enrolled in the *Food for Thought* LCOM, experiences with interdisciplinary nutrition education, and aspects of the LCOM that had the greatest influence on food choice motives. The asynchronous interview was conducted virtually using *Qualtrics*. Participants were asked initial interview questions and received subsequent probing questions used to clarify answers and further explore specific areas.

**Analysis process.** Data analysis for each phase was determined by the source of data and the research question it was being used to address. Quantitative data collected from the interview phase was used to compare the personal health and ethical concern based motives of LCOM and non-integrated students. Thirteen LCOM students participated in the survey phase, which resulted in insufficient data to run a Chi-Square analysis to test for significant differences. Therefore, the importance scale used by participants to rate the survey questions was weighted to produce a numerical value of importance. Mean ratings for the personal health related domains

and the ethical concern domain were analyzed using an analysis of variance, specifically a t-test, using NCSS software.

Textual analysis was used to code and theme the qualitative data captured in the interview phase. The electronic qualitative analysis tool *HyperRESEARCH* was used to guide and document the iterative coding process. A priori codes were applied to responses describing food choice motives. The a priori codes include the food choice determinants determined by the literature review: individual, physical, social, and macro level. Topical codes were created and applied to responses relating to the experiences with interdisciplinary nutrition education and aspects of the LCOM that influenced food choice motives. Themes such as the importance of integrated course content, a developed sense of identity and social responsibility, and a greater concern for ethical food related issues, emerged from the data.

### **Key Findings**

Food choice motives related to personal health were targeted and analyzed to answer research question one: Is there a significant difference between the personal health food choice motives of students who completed the *Food for Thought* LCOM and students who completed a non-integrated nutrition course? According to the survey data, there was not a significant difference in the personal health related food choice motives of LCOM participants ( $M = 1.85$ ,  $SD = 0.57$ ) and non-integrated participants ( $M = 1.93$ ,  $SD = 0.57$ ) conditions  $t(71) = 1.99$ ,  $p = 0.66$ . Among all of the domains measured, the health domain was rated as the most important, regardless of the type of nutrition education received. Specifically, both groups value the ability of food to maintain and improve personal health and physical appearance (i.e. weight control).

Food choice motives related to ethics were analyzed to answer research question two: Is there a significant difference between the ethical food choice motives of students who completed

the *Food for Thought* LCOM and students who completed a non-integrated nutrition course?

The survey data showed there was not a significant difference in the ethical concern food choice motives of LCOM participants ( $M = 1.45$ ,  $SD = 0.87$ ) and non-integrated participants ( $M = 1.22$ ,  $SD = 0.72$ ) conditions  $t(71) = 1.99$ ,  $p = 0.32$ . However, mean ratings show that both groups believe issues such as environmental sustainability and human/animal rights are *a little important* in deciding what to eat. Although the results show there was not a significant difference between groups, results from the interview phase showed that interdisciplinary education develop ethical concern, thereby influencing food motives and actual dietary habits.

Interview responses were coded and themed to answer research question three: What aspects of the learning community have the most influence on students' motives for dietary choices? Textual analysis confirmed that students place a high value on personal health as a result of completing the LCOM. Specifically, LCOM participants described a concern for body weight, preventing future disease, and a desire to feel and look better. Analysis also showed that interdisciplinary nutrition education helped to develop ethical concern for food related issues that did not exist prior to enrolling in the LCOM. Participants described utilizing their increased awareness to make actual dietary change. The learning community experience also contributed to students' identity formation and promoted a sense of social responsibility, overall creating a rich learning environment.

## **Conclusions**

Four conclusions have been made on the personal health and ethical concern food choice motives of participants as well as the effectiveness of interdisciplinary nutrition education and learning communities. These conclusions are supported by the key findings of the study and discussed in the context of existing research.

**Conclusion one.** Personal health as a domain was highly valued by all participants regardless of the type of nutrition education received. The food choice motives survey included a defined *health* domain however, the *weight control* and *natural content* domains were also considered in determining whether or not concern for personal health influenced dietary habits. According to the survey data, all participants consider the health impact and nutritional value of food when deciding what to eat. Participants also placed value in the ability of food(s) to enhance physical health/appearance such as the ability to control a healthy body weight and/or improve hair/skin/nails/teeth. This demonstrates that after completion of a nutrition course, whether interdisciplinary in nature or not, students value personal health.

In a time when obesity and chronic illnesses are at a record high it is encouraging that nutrition education can result in dietary habits governed by health-based motives. This is consistent with the research conducted on college level nutrition courses. Recent studies show that college level nutrition education can promote an increase in fruit and vegetable intake and decrease soda consumption (Ha & Caine-Bish, 2009, 2011; Ha et al., 2009). Although this study did not measure actual dietary habits, motives have been proven to be an effective way to predict dietary choices (Carrillo et al., 2011; Eertmans et al., 2005; Glanz et al., 1998). Therefore, the participants in this study likely choose nutritious foods as a result of completing one of the nutrition courses.

**Conclusion two.** The *Food for Thought* LCOM was effective in developing a greater value for ethical concern related to food. According to the interview data, none of the LCOM participants reported having any concern for ethical food issues prior to enrolling in the LCOM. Therefore, it can be concluded that it was the interdisciplinary nutrition education that developed the ethical based motives. Although the survey data shows the *ethical concern* domain as the

least valued of all of the domains, students still reported it as being influential in their dietary choices. One reason the mean rating for the *ethical concern* domain may be lower compared to the other domains assessed is because it measured concern for religion and politics. Both of these issues are related to ethical values placed on food however, neither was taught in the *Food for Thought* LCOM. Had the religious and political questions been removed and a new mean rating calculated, the ethical domain would have been more valued than the *weight control*, *familiarity*, and *price* domains.

The fact that food choice motives can be influenced by macro level issues such as environmental sustainability and concern for animal/human welfare is consistent with the stealth intervention model. The stealth intervention model believes healthful dietary change is a consequence of supporting a social cause (Robinson, 2010a). The social/ideological values emphasized in environmental sustainability and animal welfare issues support dietary habits that focus on locally grown, seasonal produce and a lowered consumption of animal based foods. Although examining the dietary habits of LCOM participants was not the intent of this study, many participants in the interview phase volunteered to share the dietary changes they have made as a result of taking the LCOM.

Interview participants shared they reduced their intake of animal based foods and genetically modified foods and have increased their consumption of organic and/or local produce and overall higher quality foods (as compared to highly processed ones). Participants explained that while personal health does play a role in making these changes they have also been influenced by their frustration with industry control and industrialization of food and because of their concern for the treatment of animals and the overall environmental impact of their food choices. Therefore, this study supports the belief that the stealth intervention model is a viable



method for influencing students to make healthful dietary changes.

**Conclusion three.** Interdisciplinary nutrition education provided a rich educational experience. Participants' responses in the interview phase described the ways in which the *Food for Thought* LCOM impacted their level of nutrition understanding and changed their perceptions of food.

The participants applauded the LCOMs ability to teach nutrition concepts through various perspectives. The Biology course was helpful in understanding the scientific underpinnings of nutrition concepts. Specifically, it helped explain how the body uses food, how food is made, and the impact of genetically modified foods. Environmental Science provided a social perspective of food and shed light on how food choices impact the environment. Environmental Science also examined the food industry and the issue of food globalization, unveiling some of the harsh realities of the food system. The English course provided an opportunity for students to conduct extensive research on food related topics and build logical arguments around them, thereby improving student communication of nutrition topics. The integrated topics among the courses allowed connections to be made, made the course content more interesting, and changed the way students view food.

The majority of college level nutrition courses are built on a health outcome based approach, focusing solely on improving the value placed on personal health. This study shows that an interdisciplinary nutrition education experience can provide a rich learning experience by examining food and health through a more social lens. Participants became more aware of how their daily food choices impact the environment, where food comes from, and the processes involved in the industrial food system. This study concludes that student understanding and

appreciation for the complexity of our food environment improved as a result of integrating related disciplines into the *Food for Thought* LCOM.

**Conclusion four.** This study found that the *Food for Thought* LCOM had unanticipated positive outcomes that varied from previously studied areas, such as learning. An unanticipated theme that arose from the interview data was that participants developed a greater sense of identity as a result of completing the LCOM.

The Nutrition, Biology, and Environmental Science courses taught food related concepts through three distinct perspectives; personal health, scientific, and social, respectively. These varying views allowed students to formulate their own opinions of food and food production methods and identify with a particular stance. Although the English course did not teach food related topics, it provided students an opportunity to research nutrition and environmental topics that were of interest to them. In doing so, students became more connected to the course content and were asked to build logical arguments supporting or opposing nutrition or environmental issues. Students developed opinions on these issues by combining their level of understanding, logic, and own personal values to create a stronger sense of personal identity.

Increasing personal health and social awareness, especially in a cohort learning environment, also created a group identity. As a cohort, students attended all of their classes together, collaborated on projects, socialized on breaks, and shared opinions and values on nutrition related topics. A group identity was formed which for some students provided a level of accountability. Participants in the interview phase described feeling obligated to make more healthful dietary choices because of the influence of other students. This is consistent with the literature on identify formation (Shirky, 2010). Internal pressure from the group may promote certain behavior changes (Robinson, 2010a). Additionally, the integration of social issues

developed some students' sense of citizenry. Students became more aware of the impact their personal dietary choices have on animal welfare and the environment. As a result students expressed a desire to lessen their carbon footprint felt compelled to share the knowledge learned with family, friends, and co-workers.

### **Limitations**

There are several limitations of this study. First, this study explored the impact of a very specific learning community that provided a unique nutrition education experience. Convenience sampling was used which resulted in a reduced sample size that ultimately limited the type of statistical analysis used. Additionally, using a convenience sample limits the generalization capability of the study's findings. Research conducted on interdisciplinary nutrition education not in an LCOM setting and not centered on the theme of environmental sustainability may produce different findings. Second, 25% ( $n = 15$ ) of the non-integrated students completed a college level Biology and/or Environmental Science course at some point in their undergraduate career. This could have influenced the ethical concern food choice motives responses since these students may have been exposed to social/ideological values making them more likely to value foods that promote sustainability and preserve animal/human rights. It is possible this was an intervening variable that would need to be controlled in future research studies. Third, students enrolled in the non-integrated sections participated in the survey phase but were not interviewed in the secondary phase. Therefore, the impact the LCOM had on dietary habits and identity formation may also be seen in students completing non-integrated nutrition courses. Lastly, in the interview phase LCOM participants were asked to retrospectively describe the motives behind their dietary choices prior to enrolling in the LCOM. This could have resulted in an inaccurate recall.

## **Recommendations for Further Research**

Most recommendations for future research are related to the longevity and sustainability of newly developed food choice motives and dietary changes. While this study has found that all students value foods that improve their personal health immediately following the completion a nutrition course, it does not examine the sustainability of health-based motives. College level nutrition courses may have a lasting effect and students may draw upon their knowledge during more nutritionally relevant times in their life. Most of the study's participants were between the age of 18 and 24, a time in which most chronic illness have not yet presented. Therefore, future research should consider a study design in which the longevity of health based motives are examined to discover whether or not a college based nutrition course impacts the dietary habits when they may have greater perceived level of importance.

Conceptually, the stealth intervention model should produce lasting behavior change since it influences personal values, thereby impacting the way individuals view food. However, there is little research examining the sustainability of behavior change when using this model in formal education. Therefore, future research should examine the lasting impact of ethical motives to gain more insight into the sustainability of ethical concern on dietary habits.

Another area for further research is interdisciplinary education and learning communities. Although interdisciplinary education has become more prominent in higher education, interdisciplinary nutrition education is not yet a common curricular approach. Therefore, future research should look for interdisciplinary nutrition education opportunities and examine the impact of them not only knowledge but also food choice motives and actual behavior change. The literature supports that identity formation is associated with sustained behavior change. Learning communities typically only last for an academic term which makes it difficult to study

the longevity of the effects. (Friedman & McAdam, 1992; Robinson, 2010a; Shirky, 2010; Snow, 2001). However future nutrition education research should explore further the role of curricular learning communities as a method to build intrinsic motivation and initiate behavior change, especially if the LCOM is centered on a social/ideological movement such as sustainability.

### **Recommendations for Practice**

A college level nutrition course may be the only formal nutrition education a person receives. Therefore, institutions of higher education and faculty should leverage the trends being seen in the nutrition field and in interdisciplinary nutrition education in an effort to provide the most impactful and meaningful nutrition education experience. Specifically, nutrition faculty should be open to the idea of collaboration across disciplines since the nutrition field is inherently interdisciplinary. Outside, but related, disciplines may include but are not limited to Biology, Environmental Science, English, Political Science, and Psychology. Providing various perspectives on nutrition education can help students identify with an area that matches their interest and resonates with them the most. Nutrition curriculum should not be limited to the typical health outcome based approaches. Rather, it should include areas that relate to current social movements that are meaningful and relevant to students and are consistent with healthy lifestyle choices. Nutrition courses could integrate other disciplines into a stand alone nutrition course however, providing education in the form of a curricular learning community may prove more beneficial. This study demonstrated that a cohort model provided support, accountability, and helped develop a collective identity, which may or may not have influenced food choices and dietary change.

**Closing**

In a time when obesity and chronic illness dominate the U.S. public health forum, research on nutrition education and food choice motives is important and necessary. It is encouraging that college nutrition courses can influence students to make decisions about what to eat based on the desire to improve health and prevent future disease. However, since initiating behavior change is both difficult and complex having additional methods that influence dietary choices can be powerful. It is promising that innovative approaches that integrate social issues can serve as a viable model to impact students' dietary decisions. Learning communities can act as the learning modality in which this model is used by promoting meaningful integrative coursework that connects students to the social world. Leveraging the interdisciplinary trends of the nutrition field and of higher education provides a unique opportunity to foster a rich learning experience and promote healthy dietary motives.

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APPENDIX A  
Informed Consent (LCOM)

“Examination of Food Choice Motives: The Influence of an Innovative, Interdisciplinary Learning Community Related to Environmental Sustainability”

Dear Student,

My name is Kelly Billingsley and I am a doctoral student in education at Pepperdine University, Graduate School of Education and Psychology. As a dietitian and professor of nutrition I am particularly interested in how a college nutrition course, as part of a learning community, impacts the reasons why individuals chose to eat the foods they do. I would like to invite you to participate in a two phase survey that will help me examine (a) your reasons for deciding what you eat and (b) the role the learning community (LCOM) had on shaping those reasons. **Completing the surveys is entirely voluntary. Should you chose to not participate, it will in no way affect your grade or standing in the class. Please note that you must be at least 18 years of age to participate.** Approval to ask you to participate has been approved by MSJC’s research committee and also by Pepperdine’s Human Subjects Committee. This research is in partial fulfillment of my doctoral degree.

The first phase involves a survey to be taken online and you will be provided with a direct link to the survey through your MSJC email account. The survey should take 5-10 minutes to complete and will include questions about the reasons why you choose to eat the foods you do. I will also ask for other information such as your age, gender, and ethnicity. You have the right to refuse answering any single question or discontinue the survey at any time. The survey link will be emailed to you today on Thursday, May 16th. I would appreciate if you complete the survey by Monday, May 20th. You may choose to only complete the first phase, if you would like. As a thank you for your time and input you will receive a catered free meal from Chipotle for completing the phase 1 survey. This will be catered during Dr. Mason’s class on Tuesday, May 21st.

The second phase also consists of an online survey, asking open-ended questions about your overall experience of being enrolled in the LCOM. To complete this survey you will have needed to complete the survey in phase 1 to become familiar with the terms used. A direct link will be emailed to your MSJC email account. It will take you approximately 20-30 minutes to complete. In the case that further clarification is needed, you may receive a follow up email providing you with another link to additional questions to elaborate or provide clarification. If a follow up is needed it will take an additional 10 minutes. The survey link will be emailed to you on Wednesday, May 22. I would appreciate if you complete the survey by Sunday, May 26th. Any necessary follow up surveys will be emailed on Monday, May 27th and will need to be completed by Thursday, May 30th. As a thank you for your time and input 20 extra credit points will be awarded to your gradebook. Should you choose to not participate, another extra assignment is available as an option.

The only foreseeable risks associated with participating in the study, include the time it will take and any possible emotions that may come up while reflecting upon your food choices. There are no right or wrong answers; I am just trying to understand your food choices.

To protect your privacy, your survey answers are entirely anonymous. You will never be asked to include your name on any documentation. Therefore, I will not be able to link your

identity to your survey responses. Additionally, no person other than myself will have access to the completed surveys. **Therefore, you can be certain that your responses will in no way impact your grade or standing in this class, or any of the other classes participating in the learning community. Additionally, your grade or standing will not be impacted by whether or not you choose to participate in the study. I will not know which students participate and which do not.** Because I won't know who is participating, I apologize in advance that everyone will receive a reminder electronically to participate or not.

When the results of the survey are reported they will be described as a whole and not individually. I am required to keep the anonymous survey results in a secure location for 5 years. After that time the information will be destroyed.

Please feel free to ask any questions about this study either before or during the process. If you have any questions, please contact Kelly Billingsley, Principal Investigator at [REDACTED] or [REDACTED]. If you have any additional questions you may contact my dissertation chairperson, Kay Davis, Ed.D., Pepperdine University, Graduate School of Education and Psychology, 6100 Center Drive, Los Angeles, CA 90045, [REDACTED]. If you have any questions regarding your rights as a participant please contact Doug Leigh, Ph.D., Chairperson of the Graduate and Professional Schools Institutional Review Board, Pepperdine University, Graduate School of Education and Psychology, 6100 Center Drive, Los Angeles, CA 90045, [REDACTED]. By completing the online surveys you are acknowledging that you have read and understand what your study participation entails and are consenting to participate in the study.

I hope you choose to participate in the study. Thank you for your time and consideration.

Sincerely,

Kelly Billingsley

Pepperdine University  
Graduate School of Education and Psychology  
6100 Center Drive  
Los Angeles, CA 90045

APPENDIX B  
Informed Consent (Non-integrated)

“Examination of Food Choice Motives: The Influence of an Innovative, Interdisciplinary Learning Community Related to Environmental Sustainability”

Dear Student,

My name is Kelly Billingsley and I am a doctoral student in education at Pepperdine University, Graduate School of Education and Psychology. As a dietitian and professor of nutrition I am particularly interested in how a college nutrition course impacts the reasons why individuals chose to eat the foods they do. I would like to invite you to participate in a survey that will help me examine your reasons for deciding what you eat. **Completing this survey is entirely voluntary. Should you chose to not participate, it will in no way affect your grade or standing in the class. Please note that you must be at least 18 years of age to participate.** Approval to ask you to participate has been approved by MSJC’s research committee and also by Pepperdine’s Human Subjects Committee. This research is in partial fulfillment of my doctoral degree.

The survey will be taken online and you will be provided with a direct link to the survey through your MSJC email account. The survey should take 5-10 minutes to complete and will include questions about the reasons why you chose to eat the foods you do. I will also ask for other information such as your age, gender, ethnicity, and other college classes you may have taken. You have the right to refuse answering any single question or discontinue the survey at any time. The survey link will be emailed to you today on May 20th. I would appreciate if you complete the survey by Wednesday, May 29<sup>th</sup> (the day before your final exam). As a thank you for your time and input you will receive a catered free meal from Chipotle on Thursday, May 30<sup>th</sup>, the day of your final exam. Please arrive to class by 5:45pm (15 minutes before your scheduled final) to receive your meal before the start of your exam.

The only foreseeable risks associated with completing the survey is the time it will take and any possible emotions that may come up while reflecting upon your food choices. There are no right or wrong answers; I am just trying to understand your food choices.

When the results of the survey are reported they will be described as a whole and not individually. To further protect your privacy, your survey answers are entirely anonymous. You will never be asked to include your name on any documentation. Therefore, I will not be able to link your identity to your survey responses. Additionally, no person other than myself will have access to the completed surveys. **Therefore, you can be certain that your responses will in no way impact your standing or grade in the class. Additionally, your grade or standing will not be impacted by whether or not you choose to participate in the study. I will not know which students participate and which do not.** Because I won’t know who is participating, I apologize in advance that everyone will receive a reminder electronically to participate or not. I am required to keep the anonymous survey data in a secure location for 5 years. After that time the information will be destroyed.

Please feel free to ask any questions about this study either before or during the process. If you have any questions, please contact Kelly Billingsley, Principal Investigator at [REDACTED] or [REDACTED]. If you have any additional questions you may contact my dissertation chairperson, Kay Davis, Ed.D., Pepperdine University, Graduate School of

Education and Psychology, 6100 Center Drive, Los Angeles, CA 90045, [REDACTED]. If you have any questions regarding your rights as a participant please contact Doug Leigh, Ph.D, Chairperson of the Graduate and Professional Schools Institutional Review Board, Pepperdine University, Graduate School of Education and Psychology, 6100 Center Drive, Los Angeles, CA 90045, [REDACTED]. By completing the online survey you are acknowledging that you have read and understand what your study participation entails and are consenting to participate in the study.

I hope you choose to participate in the study. Thank you for your time and consideration.

Sincerely,

Kelly Billingsley

Pepperdine University  
Graduate School of Education and Psychology  
6100 Center Drive  
Los Angeles, CA 90045

APPENDIX C  
Permission to Use Food Choice Motive Questionnaire

-----Original Message-----  
From: Billingsley, Kelly (student) [REDACTED]  
Sent: 18 February 2013 22:35  
To: Steptoe, Andrew  
Subject: Permission to use Food Choice Questionnaire

Hello Professor Steptoe,

My name is Kelly Billingsley and I am a doctoral student at Pepperdine University in the United States. I am writing to request your permission to use the Food Choice Questionnaire you developed with Tessa Pollard and Jane Wardle, published in 1995 in *Appetite*, in my dissertation research.

The purpose of my dissertation research is to examine the influence an innovative learning community focused on societal level issues related to environmental sustainability has on students' motives for dietary choices. The first phase of the study is designed to compare the influence of social/ideological values to individual level determinants on food choice motives. This will be accomplished by quantitatively measuring the self-reported motives of students enrolled in an environmental sustainability themed learning community and those enrolled in a non-integrated nutrition course. The Food Choice Questionnaire you developed will help me accomplish this. Since my research is focusing on the role social/ideological values play in food choice motives I would like to add the Ethical Food Choice Motives supplement, developed by Marjaana Lindeman and published in *Appetite* in 2000, to the Food Choice Questionnaire.

Please let me know if I have your permission to use the Food Choice Questionnaire and/or have any questions regarding how I intend to use it in my research. I very much appreciate your time and consideration.

Kelly J. Billingsley, RD  
Pepperdine University  
Graduate School of Education & Psychology [REDACTED]

Sent: Tuesday, February 19, 2013 12:38 AM  
To: Billingsley, Kelly (student)  
Attachments: [\[Word\]](#) Food choice questionnaire.doc (100 KB) (Open as Web Page)

Dear Kelly

That will be fine. I attach a copy of the questionnaire, and you can certainly adapt it in ways that would suit your work.

Yours

Andrew Steptoe

---

Professor Andrew Steptoe, MA, DPhil, DSc, FMedSci  
Director, Institute of Epidemiology and Health Care  
University College London  
British Heart Foundation Professor of Psychology  
Department of Epidemiology and Public Health  
1-19 Torrington Place  
London WC1E 6BT  
[REDACTED]

APPENDIX D  
Permission to Use Ethical Food Choice Motives Supplement



**Ethical Food Choice Motives**

PsycTESTS Citation:

Lindeman, M., & Väänänen, M. (2000). Ethical Food Choice Motives [Database record]. Retrieved from PsycTESTS. doi: 10.1037/t12597-000

Test Shown: Full

Test Format:

Respondents are asked to indicate whether they agree with the statements which all begin in the following way: "It is important to me that the food I eat on a typical day..." (1 =Not at all important, 4 = Very important).

Source:

Supplied by author.

Original Publication:

Lindeman, Marjaana, & Väänänen, M. (2000). Measurement of ethical food choice motives. *Appetite*, Vol 34(1), 55-59. doi: 10.1006/appe.1999.0293

Permissions:

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APPENDIX E  
Food Choice Motives Survey

Thank you for choosing to participate in the survey. The first section of the survey will ask you demographic information and about other courses you may have taken.

What is your age?

- 18-24 years old  
 25-34 years old  
 35-44 years old  
 45-54 years old  
 55-64 years old  
 65-74 years old  
 75 years or older

Please specify your gender:

- Male  
 Female

Please specify your ethnicity:

- White  
 Hispanic or Latino  
 Black or African American  
 Native American or American Indian  
 Asian / Pacific Islander  
 Other

Please indicate which of the following courses you have completed (either at MSJC or another college).

- General Biology  
 Environmental Science  
 I have not taken any General Biology or Environmental Science courses

The next section of the survey will ask you about why you choose to eat the foods you do.

Every person has different reasons for choosing to eat the foods they do. Now that you have completed a nutrition course, I am interested in finding out what factors influence *your choice of food*, as a result of taking this class. Listed below are a series of factors that may be relevant to your choice of foods. Read each item carefully and decide how important the item is to you. Select the box that best reflects your feelings. Remember, there are no right or wrong answers – I am interested in *what is important to you*.

<i>It is important to me that the food I eat on a typical day:</i>	<i>Not important at all</i>	<i>A little important</i>	<i>Moderately important</i>	<i>Very important</i>
--	-----------------------------	---------------------------	-----------------------------	-----------------------

<i>It is important to me that the food I eat on a typical day:</i>		<i>Not important at all</i>	<i>A little important</i>	<i>Moderately important</i>	<i>Very important</i>
1	is easy to prepare				
2	contains no additives				
3	is low in calories				
4	tastes good				
5	has been prepared in an environmentally friendly way				
6	contains natural ingredients				
7	is not expensive				
8	is low in fat				
9	has been produced in a way that animals have not experienced pain				
10	is familiar to me				
11	is high in fiber				
12	is nutritious				
13	is easily available in stores and supermarkets				
14	is good value for money				
15	cheers me up				
16	has been produced in a way which has not shaken the balance of nature				
17	smells nice				
18	can be cooked very simply				
19	helps me cope with stress				
20	helps me control my weight				
21	has a pleasant texture				
22	has been produced in a way that animals' rights have been respected				
23	is packaged in an environmentally friendly way				
24	comes from a country I approve of politically				
25	is like the food I ate when I was a child				
26	contains lots of vitamins and minerals				
27	contains no artificial ingredients				
28	comes from a country in which human rights are				

<i>It is important to me that the food I eat on a typical day:</i>		<i>Not important at all</i>	<i>A little important</i>	<i>Moderately important</i>	<i>Very important</i>
	not violated				
29	keeps me awake and alert				
30	looks nice				
31	helps me relax				
32	is in harmony with my religious views				
33	is high in protein				
34	takes no time to prepare				
35	has been prepared in a way that does not conflict with my political values				
36	keeps me healthy				
37	is good for my skin/teeth/hair/nails etc				
38	makes me feel good				
39	has the country of origin clearly marked				
40	is what I usually eat				
41	helps me to cope with life				
42	is not forbidden in my religion				
43	can be bought in stores close to where I live or work				
44	is cheap				

Thank you for your time and honesty. Your catered lunch will be provided for you in class on the designated date.

## APPENDIX F

### Web-Based Interview Questions

Thank you for choosing to participate in this web-based interview. You may choose to skip a question or end the interview at any time. These interview questions will take approximately 15-20 minutes to complete. Please answer them honestly. Your answers are completely anonymous and will in no way impact your grade or standing in any of the LCOM courses. These questions were designed to gain insight into your experiences of being enrolled in the learning community (LCOM). These questions have been separated into 3 distinct categories: overall experience, experience with nutrition education, and the possible impact of the LCOM on your motives to eat the foods you do.

#### **Overall Experience**

Question: *Describe your overall experience of being a student enrolled in this LCOM.*

#### **Nutrition Education Experience**

Question: *Do you feel that your LCOM experiences have in any way, positively or negatively, impacted your understanding of nutrition? Please explain.*

Question: *Do you feel the Biology, Environmental Science, and/or English courses have in any way assisted in your understanding of nutrition? Please explain.*

Question: *Do you feel that your LCOM experiences have in any way, positively or negatively, impacted your feelings about nutrition and foods? Please explain.*

#### **LCOM and Food Motives**

Question: *Before enrolling in the LCOM, how you would describe the motives behind selecting the food you ate?*

Question: *Do you feel any of these motives have changed as being a part of the LCOM? If so, how? If not, why not?*

Question: *Specifically, what aspects of the LCOM had the greatest impact on your reasons for choosing certain foods? If you did not experience a change in the reasons you eat certain foods, why do you think that is?*

At this time, this concludes the interview. Upon reviewing your comments there may be a need to request further clarification. If this is the case, you will be emailed another link with only a few follow up questions. These questions won't take longer than 5-10 minutes to complete and will be emailed to you.

Thank you very much for your time and honesty.

APPENDIX G  
GPS IRB Approval Notice

# PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

May 16, 2013

Kelly Billingsley

**Protocol #:** P0413D04

**Project Title:** Examination of Food Choice Motives: The Influences of an Innovative, Interdisciplinary Learning Community Related to Environmental Sustainability

Dear Ms. Billingsley,

Thank you for submitting your application, Examination of Food Choice Motives: The Influences of an Innovative, *Interdisciplinary Learning Community Related to Environmental Sustainability*, for exempt review to Pepperdine University's Graduate and Professional Schools Institutional Review Board (GPS IRB). The IRB appreciates the work you and your faculty advisor, Kay Davis, have done on the proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations (45 CFR 46 - <http://www.nihtraining.com/ohsrsite/guidelines/45cfr46.html>) that govern the protections of human subjects. Specifically, section 45 CFR 46.101(b)(2) states:

(b) Unless otherwise required by Department or Agency heads, research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from this policy:

**Category (2) of 45 CFR 46.101**, research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: a) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

In addition, your application to waive documentation of consent, as indicated in your **Application for Waiver or Alteration of Informed Consent Procedures** form has been **approved**.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit a **Request for Modification Form** to the GPS IRB. Because your study falls under exemption, there is no requirement for continuing IRB review of your project. Please be aware that changes to your protocol may prevent the research from qualifying for exemption from 45 CFR 46.101 and require submission of a new IRB application or other materials to the GPS IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the GPS IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the GPS IRB and the appropriate form to be used to report this information can be found in the

*Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual*  
(see link to "policy material" at <http://www.pepperdine.edu/irb/graduate/>).

Please refer to the protocol number denoted above in all further communication or correspondence related to this approval. Should you have additional questions, please contact me. On behalf of the GPS IRB, I wish you success in this scholarly pursuit.

Sincerely,



Doug Leigh, Ph.D.  
Chair, Graduate and Professional Schools IRB  
Pepperdine University  
Graduate School of Education & Psychology  
6100 Center Dr. 5th Floor  
Los Angeles, CA 90045

[Redacted contact information]

cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives  
Ms. Alexandra Roosa, Director Research and Sponsored Programs  
Dr. Kay Davis, Graduate School of Education and Psychology

## APPENDIX H

### XYZ College Approval Notice

Pepperdine University,

4.12.13

The following is to acknowledge that the IR Committee on 4.11.13 reviewed and approved Ms. Kelly Billingsley's human research project, "Examination of Food Choice Motives: The Influence of an Innovative, Interdisciplinary Learning Community Related to Environmental Sustainability".

On 4.2.13, Kelly submitted the appropriate document, "Outside Classroom-Research Form", to the MSJC Office of Institutional Effectiveness' Research & Planning Department. Her research will be conducted among students during spring 2013. The research subjects will consist of three sections of Nutrition 101 students, one section from each of three campuses (sections 3550, 5063 and 1261).

There are two phases of the study. The first phase uses a survey to compare the influence of social/ideological values to individual level determinants, such as health concern, on food choice motives. The second phase employs a web-based interview process to explore the experiences of students enrolled in the learning community as they relate to their food choice motives

By signing this document Ms. Billingsley has agreed to:

- (1) Supervise all research in accordance with the policies established by Research Committee and
- (2) Follow the ethical guidelines established by AIR, APA, and AERA, as well as all policies and regulations related to confidentiality of records and information.

If you hve any questions please do not hesitate to contact me by phone or email.

APPENDIX I  
Topic Codes and Operational Definitions

Topic	Operational Definition
Accountability	Feeling compelled to make certain choices
Better understanding of food/health	Improved self perception of nutrition knowledge
Biology helped understanding	Aspects of the Biology course that improved understanding of nutrition related topics
Changed for social/ethical reasons	Dietary habits influenced by social movements and personally held morals
Communicate nutrition concepts	Ability to verbalize or communicate nutrition concepts in writing
Comraderie with peers	Interaction/relations with peers
Citizenship/social responsibility	Feeling compelled to share information and/or make better choices to improve environmental health, human and/or animal rights
Physically feel/look better	Dietary choices made to improve energy and/or physical appearance
Desire to reduce illness/disease	Dietary choices made to prevent future disease
Ecological Footprint Assignment	An assignment given in the Environmental Science course that provided the opportunity for students to evaluate their own carbon footprint
English helped understanding	Aspects of the English course that improved understanding of nutrition related topics
Environmental effects of food choices	The effects of food choices on environmental health such as global warming, contamination, sustainability, etc.
Faculty worked together	Faculty provided various perspectives and Integrated the course content
Food Inc documentary	Documentary that unveiled truths about the industrial food system
Food industry/globalization	Industry connections to food and global issues
Food processing and conditions	How food is made, how animals are processed, and the conditions in which they occur under
Forks Over Knives documentary	Documentary featuring the health benefits of a plant base diet
GMOs	Genetically modified organisms
Helped match student interest	Aspects of the LCOM that best suited individuals
Holistic view of food	A macro level view of food and nutrition



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Individual level	Personal preferences, demographics, and/or food related knowledge that impacts what a person chooses to eat
Industry control of food	Concern or frustration expressed for industry ties to food
Interdisciplinary nutrition education Knowledge	Nutrition education integrating An individual level food choice determinant
Logical/moral arguments	The logic used by the instructors and course content that helped build credibility
Macro level	Cultural norms, agricultural policies, food marketing, and social movements that may impact what a person chooses to eat
Multiple perspectives	Various views of food/health/nutrition Offered by the four courses involved in the LCOM
Personal health	Factors associated with individual health such as weight, disease prevention, nutrient content of food, etc.
Physical level	The location, convenience, accessibility, and/or cost of food that impacts what a person chooses to eat
Price	A physical level food choice determinant
Repetition of content	Course content that was discussed in more than one of the courses involved in the LCOM
Social level	Relationships with family, friends, co-workers, peers, that provide accountability for food choices, a sense of familiarity, or a feeling of pressure/guilt to eat a certain way
Support from peers	Relationships with classmates that provided support in understanding nutrition concepts
Taste/appetite/desire	An individual level determinant
Treatment of animals	The conditions in which animals are raised and how they are treated during slaughter

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