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**Eating Behaviors and Body Composition among College Freshmen:
The Effect of Dietary and Commensal Culture on Biological Outcomes**

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2012

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A Thesis Submitted in Candidacy for Honors at Graduation from Lawrence University

Introduction

The study of food is a study of people and the ways in which they live. Because of the complex role of diet in people's lives, studying eating and other food-related behaviors can provide insight into how humans function as biological organisms within cultural environments, and can provide insight into the relationship between their cultural contexts and their health. The collaborations of anthropologists, psychologists, and biologists have increased the scope of insight that can be gained from the study of individuals' eating behaviors, and such research points to the need for more cross-disciplinary work on the biological and cultural aspects of behaviors relating to food (Hubert, 2004; Bisogni et al., 2002; Messer, 1984; Messer, 2004).

In the United States, attending college represents a relatively common cultural transition that may affect individuals' eating behaviors. With this transition, most first-year students are given relatively high amounts of control over their eating behaviors for the first time in their lives. Students' behaviors related to food during this period will be susceptible to change and influenced by both their past and present cultural environments. Importantly, as eating inherently fulfills a biological as well as a cultural role, the changes that first-year college students make in their behaviors related to food will necessarily have an impact on their physical conditions.

The physical changes that students experience during or as a result of their transition to college related to their eating behaviors and body composition may contribute to the existing population-wide problem in the United States of adults carrying excess weight. As of 2010, about 64 percent of the adults in the United States' were overweight or obese, a proportion of the population that has been increasing steadily for the past three decades (Center for Disease Control and Prevention, 2011a; Wang & Beydoun, 2007). The medical care costs of the health conditions associated with being overweight or obese are immense, totaling \$113.9 billion in

2008 in the United States, and amounting to approximately 5 to 10 percent of the country's healthcare spending (Tsai et al., 2011). Per person in 2008, the direct medical cost of overweight totaled \$266, and \$1,723 for obesity (Tsai et al., 2011).

The Lifespan Approach

Within the discipline of human biology, a lifespan approach is employed by researchers in order to assess how events or changes that individuals experience at particular points during their lives affect their vulnerability to health conditions in the future (Little, 2010). Based in evolutionary and life history theory, this approach examines the long term impacts of the adaptations that allow individuals to allocate their limited resources toward vital processes such as growth, maintenance, reproduction, rearing of offspring, and survival (Bogin, 2010; Stearns, 1992). Because an organism's energy and time are limited, the ways in which it allocates its resources over the course of its life is often understood as reflecting a series of trade-offs between functions like growth and reproduction or immune function (Bogin, 2010). The central theory behind this approach is that no period in an individual's life can be understood as separate from the events preceding it or from its consequences (Riley, 1979). This perspective stems from the work of anthropologist Franz Boas, who used longitudinal studies to demonstrate the significance of environmental influences experienced during early development in determining physical measurements such as height and cranial size later in life (Little, 2010; Boas, 1912). With a lifespan approach, it is possible to gain a more complete picture of the biological significance of students' experiences during their first year of college by demonstrating how these may influence their health in the future.

Physical Changes During Students' First Year of College

In popular culture, first-year college students are generally thought to experience physical changes that are associated with their weight and body composition. According to modern-day folklore, the beginning of college corresponds with the infamous “Freshman 15,” a phrase that refers to the mythical fifteen pounds of unwanted weight that first-year students gain. The first mention of freshman-year weight gain in academic literature was in the journal *Addictive Behaviors* in 1985, though the actual “Freshman 15” phrase was first printed in the popular *Seventeen* magazine in 1989 (Hovell et al., 1985; Brown, 2008; Zagorksy & Smith, 2011; Watkins, 1989). Printed magazines, newspapers, and web-based materials have continued to discuss this supposed phenomenon, and the amount of material on the “Freshman 15” in the United States has surged since the late 1990’s (Brown, 2008). The continued discussion within the printed literature about the possibility of the “Freshman 15” demonstrates that it has remained as a persistent cultural myth since its inception.

Perhaps in part because of its ubiquity in popular culture, researchers have attempted to investigate whether weight change during the first year of college is a reality for most students. However, the number of peer-reviewed papers on this theoretical phenomenon is still relatively low in comparison to the prevalence of popular-press articles on the “Freshman 15” (Brown, 2008). Reviews of the academic literature on the physical changes in first-year college students have determined that the average amount of weight gained is much less than 15 pounds (Zagorsky & Smith, 2011; Crombie et al., 2009; Vella-Zarb & Elgar, 2009). These reviews examined longitudinal studies that measured first-year students’ weight (as well as other aspects of their physical condition) over the course of their first or first and second semesters in college. A recent review (Zagorsky & Smith, 2011) of 19 articles on freshman weight change that have

been published since 1985 reported that the average amount of weight that students gain over their first two semesters is about 1.3 to 1.6 kilograms (2.5 to 3.5 pounds). Additionally, only about 10 percent of first-year college students gained fifteen pounds or more, while about 25 percent lost weight. An earlier review (Crombie et al., 2009) included data from 17 studies conducted between 1985 and 2008, and reported that the average change among students who gained weight ranged from 3.1 to 3.4 kilograms (6.8 to 7.5 pounds). This review also demonstrated that the various studies reported that the average amount of weight change experienced by first-year students, including those who lost weight, ranged from 0.7 to 3.1 kilograms (1.5 to 6.8 pounds) (Crombie et al., 2009). While these articles demonstrate that the “Freshman 15” is likely a myth, they also indicate that first-year college students may experience a noteworthy change in their weight during their first year of college.

Some studies of first-year students’ physical conditions have employed multiple biological indicators (Crombie et al., 2009). Such work has often included various measurements of body composition and physical activity to determine whether and why first-year college students experience changes in their lean or fat mass. Unfortunately, there is not a clear consensus on the nature of changes that college students experience over the course of their first year of college (Crombie et al., 2009; Vella-Zarb et al., 2009). Some studies have shown that first-year students on average experience increases in weight and fat mass with decreases in lean mass, while others have shown that the average first-year student demonstrates increases in both lean and fat mass corresponding with weight-gain (Crombie et al., 2009). Those students who lost weight often also had significant decreases in their fat mass (Crombie et al., 2009). A decrease in physical activity from the beginning to the end of students’ first year of college is strongly associated with weight gain (Vella-Zarb & Elgar, 2009; Vella-Zarb & Elgar, 2010;

Crombie et al., 2009). Additionally, a downward trend in physical activity appears to generally take place from late adolescence to early adulthood, which may affect weight over the course of this period (Crombie et al., 2009). Initial BMI appeared to be a relatively reliable indicator of whether a student would gain weight, as students with higher BMI at the start of their first year of college gained significantly more weight than those with lower BMI (Crombie et al., 2009).

Physical Changes and the Risk of Obesity and Related Conditions

Individuals' physical status at particular points in their lives may indicate whether they are likely to be overweight or obese in the future. Gordon-Larsen, Adair, Nelson, and Popkin (2004) demonstrated through longitudinal research that conditions of overweight (defined as having a BMI between 25 and 29.9) and obesity (BMI of 30.0 or higher) frequently persist from childhood and adolescence into adulthood, as less than 2 percent of obese adolescents became non-obese by the time they were young adults. Furthermore, BMI during childhood and adolescence are highly predictive of individuals' risk of these conditions as adults, suggesting also that "critical periods" exist within the life course that contribute to the development of overweight and obesity during adulthood (Guo et al., 2004).

The transition to college appears to often correspond with a time in individuals' life course when weight gain is typical. Though there is diversity in the ages of first-year college students, the majority of these students is within a relatively small age range and may be at a similar point in their development. While over 40 percent of college attendees do not start college when they are 18 years old (Zagorsky & Smith, 2011), the United States Department of Education reported in 2010 that about 79 percent of students enrolled in undergraduate schools in the fall of 2009 were less than 25 years old (Aud et al., 2011). Nelson et al. (2008) contend that

individuals experience an important period in development between the ages of 18 to 25 during “emerging adulthood,” and their experiences during this time may put them at risk of gaining weight regardless of whether they attend college.

Additional research has demonstrated that the time in an individual’s life when he or she traditionally starts to attend college often correlates with changes in body composition. The National Longitudinal Study of Adolescent Health, which included data on 9,795 adolescents and young adults in the U.S., determined that the greatest increase in the prevalence of overweight and obesity occurs when individuals are between the ages 18 and 29 (Gordon-Larsen et al., 2004). These data (Gordon-Larsen et al., 2004) also demonstrated that 12.7 percent of the participants were not obese when measured between the ages of 13-20 years old, but became obese by the time they were measured five years later, while 9.4 percent of the people in the sample were obese when measured both at the beginning and the end of the five-year period. These percentages translate to about 1.6 million adolescents reaching obesity by the time they were 18 years old, and three million individuals either staying or becoming obese during the transition to adulthood (Gordon-Larsen et al., 2004).

If these changes are associated with the stage in individuals’ life course they are at when they start college, and not due to the college environment itself, first-year undergraduate students and same-aged individuals not in college would experience similar physical changes. To investigate the influence of the college setting on weight-gain, researchers compared the physical conditions of individuals of the same age who did and did not attend college, and determined that the average person who attends college gains an extra half a pound during their first year (Zagorsky & Smith, 2011). However, this research also demonstrates that the weight gained during students’ first year of college is not what puts them at an elevated risk of obesity

(Zagorsky & Smith, 2011). Rather, it is the steady, moderate weight-gain that these college attendees experience throughout early adulthood that contributes to their risk. Over the course of their college careers, the average female student generally gains about 4.1 kilograms (9 pounds) and the average male gains about 6.1 kilograms (13.5 pounds) (Zagorsky & Smith, 2011). These results suggest that students' first year of college represents a transitional period that can have a significant effect on students' physical condition in the long term, though the immediate changes in weight it produces seem to be minor.

The correlations between carrying excess weight, especially fat tissue, during adulthood and numerous health conditions are well established. Excess body weight is associated with increased morbidity and mortality, and an unhealthy diet may lead to obesity and increased risk of related chronic health conditions, including heart disease, stroke, some cancers, Type 2 diabetes, osteoarthritis, and disability (Briefel & Johnson, 2004; National Heart, Lung, and Blood Institute and the National Institute of Diabetes and Digestive and Kidney Diseases, 1998; National Task Force on the Prevention and Treatment of Obesity, 2000). Furthermore, if these conditions arise early in life, individuals may be at greater risk for the associated health problems, as the relative risk of high blood pressure, high cholesterol levels, and diabetes is greater in overweight adults aged 20 to 45 years than in older overweight adults (Van Itallie, 1985). Being overweight or obese may also be associated with mental health conditions. A recently published longitudinal study (Pickering et al., 2011) using a nationally representative sample of 34,653 U.S. adults indicated that overweight and obese women were at an increased risk for incident major depressive disorder. Additionally, according to a longitudinal study of a Spanish cohort of 11,825 participants, childhood and young adult overweight or obesity was associated with elevated risk of adult depression (Sánchez-Villegas et al., 2010).

A Biocultural Food Choice Process Model

Often, studies of the factors influencing the development of eating behaviors during students' first year of college have been in the context of eating disorders and have focused on psychosocial determinants of change (LaCaille et al., 2011). A biocultural approach, that seeks to bridge the gap between a cultural focus and a strictly biological one, has the potential to create a comprehensive understanding of individuals' eating behaviors (Messer, 2004; Messer, 1984).

The Food Choice Process Model is one framework designed to characterize how the diverse factors and processes involved in people's eating behaviors interact (Sobal & Bisogni, 2009; Bisogni et al., 2002; Bisogni, 2003). Research based on this model has demonstrated that people develop personal food systems that guide their behavioral strategies for eating in different contexts as they actively experience, interpret, and consider the world in personal ways (Connors et al., 2001; Bisogni et al., 2002; Bisogni, 2003; Furst et al., 1996). These personal food systems are affected by a broad range of factors that may influence individuals' food-related decisions over their life course, including their cultural ideals, personal factors, resources, social factors, and present contexts (Sobal & Bisogni, 2009; Bisogni et al., 2002; Furst et al., 1996). Research guided by this perspective affirms the significance of individual eating behaviors over group trends, so that each person's food choices can be understood individually. The Food Choice Process Model is based on the constructionist perspective, meaning that it focuses on individuals' subjective thoughts and experiences (Berger & Luckmann, 1967; Charmaz, 2000; Furst et al., 1996). By separately considering each person's subjective account of how they behave and make decisions, researchers using The Food Choice Process Model reduce the danger of projecting predetermined expectations onto individuals (Bisogni et al., 2002; Sobal & Bisogni, 2009).

Research Question

The relationship between college students' eating behaviors and their physical outcomes presents a unique focus of study, as these individuals are independently developing eating behaviors while experiencing a cultural transition that will likely have direct and indirect effects on their short and long term health. Analysis of students' reported food-related behaviors, as well as their opinions about these behaviors, demonstrates how eating habits influence and are influenced by experiences during the first year of college. Additionally, assessments of physical changes during this transition provide insight into how cultural experiences manifest biologically. It is the goal of this study to develop a framework that may be expanded by future researchers employing a lifespan approach to examine the relationship between individuals' food-related behaviors and their health outcomes across the life course.

Methods

Participants and Data Collection

Participants were college students who were beginning their first year at Lawrence University during the fall of 2011, and who were at least eighteen years of age. These students were recruited at the first meeting of their "Freshman Studies" classes, a course that all incoming students are required to take during their first and second terms on campus. I recruited students from four of the twenty-six total Freshman Studies sections. About fifteen students were enrolled in each section, and these classes contained a representative sample of the first-year student population. The self-selected participant population was made up of twenty-one students who expressed interest in being involved with the study and who maintained involvement over the course of the ten-week term. Participation was limited to students not currently diagnosed with

diabetes, bulimia, anorexia, or any other eating disorder, multiple severe food allergies, or any other condition that would result in management of the student's diet with the assistance of a health care professional such as a physician or a nutritionist.

Data collection took place during the fall of 2011. I met with each of the twenty-one participants three times over the course of the first ten-week term of the 2011-2012 academic year at Lawrence University. Each student's second and third meeting with me took place about three weeks after his or her previous meeting [see Appendix 1 for sample schedule].

Anthropometric Assessment

I conducted anthropometric measurements of each participant's weight, height, and body density at each of the three meetings conducted during the fall term. These anthropometric measurements were chosen because they are minimally invasive ways of assessing body composition and are relatively reliable from day to day (Willett, 1998; Lohman et al., 1988). Weight was measured using a standard bathroom scale, and a portable stadiometer manufactured by Invicta Plastics Limited was used to measure height. BMI was calculated for each meeting using the equation: $BMI = \text{mass (kg)} / \text{height}^2 \text{ (m)}$ (Garrow & Webster, 1985).

Skin fold thickness was measured on the thigh, suprailium, and triceps on women, and on the thigh, abdomen, and chest on men with the Harpenden Skinfold Caliper. At each meeting, I measured the thickness at each location three times following the protocol described by Lohman et al. (1988) and averaged these three measurements. I then used these averages and the equations of Jackson and Pollock (1985) to estimate participants' body density. Body fat was calculated from body density according to Siri (1961).

I used the Student's Paired t -test at the 95% confidence interval ($p \leq 0.05$) to determine whether participants experienced significant changes in their anthropometric measurements over the course of the term. Statistical analyses were carried out using Microsoft Excel 2008 for Mac, Version 12.2.3.

Food Behavior Interviews

At each meeting, I asked participants to report their food-related behaviors over the course of the previous day through a 24-hour behavioral recall. For example, if I spoke with a student on a Tuesday, I asked him or her to describe all of the behaviors that he or she carried out on Monday that were related to food and eating. Once the participants concluded these descriptions, I asked follow-up questions designed to probe for the underlying motivations for particular behaviors, including decisions to forego eating or to eat certain foods. To ensure that students did not know the exact dates of our meetings and alter their eating behaviors accordingly, I would contact students in the morning to set up appointments that would take place in the evening of the same day.

Students were interviewed only about their food-related behaviors that took place on Monday-Thursday, meaning that meetings took place on Tuesday-Friday. To help ensure that the day of the week the student was interviewed about was less likely to have an effect on the data, I refrained from carrying out 24-hour recall interviews with students regarding their actions on Fridays, Saturdays, and Sundays, as students are likely to have different behaviors on the weekend and during the week.

In order to gain an understanding of students' ideas about the reasons they behave in certain ways and experience certain biological outcomes, I conducted semi-structured interviews

with participants at the first and third meetings (Bernard, 2006). During these interviews, I asked participants general questions about the aspects of their surroundings that they thought strongly influenced their behaviors related to food, and whether they were satisfied with the behaviors that they had developed. I also asked participants whether they had seen or felt any physical changes over the course of the term and if they paid attention to food's physical effects on their bodies [see Appendix 2 for sample questions].

The qualitative data analysis methods for the present study were informed by the interview pilot study I conducted during the summer of 2011. During that study, I asked participants open-ended questions designed to prompt them to describe personally relevant details about habits, opinions, and factors that influence and were influenced by their eating behaviors. To analyze participants' responses, I used the "constant comparative" method to distinguish themes in the data (Straus & Corbin, 1998; Jastran et al., 2009). Based on the grounded-theory approach to qualitative analysis, the constant comparative method is used to identify consistencies and variation within participants' responses (Bernard, 2006; Ryan & Bernard 2003). By examining participants' descriptions of their feelings and behaviors, this method allows researchers to identify participants' habitual and unconscious food habits, as well as participants' more consciously considered ideas and decisions relating to food, both of which characterize their eating behaviors (Bisogni, 2003). During the pilot study, I determined that this method, which had also been employed by researchers who examined the eating habits of dissimilar populations (e.g. Falk et al., 1996; Devine et al., 1998; Bisogni et al. 2002), could be appropriately applied to the interview data from the Lawrence University student population.

I analyzed participants' descriptions of their behaviors at each meeting in relation to their responses at the other two meetings in order to identify consistent characteristics of the behaviors

that they developed over the course of the term (Straus & Corbin, 1998). Once they were categorized, I characterized the demonstrated goals associated with participants' eating behaviors based on the stated or implicit motivations that were conveyed through the descriptions of their behaviors. In order to relate the interview data to the anthropometric data, I paid special attention to the results when people expressed goals related to specific physical outcomes and whether these conflicted with other food-related goals they may have had. Additionally, I was particularly interested in whether consistent prominent features of participants' eating behaviors correlated with particular physical outcomes.

Results

Anthropometric Status

Twenty-one first-year students participated in this study during their first term on campus. This group of students consisted of nine men and twelve women, all ages eighteen and nineteen years old. The population of students involved in this study was not representative of the population of first-year Lawrence University students as a whole due to the small size of the sample and a sampling bias. Participants in this study were self-selected, meaning that they may share traits that made them more likely to choose to be involved in this study and that differentiate them from their peers. Anthropometric measurements of the study population are presented in Table 1.

During their first term on campus, the average body fat percentage of the men involved in this study was on the low end of the healthy range (defined as between 8%-19%), while their average BMI classified the group as overweight (defined as a BMI between 25 and 29.9) (See Figure 1) (Gallagher et al., 2000; Garrow & Webster, 1985; Center for Disease Control and

Prevention, 2011b; World Health Organization, 1995). These data suggest that the male participants as a group were relatively heavy but generally lean. The characteristics of the group as a whole may have been affected by the inclusion of three male in-season varsity football players. Based on their BMI, two of these football players were overweight and one was obese. However, each of these athletes had body fat percentages within the healthy range for their ages, and the average body fat percentage of these three participants was slightly lower than the whole group's average throughout the term.

Table 1: Anthropometric measurements of male and female first-year Lawrence University students at three meetings during the ten-week first term of classes in the fall of 2011-2012 school year ($n = 21$).

Anthropometric measurements		First Meeting		Second Meeting		Third Meeting	
		Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Weight (kg)	M	80.9	19.9	82.0*	20.6	81.6	20.2
	F	65.6	11.0	66.3*	11.3	66.4	11.8
BMI	M	26.6	4.8	26.9*	4.9	26.8	4.7
	F	24.4	3.9	24.6*	3.9	24.6	4.0
Body Fat (%)	M	12.5	5.1	12.2	5.1	11.8	5.4
	F	26.7	8.3	26.8	7.7	26.7	8.0
Height (cm)	M	68.2	3.8	68.3	3.8	68.3	3.9
	F	64.6	4.0	64.6	3.9	64.7	4.0

* Significantly different from anthropometric measurement at first meeting ($p \leq 0.05$)

Abbreviations: M: males; F: females; St. Dev.: standard deviation.

The body fat percentages and BMI of the women were within the healthy range for their sex and age group (defined as between 21-33% and 18.5 – 24.9, respectively) (See Figure 1) (Gallagher et al., 2000; Garrow & Webster, 1985; Center for Disease Control and Prevention, 2011a; World Health Organization, 1995). Three of the women were in-season varsity athletes, including two tennis players and a soccer player. Two of these athletes had body fat percentages below or on the low end of the healthy range during their first term on campus.

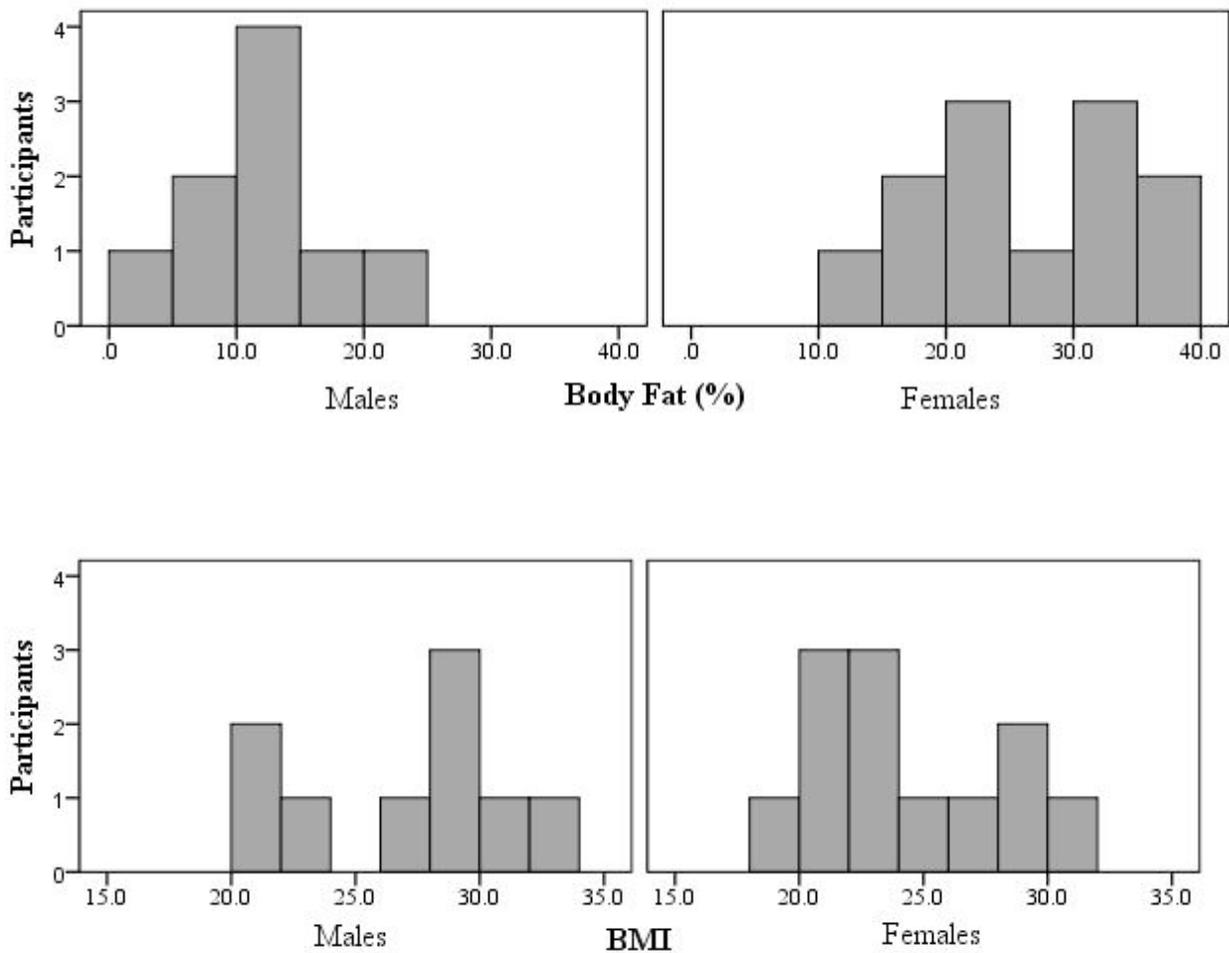


Figure 1. Mean body fat percentages and BMI of sample of male and female first-year college students over the course of the ten-week first term of classes in the fall of 2011. $n = 21$.

Change in Anthropometric Measurements

Weight: The male participants' weight increased significantly between the first and second meetings, ($p = 0.014$, 8 d.f., $t = 3.12$), but there was no significant difference between the first and the third meetings ($p = 0.424$, 8 d.f., $t = 0.84$). Likewise for the female participants, weight increased significantly between the first and second meetings ($p = 0.036$, 11 d.f., $t = 2.39$) but not between the first and third meetings ($p = 0.16$, 11 d.f., $t = 1.52$) (See Table 1). Two-thirds of the

male and female participants gained weight between their first and third meetings, meaning that fourteen students total gained weight. The mean amount of weight gained between the first and third meeting was 1.6 kg (3.6 lb) for the six men who gained weight, and 1.7 kg (3.8 lb) for the eight women who gained weight. Of the participants who lost weight, the three men lost an average of 1.3 kg (2.9 lb), and the four women lost an average of 1.1 kg (2.5 lb). A male student had the greatest increase in weight over the course of the term, gaining 5.1 kg (11.3 lb), and a different male student lost the most weight, decreasing his weight by 3.4 kg (7.4 lb). Over the course of the first term, two students (one male and one female) lost over five pounds, while three students (two females and one male) gained over five pounds.

It is likely that the group's average weight did not significantly increase or decrease between the first and third meetings because the participants who gained weight during their first term generally gained it quickly and did not lose it. However, those who lost weight did so gradually over the course of the term. These differences in patterns of weight change meant that the weight gain experienced by participants early in the term was balanced out at the end of the term because their weight gain slowed and other participants lost weight. The students who gained weight over the term gained an average of 1.3 kg (3.0 lbs) between the first and second meetings, and only 0.3 kg (.72 lbs) on average between the second and third meetings. In contrast, the students who lost weight by the end of the term lost an average of less than 0.1 kg (0.06 lbs) between the first and second meetings, and 1.2 kg (2.6 lbs) between the second and third meetings.

BMI: Like weight, increase in BMI for both men and women was significantly different from zero between the first and second meetings (M: $p = 0.021$, 8 d.f., $t = 2.87$; F: $p = 0.041$, 11 d.f., t

= 2.307), but was not significant between the first meeting and the third (M: $p = 0.061$, 8 d.f., $t = 0.533$; F: $p = 0.234$, 11 d.f., $t = 1.258$) (See Table 1).

Body Fat Percentage: Increase or decrease in body fat percentage was not significantly different from zero between the first and second meetings for both men and women (M: $p = 0.307$, 8 d.f., $t = 0.949$; F: $p = 0.414$, 11 d.f., $t = 0.848$). Additionally, neither men nor women exhibited a significant increase or decrease in their body fat percentage between the first and third meetings (M: $p = 0.275$, 8 d.f., $t = 1.171$; F: $p = 0.951$, 11 d.f., $t = 0.063$) (See Table 1).

Six of the students who gained weight between their first and third meeting (three men and three women) demonstrated a decrease in their body fat (ranging from 0.1% to 2.2% change), suggesting that the weight they gained may have been lean tissue and that they were not gaining fat over the course of the term.

An unrelated group of six students (four women and two men) experienced changes that caused them to shift from one body fat status to another over the course of the term. Five of these six students moved to a healthier category of body fat status than they were in at the beginning of the term. Of the four women, one each transitioned from: healthy to underfat, overfat to healthy, obese to overfat, and underfat to healthy. One man went from overfat to healthy and another went from underfat to healthy.

Height: Participants did not demonstrate a significant change in height over the course of the term ($p = .207$, 20 d.f., $t = 1.304$).

Interview Results

With the transition to being a student at Lawrence University, participants gained an increased measure of independence. This independence provided them with the ability to determine their own behaviors with a new level of freedom. For many, having more independence translated into the ability to eat essentially whenever and whatever they wanted. Many participants distinguished the sense of control over their eating they felt when starting college from their experiences before college, when their parents or high school dictated many aspects of their food-related behaviors.

Participants' reactions to their newfound freedom differed. Some participants explained that they felt an increased sense of responsibility for their diet and accordingly created personal expectations for themselves regarding what and when to eat. A male participant, at his final meeting, stated, "I feel like I have a lot of responsibility in determining what I eat because it's not just given to me... It's kind of taking it into your own hands to decide what to eat. I'm maturing into my food habits." In contrast, managing this freedom was a struggle for other students who felt unsure about how to behave appropriately. A female student explained that she had seen others experience difficulties when given control over what and when to eat, saying at her third meeting, "Sometimes people get blindsided when they're living alone and find that it's harder to stay healthy than when you're living with your parents – maybe they were cooking for you or packing the meals." Despite the potential pitfalls, some participants enjoyed the lack of structure and took advantage of their independence by not creating strict limitations or rules for themselves. One male student explained at his first meeting, "In high school, there was a time you'd get food and you'd eat whether you were hungry or not. Now I can eat whenever I feel like it."

The new sense of independence that participants experienced with the start of college provided them with the opportunity to develop eating behaviors over the course of the term through which they could uphold personal goals. These goals were either explicitly articulated by students during their interviews or were demonstrated through their eating behaviors. These goals included meeting student responsibilities, convenience, managing social relationships, eating healthy, maintaining energy levels, and managing weight concerns.

Meeting Student Responsibilities

To meet this goal, participants based their eating schedules around their classes and schoolwork, and would eat at certain times that they felt either helped or did not hinder their ability to fulfill their responsibilities. Participants often reported eating quickly between classes, or missing meals completely because they did not have enough of a break in their schedules to get themselves food. Others would eat lunch at the same time every weekday because that was the only period during which they had enough time to get a meal. Participants also described feeling compelled to have meals at certain times whether or not they felt hungry, since they would not get another opportunity to eat. When another student was asked why he developed his behaviors, he expressed a feeling held by many participants, “I don’t think anything else would really work, in terms of times to eat.” One participant indicated that, despite her increased independence, she did not feel that she had any more freedom in deciding when to eat than she did at home. She explained, “Here, my eating times are more structured because they’re based around my class and stuff, whereas at home I had to base it around school.”

Convenience

Participants often had the goal of eating convenient and readily available foods. The desire to eat foods that were easily accessible was often associated with the time constraints that participants felt as they tried to finish their schoolwork and attend their classes. For example, when asked at her final meeting what she thought were the factors that most strongly influenced her behaviors, one participant responded, “I think that it’s still mostly a convenience thing. I eat mostly what’s offered to me and what’s in front of me. I don’t have time to be picky.” Many participants indicated that they upheld the goal of eating what was convenient by looking around the Student Commons and determining their food choices based on “what looked good.” Participants also described skipping meals because they found it too inconvenient to get themselves food, such as the student who said, “I’ve actually been eating less because I’m too lazy to go to the [Student Commons]... Sometimes I just don’t care.” Others would miss meals or eat less because they said they were sick of the food served in the Commons, but that they did not want to have to go to places off campus to eat.

Managing Social Relationships

Participants also developed eating behaviors that allowed them to maintain their social relationships and respond appropriately to other social pressures. Participants demonstrated that they upheld these goals through their decisions about where and when to eat. Often, participants determined when to go to the Student Commons for a meal based on knowledge of when their friends would be present. One student explained the common habit of determining his behaviors based on others’ schedules, saying, “Sometimes my friends are like, ‘You want to go to eat?’ And I go with them but I’m not hungry.” Participants also described avoiding going to the

Commons or even skipping meals because they knew they would have to eat alone. Another participant stated that he did this because “you look kind of weird eating by yourself. And it’s more fun to eat with others.”

Participants also chose to eat only certain types of food in specific social situations because of the social pressure that they perceived. Some participants felt that their behaviors were constrained when eating with others because they did not want their companions to pass judgment on their diet. One female participant explained, “I don’t want to look like I’m overeating in front of people and I think that plays a part in my having better habits here than I do at home.” In contrast, some students would eat certain foods in social situations that they would not eat alone. One female participant stated that she “never really ate desserts,” but reported eating foods like ice cream that she classified as dessert when with friends.

While fulfilling student responsibilities frequently influenced participants’ eating habits, there was much greater variation in how strongly participants’ behaviors were affected by their goals of maintaining social relationships and appropriately reacting to social pressures. While some students refused to eat in the Commons alone, a few made statements along the same lines as the participants who explained, “If I’m really hungry, I go by myself.” Another participant explained that “it’s not necessary,” to eat with others, though she generally likes to. Some participants changed their feelings about eating with others over the course of the term, as one expressed at his final meeting, “I used to go eat alone, but now I have to go eat with friends or I don’t feel comfortable anymore.”

Healthy Eating

Notably, all of the participants in this study brought up the desire to have healthy eating behaviors without being directly prompted to do so. Despite this shared desire, participants' definitions of healthy behaviors were diverse. Often participants classified their behaviors as healthy or unhealthy based on whether they ate certain foods or foods that had specific properties. For example, one participant explained, "I think pop is unhealthy. I also think burgers and fries are unhealthy, but not terrible. Salads are definitely healthy. I also try not to eat a lot of bread. I think it can be unhealthy so I don't eat much." Some participants would describe the foods they ate or their behaviors as "good" or "bad," which they equated to healthy or unhealthy. When asked how content she was with her eating behaviors, one participant shared, "When you [contact] me about meeting, I'll look at the previous day and kind of categorize it as if I had a good day of eating or a bad day of eating... The more I snack and eat desserts or things that aren't nutritionally valuable makes it a bad day."

Some participants defined eating healthy as having "balanced" eating behaviors. Participants generally defined "balanced" eating as including foods from different personally defined categories within one meal or throughout the day. For example, a participant explained, "I ate decently healthy at home but I didn't get all of the essential food groups in. Here, I try to get in a vegetable serving with every meal, and a fruit serving with every meal, and protein." When discussing balance, participants classified food in various ways, such as "healthy" or "unhealthy," "good" or "bad," or based on the section of the food pyramid that it was in. For example, when describing how he chose what to eat, one student explained, "I usually get a mixture of unhealthy and healthy stuff – like, I'll get a salad but then a burger and fries. I think most people do, too."

While participants articulated that they desired healthy eating behaviors, they frequently also justified the choices they considered to be unhealthy by describing their eating as balanced. Some participants indicated that they believed that by taking extra steps that they considered healthy, they were able to cancel out the behaviors that were inconsistent with this goal. For instance, when asked what having balanced eating behaviors meant to him, a different participant said, “If I do go back up and have a couple of slices of pizza or something like that, I get salad or veggie, too.”

Participants frequently discussed their ideas about healthy eating behaviors in relation to the actions they felt they “should” take. They expressed this feeling most frequently when discussing the foods that they ate and, less often, the times at which they would eat. Participants frequently made statements like, “I probably should eat less, especially for lunch,” and “If I’m full, I should stop eating.” While this feeling that they should be eating a certain way was influenced by various sources, it was rarely based on any specific knowledge of nutrition. For example, in an effort to be healthy, one participant described, “I just have a two-liter jug and I drink one of those everyday because I think you’re supposed to drink that much water everyday.” Another participant explained, “I’ve heard it’s good for your body to get something in you early in the day to get your metabolism going instead of waiting until dinner time.”

Instead of originating in an understanding of nutrition, participants’ impression that there were ways that they should behave was generally the result of the expectations that they had been exposed to through their social interactions. Some students recognized that their family most strongly influenced their ideas about healthy behaviors, such as the participant who said, “If you’re brought up in a family where you’re given healthy foods, you’re going to want to continue eating healthy foods when you make your own choices. It’s the same thing with

unhealthy foods.” Others demonstrated that their friends primarily affected their definitions of healthy, like the football player who explained at his first meeting, “I base my eating pretty much on what I’ve heard... When I was just eating my salad, football players would say, ‘You have to get some protein in there somehow.’”

Maintaining Energy

Some participants articulated the goal of having healthy eating behaviors in order to achieve specific physical outcomes, such as maintaining their energy levels. For example, some participants felt compelled to eat specific foods at certain times of day in order to be more productive and alert. One participant said that the ways that foods affected his energy influenced what he ate at a given time, saying, “I don’t want to eat a ton of sugary stuff because I know that will give me a sugar high and then I’ll crash in my classes and I won’t be able to pay attention.” At her third meeting, another participant explained she would eat at certain times because “I find that I’m more functional if I’m not really, really hungry, especially if I’m in a practice room or working on homework.” Some of the in-season varsity student athletes also indicated that they focused on how eating certain foods or at specific times of the day affected their energy and ability to carry out their activities. These participants explicitly described feeling the need to properly fuel their activities during their practices or games. For example, one soccer player explained, “I think that everything I put into my body should have a purpose and an M&M cookie is not going to have a purpose. It’s not going to fuel me. It’s not going to get me anywhere.”

Managing Weight Concerns

Rather than thinking of food as fuel, some participants (including some athletes) had the goal of eating only as much as they could “use up,” because eating too much could result in undesirable physical outcomes. This goal was often associated with participants’ concern about gaining weight. When comparing her summer practice schedule to her activity level during the school year, one tennis player explained, “I felt like I could eat whatever because we were exercising for four hours in the day, as opposed to now, when I’m sitting around all day. I have to think more about what I’m eating because I have less time to burn it off.” Another female participant said during her first meeting, “All I heard about before I came was, ‘Watch out for the freshmen fifteen! They’re going to get you!’” Other participants, who initially did not seem worried about their potential to gain weight, became concerned by the end of their first term on campus. A female participant lamented the changes she had seen in her body over the course of the term at her last meeting, saying, “Food here makes me gain more weight than it does back home.”

Healthy Eating and Physical Changes

Participants’ perceptions of the physical outcomes of their behaviors were associated with whether they felt they had healthy eating habits. Six of the nine participants who did not consider their behaviors to be healthy mentioned that they had noticed physical changes associated with their eating that they were unhappy about. These physical changes included changes in their weight or energy levels, causing them to frequently feel more tired than they had at the beginning of the term. The other three students who said their behaviors were unhealthy said that they had not noticed physical changes. These participants also explained that they had

not paid attention to changes, or that they would not expect to change because they had never considered their behaviors to be healthy. In contrast, those students who considered themselves to have healthy eating behaviors were also generally more content with associated aspects of their physical conditions, such as their weight and body composition at the end of the term. Some also remarked on other aspects of their physical conditions, such as how much more energized they felt when they were eating healthy.

At their final meeting, nine of the twenty-one participants explicitly expressed that they felt that their eating behaviors were generally unhealthy. These participants did not experience changes in weight or body fat over the course of the term that were significantly different from the changes experienced by participants who described their eating behaviors as healthy (weight: $p = 0.549$, 19 d.f., $t = 0.310$; body fat: $p = 0.254$, 19 d.f., $t = 1.176$). The average changes experienced by the nine students who considered their eating to be unhealthy included an increase in weight of about 1.0 kg (2.2 lbs) and an increase in body fat of 0.07%. The self-described healthy eaters experienced an average weight gain of 0.5 kg (1.1 lbs) and a decrease in body fat of 1.17%.

The range of weight change that participants who considered themselves unhealthy experienced was large, with one male student losing 3.4 kg (7.4 lbs) and another male gaining 5.1 kg (11.3 lbs), a difference of 8.5 kg (18.7 lbs). The participants who considered themselves healthy demonstrated a smaller range of weight change. One female lost 0.7 kg (1.6 lbs) and a male gained 2.1 kg (4.7 lbs), a difference of 2.8 kg (6.3 lbs).

Of the two students who lost over five pounds, the male participant described his eating behaviors as unhealthy and the female participant did not. A different male participant who gained over five pounds stated that his eating behaviors were healthier at the end of the term than

they were at the beginning, while the two female participants who gained over five pounds did not consider their eating behaviors healthy at the end of the term.

Six participants (four women and two men) experienced changes that caused them to shift from one body fat status to another. In this group, three women and one man described their behaviors as unhealthy. The male participant went from overfat to healthy, and the three women transitioned from overfat to healthy, obese to overfat, and underfat to healthy.

Prioritizing Goals

Participants often encountered situations in which they felt compelled to uphold more than one goal, but the necessary behaviors to do so conflicted with one another. To cope with these competing goals, participants developed methods of prioritizing their goals or devising ways of upholding more than one goal at a time. Their eating behaviors were the results of the ways in which they prioritized their goals and experienced constraints at specific times and within different situations.

Participants demonstrated that fulfilling student responsibilities was their first priority by choosing to ignore, compromise on, or alter their other behaviors related to eating. These choices allowed participants to act within the constraints that were created by the behaviors that were necessary to uphold their primary goal. Often this meant that participants' goals associated with their social relationships did not trump the obligations that they felt to go to class or complete their schoolwork. For example, many participants would choose to eat alone in their room or go to a meal by themselves in order to get homework finished. One student exemplified this attitude by saying, "[Whether I eat alone] has to do with how much work I have to do. If I have a ton of work, I'll just have ramen in my room because I don't want to waste time." Another student, who

at the beginning of the term described disliking having meals alone so much that she would opt to eat while taking walks around campus, reported eating soup alone in the Student Commons at the end of the term in order to finish her homework.

For many participants, the constraints that their student responsibilities put on their behaviors led them to disregard their goals associated with the physical outcomes of eating in specific situations. For example, when participants' ability to eat in a healthy manner was constrained by their student schedule, they would often behave in ways that they considered more convenient. These convenient behaviors facilitated students' ability to meet their student responsibilities and were generally inconsistent with participants' definitions of healthy behaviors. A participant expressed the desire to behave in ways that were both convenient and healthy, but not the motivation to do so, saying at his third meeting, "Right now it's the easiest to snack and to not exercise. Hopefully I will change."

However, not all participants felt that their goals of being a responsible student hindered their ability to eat in a way that upheld the goals that were important to them. For example, some participants were able to find ways to achieve the goal of being healthy while functioning within the constraints that they felt as students. A few participants described planning out their meals around their student schedule so that they knew they would get the food they needed at appropriate times. One female participant reported that she kept the snacks she needed with her so she could eat throughout her activities. Other participants felt that it was a struggle to have healthy eating habits while still upholding goals related to being a student and being social, but found ways to do both. One male participant, when asked about the changes he had seen in his behaviors over the course of the term, explained, "I feel like I'm having a harder time trying to

eat healthy but still making those choices,” and the consistency in his eating behaviors over the course of the term confirmed that he was able to do so.

Discussion

This study begins to demonstrate the complexity of the environmental and personal factors that may influence first-term college students’ eating behaviors and associated biological outcomes. Numerous factors within participants’ present and past contexts influence the ways in which they conceptualize and carry out their eating habits, and these ideas and behaviors may, in turn, affect their physical conditions. By outlining the personal goals that guide and are facilitated by participants’ eating behaviors, this study provides a framework for analyzing and assessing the significance of first-term college students’ eating habits and associated physical outcomes.

Participants’ Goals and The Food Choice Process Model

The goals that participants articulated or upheld through their eating behaviors fell into one of two categories. The first of these consists of goals that participants wanted to facilitate by eating in a certain way. This category included the goals of meeting student responsibilities, managing social relationships, maintaining energy, and managing weight concerns. The second category includes goals that participants had for their eating behaviors themselves. This second category consisted of the goal of having healthy eating behaviors and the goal of having eating behaviors that were convenient. While the second category consisted of goals participants had for the process of eating, participants’ eating behaviors were a mechanism that helped them to facilitate their ability to meet the goals in the first category. By meeting the goals they had for

their eating behaviors, participants may have also facilitated their ability to uphold their first category goals. For example, by meeting the goal of having healthy eating behaviors, participants may also have facilitated their ability to uphold their goal of managing their weight.

According to The Food Choice Process Model, individuals develop personal food systems through which they adapt their eating behaviors to the constraints of their proximate situations, while integrating the influences that they have experienced over their life course into their decision-making process (Sobal & Bisogni, 2009). These personal food systems are the “cognitive processes” through which individuals make choices about their eating behaviors in different situations, and are affected by their current and past experiences and environments (Sobal & Bisogni, 2009, S43; Furst et al., 1996). In the present study, participants demonstrated that their goals were influenced by various factors over the course of their lives and they prioritized these goals within different contexts in order to make decisions about their eating behaviors. These results suggest that participants’ goals may represent an aspect of their personal food choice systems.

However, some of the participants’ articulated goals did not actually appear to influence their behaviors, as they would describe goals that they did not prioritize through their eating habits. Instead, in articulating these goals, participants conveyed their ideas about the ideal outcomes of their personal food systems. Having these goals seemed to consistently influence participants’ perceptions of their eating habits – but not their actual behaviors. Some participants were able to meet all of the goals they associated with their eating habits through their personal food systems. However, other participants’ eating behaviors were not consistent with their ideals because their habits did not fulfill the purpose that the individual desired. This inconsistency

between individuals' behaviors and their desired outcome suggests that their habits were somehow constrained by aspects of their personal food systems.

Participants based their level of satisfaction with their eating habits on whether they believed their behaviors produced these ideal outcomes. As fulfilling the responsibilities associated with being a student was participants' primary goal, they often based their level of satisfaction with their behaviors on how well their eating habits functioned to help them to achieve this goal. Generally participants who seemed content with their behaviors explained that their habits functioned well within the constraints that being a student put on their time, and that they would maintain them throughout the school year.

However, as eating healthy was a commonly articulated goal among participants, their level of satisfaction was also strongly affected by their impression of whether their eating behaviors helped them to achieve this goal. The participants whose behaviors reflected a conscious effort to act in accordance with their personal definitions of healthy generally expressed higher levels of satisfaction with their eating. Correspondingly, the nine participants who described their behaviors as generally unhealthy also said that they were dissatisfied with their eating habits overall. The participants whose behaviors were inconsistent with their goal of eating healthy also expressed a stronger desire to change their habits than the self-identified healthy eaters.

Participants' perceptions of the physical outcomes of their behaviors were also associated with their level of satisfaction with the healthiness of their behaviors. Those participants whose behaviors were inconsistent with their idea of healthy eating were more likely to be dissatisfied with their physical conditions at the end of the term than those who felt their behaviors were healthy. In contrast, the participants who were more satisfied with the healthiness of their eating

were generally also more satisfied with their eating overall, and their associated physical outcomes. These results suggest that participants who consistently ate in ways that they considered healthy may have been more strongly influenced by their understandings of how eating affected their physical conditions than those who did not choose to have healthy behaviors. However, it is possible that participants' behaviors were influenced by their perceptions of the ways their eating affected their physical conditions. The present study has not demonstrated a clear directional relationship between the short-term physical changes that participants experienced and their eating behaviors or the goals associated with them. Future research should investigate to what degree students' perceptions of the physical outcomes associated with their eating habits influence and are influenced by their behaviors, as well as examine the actual the physical outcomes of these behaviors.

Since they do not affect individuals' behaviors in their current environment, participants' goals that they associated with their ideal outcomes of their eating behaviors do not necessarily belong as a part of The Food Choice Process Model. Instead, these goals seem to exist somewhere outside the model, as consistent standards based on which participants evaluate their existing eating behaviors. By focusing on the goals that individuals facilitate through their behaviors and those that they articulate but do not act on, the results of this study demonstrate that individuals' goals related to their eating behaviors may convey their ideas about the purpose their eating habits should fulfill within their biological and cultural contexts. Additionally, this study demonstrates that these ideas may conflict with the factors that actually influence individuals' personal food systems. Because participants' goals related to the ideal outcomes of their behaviors influenced their satisfaction with their eating behaviors, these goals may affect participants' behaviors in the future. Continued research should investigate how the goals that

individuals articulate but do not act on during one period of their life course may influence their personal eating systems later in their lives.

A Lifespan Approach

The results of the present study suggest that participants may prioritize their goals and differently invest in behaviors in order to experience particular outcomes at certain points in their lives. The changes students undergo during their first year of college, both physical and behavioral, may have significant implications for their health outcomes in the future. By prioritizing certain eating behaviors over others as first-term college students, participants may cause changes in their body compositions while they are young adults that will affect their health later in their lives. Two-thirds of the participants gained weight over their first term of college and, if this trend in weight gain continues for these students, these students will be at an elevated risk of becoming obese as older adults (Zagorsky & Smith, 2011). Because a large amount of research has examined weight-change during students' first year of college (Crombie et al. 2009), continued longitudinal research should investigate whether any physical changes that students experience during their first term of college are indicative of the nature of continuing physical change that they experience throughout their life course, and whether these changes affect their vulnerability to health outcomes.

The behaviors and goals that first-year college students develop autonomously may also influence their behaviors, goals, and physical conditions throughout adulthood. The start of college often prompts students to go through a period of compulsory and rapid identity development, which is expressed through the decisions they make regarding their eating behaviors (Counihan, 1992). The behaviors related to food that students develop during their first

year of college correspond with their attitudes about their connections to their home lives and their identities as newly independent adults (Counihan, 1992; Bisogni et al., 2002). Because of their association with the beginning of adulthood, the goals that individuals prioritize as they begin attending college and assert their independence may influence their goals and behaviors later in their lives. By influencing their behaviors in the future, students' goals during college may have as great or more of an effect on their long term health than any physical changes they experience during their first year of college. Researchers should investigate whether individuals maintain the behaviors they developed as first-term college students throughout their lives, or if they develop and prioritize new goals as they age. Through research of this nature it may be possible to shed light on whether the ideas and behaviors developed during this transitional period influence individuals' eating behaviors or physical conditions over the course of their lives.

Continued research should also address whether attending college significantly affects students' eating habits and health. The influence of the transition to college on individuals' behaviors can be considered significant if it causes students to develop eating behaviors that differently affect their vulnerability to future health outcomes from the eating behaviors that non-college students develop during this period of their lives. To determine the relationship between attending college and individuals' future behaviors and health, research may use the framework presented here to identify the personal goals that students and non-students prioritize, and then analyze these in conjunction with their biological conditions later in their lives.

The results of the present study confirm and expand upon the findings of an interview pilot study I conducted during the summer of 2011. The primary goals that members of the sub-population studied in the summer of 2011 conveyed through their descriptions of their eating

behaviors were similar to the goals participants in the present study demonstrated, including maintaining their social relationships, the convenience and availability of food, taste and personal preference, the health-related or physical outcomes of food, and participants' ethical and religious considerations. Most participants in the summer study were not taking classes at the time of their interview, which was likely the reason that the goal of fulfilling student responsibilities was not expressed. Participants in the present study did not articulate that ethical and religious considerations were primary concerns that influenced their actions.

This pilot study and the present study provide a different perspective on first-year college students' behaviors than previous research. Research on changes in first-year college students' eating behaviors has primarily focused on reporting observed changes and identifying the environmental factors that influence students' physical conditions, especially change in weight (e.g., Brown, 2008; Zagorsky & Smith 2011; LaCaille et al., 2011; Vella-Zarb & Elgar, 2010; Crombie et al., 2009). The changes in eating behaviors that may accompany the shift to dorm living, including eating more and making more unhealthy food choices, are often blamed for weight gain during students' first year of college (Vella-Zarb & Elgar, 2010). Research has also shown that living and eating on campus most strongly and consistently predicts increase in weight, while changes in weight are virtually non-existent for students living off campus (Crombie et al., 2009; Vella-Zarb & Elgar, 2010; Pliner & Saunders, 2008). These results highlight the current environmental factors that may contribute to changes in first-year college students' physical conditions without considering how individuals make decisions within these contexts and how their previous experiences may influence their behaviors.

Potential Limitations

The inferential scope of this study is limited by the size and nature of the sample of participants who were involved. First, this study included a relatively small number of participants because the meetings were conducted by only one researcher over the course of one term of classes. Additionally, the participants in this study were self-selected. As the students were informed about the nature of the project before they agreed to take part, the students who chose to be involved may have possessed certain traits in common that prompted them to take part in this study. For example, it is possible that students who chose to participate may have been more conscious of their eating behaviors and physical conditions than their peers. The fact that all of the participants mentioned the desire to be healthy suggests that there was a sample bias. Because participants in this study may share traits that differentiate them from their peers, the results of this study are likely not representative of the Lawrence University first-year student population during the 2011-2012 school year. It is unknown to what degree the data obtained from the included students differs from what would have been expected if this study had included a representative sample of all first-year Lawrence University students.

An additional limitation of this study is the time frame over which data collection took place. Sampling over the course of a greater proportion of participants' first year of college may have demonstrated a greater range of goals associated with eating behaviors, and provided a better sense of how students' goals may change over the course of the school year. Because the majority of research on students' physical changes during their first year of college examines their outcomes after more than ten weeks on campus (Zagorsky & Smith, 2011), it is difficult to compare or contrast the results of this study to previous work. Though the results of this research did not demonstrate that significant changes took place in students' physical conditions by the

end of their first term, previous research indicates that it is likely that these students on average will experience a significant increase in weight or body composition by the end of their first year of college (Zagorsky & Smith, 2011; Crombie et al., 2009). Future research should be conducted on more representative populations of first-year college students over a longer time period in order to gain a more accurate and complete understanding of the association between their eating behaviors, their articulated goals, and their physical outcomes.

Conclusion

The transition to college represents a period in individuals' lives during which they gain increased independence and control over their eating habits. Participants in this study demonstrated that this independence provided them with the opportunity to autonomously develop eating behaviors through which they upheld personal goals. Like changes or events that are experienced during critical periods, it is possible that the goals and eating behaviors that students develop during their first year of college will have long term effects. Because of the potential influence that first-term college students' goals and eating behaviors may have on their future health outcomes, this transitional period may represent a biologically significant, culturally demarcated critical period within an individual's life.

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References

Aud, S., W. Hussar, G. Kena, K. Bianco, L. Frohlich, J. Kemp, and K. Tahan

2011 The Condition of Education 2011. U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Berger, P. L., and T. Luckmann

1967 The Social Construction of reality: A Treatise in the Sociology of Knowledge. New York: Anchor.

Bernard, H. R.

2006 Research Methods in Anthropology: Qualitative and Quantitative Approaches 4th ed. Lanham, MD: AltaMira Press.

Bisogni, C., M. Connors, C. Devine, and J. Sobal

2002 Who We Are and How we eat: A Qualitative Study of Identities in Food Choice. Journal of Nutrition Education and Behavior 34(3):128-139.

Bisogni, C.A.

2003 Communicating about Food Choice: Tools for Professional Development. Division of Nutritional Sciences, Cornell University, Ithaca, New York.

Boas, F.

1912 Changes in bodily form of descendants of immigrants. American Anthropologist 14:530-562.

Bogin, B.

2010 Evolution of Human Growth. *In* Human Evolutionary Biology, M. Muehlenbein, ed. Pp. 379-395. Cambridge: Cambridge University Press.

Briefel, Ronette R., and Clifford L. Johnson

2004 Secular Trends In Dietary Intake In The United States. *Annual Review of Nutrition* 24(1):401-431.

Brown, C.

2008 The Information Trail of the 'Freshman 15' – A Systematic Review of a Health Myth Within the Research and Popular Literature. *Health Information and Libraries Journal* 25(1):1-12.

Centers for Disease Control and Prevention.

2011a. Adult obesity. <http://www.cdc.gov/obesity/data/adult.html>, accessed on January 30, 2012.

Centers for Disease Control and Prevention.

2011b. About BMI for adults.

http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html, accessed on January 30, 2012.

Charmaz, K.

2000 Grounded Theory: Objectivist and Constructivist Methods. *In Handbook of Qualitative Research*. N.K. Denzin and Y.S. Lincoln, eds. Pp. 509-535. Thousand Oaks: Sage.

Connors, M., C. A. Bisogni, J. Sobal, and C. M. Devine

2001 Managing Values in Personal Food Systems. *Appetite* 36:189-200.

Counihan, Carole M.

1992 Food Rules in the United States: Individualism, Control, and Hierarchy. *Anthropological Quarterly* 65(2):55-66.

Crombie, Aaron P., Jasminka Z. Ilich, Gareth R. Dutton, Lynn B. Panton, and Doris A. Abood

2009 The Freshman Weight Gain Phenomenon Revisited. *Nutrition Reviews* 67(2):83-94.

Devine, C.M., M. Connors, C.A. Bisogni, and J. Sobal

1998 Life Course Influences on Fruit and Vegetable Trajectories: Qualitative Analysis of Food Choices. *Journal of Nutrition Education* 31:86-93.

Falk, Laura, Carole A. Bisogni, and Jeffery Sobal

1996 Food Choice Processes of Older Adults: A Qualitative Investigation. *Journal of Nutrition Education* 28(5):257-265.

Furst, T., M. Connors, C. Bisogni, J. Sobal, and L. Falk

1996 Food Choice: A Conceptual Model of the Process. *Appetite* 26(3):247-265.

Gallagher, D., S. B. Heymsfield, M. H., S. A. Jebb, P. R. Murgatroyd, and Y. Sakamoto

2000 Healthy Percentage Body Fat Ranges: An Approach for Developing Guidelines Based on Body Mass Index. *The American Journal of Clinical Nutrition* 72(3):694-701.

Garrow, J. S., and J. Webster

1985 Quetelet's index (W/H^2) as a Measure of Fatness. *International Journal of Obesity*. 9: 147-153.

Gordon-Larsen, Penny, Linda S. Adair, Melissa C. Nelson, and Barry M. Popkin

2004 Five-Year Obesity Incidence in the Transition Period between Adolescence and Adulthood: The National Longitudinal Study of Adolescent Health. *The American Journal of Clinical Nutrition* 80(3):569-575.

Guo, X., B. A. Warden, S. Paeratakul, and G. A. Bray

2004 Healthy Eating Index and Obesity. *European Journal of Clinical Nutrition* 58(12):1580-1586.

Hovell, M., C. Mewborn, Y. Randle, and S. Fowler-Johnson

1985 Risk of Excess Weight Gain in University Women: A Three-Year Community Controlled Analysis. *Addictive Behaviors* 10:15-28.

Hubert, A.

2004 Qualitative Research in the Anthropology of Food: A Comprehensive Qualitative/Quantitative Approach. *In* *Researching Food Habits: Methods and Problems*. H. Machbeth and J. MacClancy, eds. Pp. 181-192. New York: Berghahn Books.

Jackson, A. S., and M. L. Pollock

1985 Practical assessment of Body Composition. *The Physician and Sportsmedicine*, 13:76-90.

Jastran, M, Bisogni CA, Blake C, Sobal J, Devine CM.

2009 Eating routines: Embedded, Value Based, Modifiable, and Reflective. *Appetite* 52:127-136.

LaCaille, Lara J., Kim Nichols Dauner, Rachel J. Krambeer, and Jon Pedersen

2011 Psychosocial and Environmental Determinants of Eating Behaviors, Physical Activity, and Weight Change among College Students: A Qualitative Analysis. *Journal of American College Health: J of ACH* 59(6):531-538.

Little, M.

2010 History of the study of human biology. *In* *Human Evolutionary Biology*, M. Muehlenbein, ed. Pp. 29-47. Cambridge: Cambridge University Press.

Lohman, T., A. Roche, and R. Martorell

1988 *Anthropometric Standardization Reference Manual*. Champaign, IL: Human Kinetics Books.

Messer, Ellen

1984 Anthropological Perspectives on Diet. *Annual Review of Anthropology* 13:205-249.

Messer, Ellen

2004 Food, Culture, Political and Economic Identity: Revitalizing the Food-Systems Perspective in the Study of Food-Based Identity. *In Researching Food Habits: Methods and Problems*. H. Machbeth and J. MacClancy, eds. Pp. 181-192. New York: Berghahn Books.

National Heart, Lung, and Blood Institute and National Institute of Diabetes and Digestive and Kidney Diseases

1998 Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report. Bethesda, MD: National Institutes of Health.

National Task Force on the Prevention and Treatment of Obesity.

2000 Overweight, Obesity, and Health Risk. *Archives of Internal Medicine* 160(7):898–904.

Nelson, Melissa, Mary Story, Nicole Larson, Dianne Neumark Sztainer, and Leslie Lytle

2008 Emerging Adulthood and College-aged Youth: An Overlooked Age for Weight-Related Behavior Change. *Obesity* 16(10):2205-2211.

Pickering, Roger, Rise Goldstein, Deborah Hasin, Carlos Blanco, and Sharon Smith

2011 Temporal Relationships between Overweight and Obesity and DSM-IV Substance use, Mood, and Anxiety Disorders: Results from a Prospective Study, the National Epidemiologic Survey on Alcohol and Related Conditions. *The Journal of Clinical Psychiatry* 72(11):1494-1502.

Pliner, P. & T. Saunders

2008 Vulnerability to Freshman Weight Gain as a Function of Dietary Restraint and Residence. *Physiology & Behavior* 93:76-82.

Riley, M.W.

1979 Introduction: Life-Course Perspectives. *In Aging from Birth to Death: Interdisciplinary Perspectives*, M.W. Riley, ed. Pp 3-13. Boulder, CO: Westview Press.

Ryan, Gery W., and H. Russell Bernard

2003 Techniques to Identify Themes. *Field Methods* 15(1):85-109.

Sánchez-Villegas, A., A. Pimenta, J. Beunza, F. Guillen-Grima, E. Toledo, & M. Martinez-Gonzalez

2010 Childhood and young adult overweight/ obesity and incidence of depression in the sun project. *Obesity* 18(7):1443-1448.

Siri, W. E.

1961 Body Composition from Fluid Space and Density: Analysis of Methods in Techniques for Measuring Body Composition. *In Techniques for Measuring Body Composition*. Joseph Brozek & Austin Hanschel, eds. Pp. 223-244. National Academy of Science, Research Council.

Sobal, Jeffery, and Carole A. Bisogni

2009 Constructing Food Choice Decisions. *Annals of Behavioral Medicine* 38:37-46.

Stearns, S.C.

1992 *The evolution of life histories*. Oxford: Oxford University Press.

Strauss, Anselm L., and Juliet M. Corbin

1998 *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 2nd ed. Thousand Oaks: Sage Publications.

Tsai, A., D. Williamson, & H. Glick

2011 Direct medical cost of overweight and obesity in the United States: A Quantitative Systematic Review. *Obesity Reviews*, 12(1):50-61.

Van Itallie, Theodore B.

1985 Health Implications of Overweight and Obesity in the United States. *Annals of Internal Medicine* 103(6):983-988.

Vella-Zarb, Rachel A., and Frank Elgar

2009 The 'Freshman 5': A Meta-Analysis of Weight Gain in the Freshman Year of College. *Journal of American College Health* 58(2):161-166.

Vella-Zarb, Rachel A., and Frank Elgar

2010 Predicting the 'Freshman 15': Environmental and Psychological Predictors of Weight Gain in First-Year University Students. *Health Education Journal* 69(3):321-332.

Wang, Youfa, and May A. Beydoun

2007 The Obesity Epidemic in the United States—Gender, Age, Socioeconomic, Racial/Ethnic, and Geographic Characteristics: A Systematic Review and Meta-Regression Analysis. *Epidemiologic Reviews* 29(1):6-28.

Watkins, T.

1989 Fight the Freshman 15. *Seventeen*. 48:162.

Willett, Walter

1998 *Nutritional Epidemiology* / Walter Willett. Vol. 2nd ed. New York : Oxford University Press.

World Health Organization.

1995 *Physical status: The use and interpretation of anthropometry*. Geneva, Switzerland: World Health Organization.

Zagorsky, J., and P. Smith

2011 The Freshman 15: A Critical Time for Obesity Intervention Or Media Myth? Social
Science Quarterly 92(5):1389-1407.

Appendix 1

Day	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9
Mon									
Tues	3, 17	10, 19	15, 20	8, 16	4	11	3, 17	10, 19	15, 20
Wed	8, 16	7, 18	2, 21	6	9, 14	1, 21	8, 16	7, 18	2, 21
Thurs	6, 5	14, 9	11, 13	3, 17	10, 19	13, 2	6, 5	14, 9	11, 13
Fri	12	4	1	5, 12	7, 18	15, 20	12	4	1

Appendix 2: Sample Initial and Final Meeting Questions

- Do you eat certain foods at certain times? Why?
- Do you have trouble eating the way you would like to at school? What is difficult?
- Do you eat differently at home and at school?
- Do you think your eating behaviors are different or similar to other people?
- Are you happy/unhappy/satisfied/dissatisfied with the way you eat?
- What kinds of foods do you generally eat or look for?
- What type of eater would you consider yourself?
- Do you feel like you have routines or habits surrounding food or the way you eat?
- How would you describe or characterize your eating habits?
- How stable or consistent is the way you are eating?
- Have you changed your attitudes towards food and your dietary behavior since coming to college?
- Do your behaviors differ on Fridays-Sundays? How are they different/similar?
- What does healthy mean to you [when the participant mentioned the word “healthy”]?
- Do you feel that there is anything significant about your eating behaviors that I haven’t asked about?