

AN ABSTRACT OF THE THESIS OF

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Title: Understanding Health Behavior Influences Among Undergraduate Students During College Transition.

Abstract approved:

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As college students transition to life away from their parental home, the need to make independent decisions regarding their eating and exercise behaviors is evident. This life transition may be a critical period for establishment of long term behavior patterns with potential impact on health, disease and weight balance. This study attempts to reveal the extent to which students perceive the influences in a new college life to impact their eating and exercise behaviors, either positively or negatively, and how the impact of that influence may compare to their pre-college behaviors. This study surveyed 247 Oregon State University students (43% male), primarily transitioning freshman (69%), regarding their perception of influences upon eating and exercise behaviors and their preparedness for college life. The results revealed significant changes in how influences impacted behavior when asked to compare previous to current influences upon those behaviors (scale = 1–7, very negative to very positive; 4 = neither positive nor negative). Influences from their pre-college life ranked as being more neutral compared to those at college, suggesting that college life environments have important influence upon behavior. The influences perceived to be significantly less positive for eating behavior included the impact of family habits, the influence of peers, and campus food choices compared to home food choices. Alternately, students were significantly more ($p < 0.05$) positively influenced to make healthful eating decisions as a result of their changing school schedule and their nutrition knowledge. The significant ($p < 0.05$) influences that students perceived to positively impact

exercise behavior included peer pressure to exercise, having an exercise partner, having a changing class schedule, having access to facilities, and their sense of stress level. No gender differences were found for perceived influences upon eating behaviors, but some differences were found for male versus female's perceived exercise behavior influences. At college, males were more positively influenced by peers than females. Females were reportedly more positively influenced to exercise when college school workload was heavy and when stressed. Students ranked the extent to which they felt prepared for college life and its impact upon eating and exercise behaviors. Student responses suggest a general perception of being well prepared (scale= 1 (least) to 7 (most)) for managing time (5.46), making healthy food choices (5.37), balancing school and healthy exercise habits (4.98), and overcoming peer pressure at college (6.04). Students were asked about changes in behavior upon coming to college, and they reported more late night eating and snacking, as well as decreased consumption of milk as a beverage at college. The genders reported some difference in changes in behavior. Males indicated that they eat more food, eat more regularly, and eat larger quantities at college than females. Males also reported eating more fast food at college, and both males and females reported more drinking of alcohol at college. Females showed a greater increase in alcohol consumption than males; females also reported drinking more coffee at college. Exercise behavior changes were less marked for both groups; however, females more consistently reported that they exercise more regularly now at college. Several correlations were found among college influences upon eating and exercise behaviors, with the strongest correlations ($r \geq 0.5$; $p < 0.05$) having to do with a changing class schedule, a heavy school workload, and students' sense of stress. These may be important influences upon college students' eating and exercise behaviors that need further study. Efforts to facilitate college students' ability to manage stress, time, and workload may be important in the development of healthy behaviors upon coming to college.

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UNDERSTANDING HEALTH BEHAVIOR INFLUENCES AMONG
UNDERGRADUATE STUDENTS DURING COLLEGE TRANSITION

by
Kerry A. Hart

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Kerry A. Hart, Author

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CONTRIBUTION OF AUTHORS

Dr. Mary Cluskey was a major contributor to the process and formation of this thesis. Dr. Cluskey assisted in creating the survey for undergraduate students, assisted in statistical analysis and result interpretation, and assisted in editing all chapters during the process of writing this thesis.

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Understanding Health Behavior Influences of Undergraduate Students during College Transition

INTRODUCTION

Quality of life and health can be affected by many factors; the increase in overweight and obesity in the United States has become a problem spanning all points in the life cycle. As a larger portion of the population struggles with this epidemic, it has become necessary to target points in the life cycle where individuals may be particularly vulnerable to weight gain. Life events such as transition to college often have a negative influence upon eating and exercise behaviors. Adopting healthy eating and exercise behaviors are two key components to a healthy weight and lifestyle. The purpose of this research is to explore, from the student perspective, the factors of influence and the challenges encountered, in adopting healthy eating and exercise behaviors at this point in their lives.

Individuals living at home with their parents typically practice certain meal and exercise behaviors according to family and school routines (Cason, 2006; Cluskey & Grobe, 2009). These routines change as individuals make the transition from home to living at university (Wethington, 2005). Patterns of consistent behavior evolve with a variety of circumstances and influence (Wethington, 2005). In the university setting, students experience new and changing influences. Meals are provided through eateries or all-you-can-eat kitchens, individuals may no longer part of a structured sports team, and students are constantly surrounded by their peers. Students become their own health monitors; contextual factors, such as gender, help explain differences in health behavior when faced with new stresses during a transition (Wethington, 2005). Weight gain, the ‘freshman 15’, and lack of adequate diet and exercise have all been described as problems faced by American college-age students (DeBate, Topping, & Sargent, 2001; Boutelle, Neumark-Sztainer, Story, & Resnick, 2002; Racette, Deusinger, Strube, Highstein, & Deusinger, 2008; Unusan, 2006; Brunt et al., 2008; Economos et al., 2008; Cluskey & Grobe, 2009).

Reports have found that the transition to college marks a critical risk period for weight gain. (Anderson, Shapiro, & Lundgren, 2003; Cluskey & Grobe, 2009). Individuals of college age, ages 18-29, represent a group that is at risk for unhealthy weight gain; further investigation should be done to understand issues that need addressed during this critical period for weight gain (Anderson, Shapiro, & Lundgren, 2003; Racette et al., 2008). Students move to a new school setting, which requires simultaneously balancing eating and exercise habits with the school-related tasks of a college student. Many factors and circumstances contribute to the actual health behaviors that students choose to practice upon coming to college.

Identifying students' perceived barriers to healthy eating or exercise behaviors is an important task, as they should feel adequately supported in the university environment to make positive health choices. Studies have established that undergraduate students tend to practice fewer healthy eating and exercise behaviors upon coming to college. However, there is a lack of information regarding the barriers to healthy eating and exercise habits faced by students. In the current study, students were asked about their eating and exercise behaviors before college and after college transition, to establish which behaviors change. Students were asked to report their preparedness to deal with challenges upon coming to college, and to rate the frequency of specific health behaviors practiced currently, compared to previous practices. The information attempts to give a snapshot of typical undergraduate behavior changes, why these behaviors change, and those factors which may impose greater influence on behavior change. The questions explored are, "How do influences on students' eating and exercise behaviors change upon coming to college?" and "what are the barriers that students face in making decisions about their eating and exercise behaviors."

Background

The American paradox addresses the fact that while fat and energy intake has reportedly decreased, the rates of overweight and obesity have increased (Butler, Black, Blue, Gretebeck, 2004). The conclusion follows that a reduction in physical activity may partially explain this trend toward weight gain in more recent years. To better

understand this, researchers continue to investigate eating and exercise behaviors among college individuals. Analysis of the life cycle and the overweight and obesity problem has revealed that the transition to college is a targeted time in which young adults adopt health behaviors. The behaviors adopted by the student may continue on into adulthood, and could affect their quality of life and health outcomes either positively or negatively.

Healthy Campus 2010 created 20 focus areas, which include nutrition and overweight, and physical activity and fitness (American College Health Association, 2009). As universities strive to be in line with meeting the goals of increasing healthier diet choices and increasing physical activity, it is necessary to understand the student's habits and challenges. A recent study shows that following a healthy diet, rather than participating in regular exercise, presents more of a challenge to students (Cluskey & Grobe, 2009). However, it has been found that nearly half of college students may not meet the recommended 20-30 minutes of moderate physical activity on most days, as given by the American College of Sports Medicine (Driskell, Kim, & Goebel, 2005). Upon coming to college, students tend to decrease their consumption of fruits and vegetables (Brunt, Rhee, & Zhong, 2008; Economos, Hildebrandt, & Hyatt, 2008), increase their consumption of fast food (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005; Economos et al., 2008; Nelson, Kocos, Lytle, & Perry, 2009), and decrease their frequency of regular exercise (Driskell et al., 2005; Racette et al., 2008; McArthur & Raedeke, 2009). These patterns of behavior are very conducive to increased caloric intake and decreased caloric expenditure, and could quickly lead to weight gain if students are not alert to their behaviors. Students come to college and may not be prepared to deal with all of the challenges and new experiences which inevitably occur simultaneously. Weight gain could be a consequence of student's lack of awareness of their eating and exercise behaviors as they work to organize other aspects of college life.

In a recent study, interviewed students explained that they were unaware of weight gain, but eventually experienced shocking realization (Nelson, Kocos, Lytle, & Perry, 2009). Another barrier to healthy eating and exercise habits was found to be

copied with heavy school workloads (Economos et al., 2008), limited knowledge of stress management, time constraint, and high costs of healthful food (Greaney et al., 2009). Differences in health approaches between males and females' have been identified and must be considered. If colleges and universities are to support their students in making healthy lifestyle choices, they must understand how to combat the barriers identified by students. Dialogue between students and staff will help increase awareness of the problem, and possible solutions can be discussed.

Research Objectives and Questions

The purpose of this study was to explore the positive or negative influences on eating and exercise behavior upon transition to college, to explore the impact of gender differences, and to address possible barriers to adopting healthful behaviors. The targeted sample was undergraduate students attending Oregon State University (OSU), enrolled in a university-required health class. Quantitative survey data was collected regarding students' eating and exercise behavior influences after transitioning to college. The survey solicited information about their preparedness for dealing with specific challenges of college, and specific health behaviors practiced currently. Demographic information, including self-reported height and weight information, was also collected.

The primary research questions and hypotheses included:

A. How do eating behaviors and perceived influences differ among students and by gender after coming to college compared to before college?

Ho 1) There are no significant differences among students in their perceived influence of eating behaviors after coming to college compared to before college.

Ho 2) There are no significant differences by gender in their perceived influence of eating behaviors after coming to college compared to before college.

B. How do exercise behaviors and perceived influences differ among students and by gender after coming to college compared to before college?

Ho 3) There are no significant differences among students in their perceived influence of exercise behaviors after coming to college compared to before college.

Ho 4) There are no significant differences by gender in their perceived influence of exercise behaviors after coming to college compared to before college.

C. What is the perceived preparedness for college, among students and are there differences between males and females?

Ho 5) There are no significant gender differences in students' perceived preparedness for college.

Research Contribution

The main contribution of this research is to show student perception of influences on current eating and exercise behaviors, whether those influences are positive or negative, and how students' behaviors change upon transition to college. Little research has been focused on the barriers that students face as they come to college to make healthy eating and exercise choices. As more awareness is brought forth, university staff will be better able to support and encourage students to practice positive health habits. Health promotion programs can be implemented at the university to educate and create awareness among students in such a way to encourage putting positive health behaviors into action. This research will add to literature which explores the differences between males and females in their eating and exercise influences and behaviors, and how their motivations may differ. Given this exploration into factors of influence, health behaviors, and reasons for these behaviors, the researchers' objective is to promote wholesome lifelong habits that increase quality of life. This data could raises awareness among students, so they are able to implement positive health habits during a challenging time period. In addition, university programs could better help students understand the action needed to make healthy, productive lifestyle choices.

LITERATURE REVIEW

Health behaviors and habits are influenced by a multitude of factors. There is much evidence showing an increased incidence of overweight, obesity, and chronic disease in our country. Ongoing investigation adds to the understanding of how and what factors contribute and give rise to this epidemic. Explanations for the increase in obesity have been proposed including biological, psychological, and environmental factors. The problem is likely multifaceted, related to such factors as food choice, past and present eating behaviors, past and present exercise behaviors, learned health habits, lifespan transition periods, and stress and other individual characteristics.

Health behaviors likely depend on individual personality and upbringing and may include important aspects of socio-economic, cultural, and family background. These influence patterns of regular mealtimes, food exposure, availability and skills, and values relative to health and lifestyle. The transition to college is considered a high risk health period that puts health to the test; marked by stress, change of environment, and adoption of coping strategies, transition to college could be considered a gateway to future health practices and habits (Lowry et al., 2000; Morrow et al., 2006; Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006; McArthur & Raedeke, 2009). The college environment often discourages healthful diet and exercise patterns; research has shown the prevalence of weight gain and obesity among college students (Anderson, Shapiro, & Lundgren, 2003; Levitsky, Halbmaier, & Mrdjenovic, 2004; Hoffman, Policastro, Quick, & Lee, 2006; Mihalopoulos, Auinger, & Klein, 2008; Brown, 2008; Crombie, Ilich, Dutton, Panton, & Abood, 2009). Student perception of the challenges and barriers faced in making positive health decisions enables university support in these efforts. Overall, as college students establish healthy behaviors, they will more likely enter adulthood practicing healthy lifestyles.

Life Course Perspective

Wethington (2005) explains health behavior as a multi-faceted concept; behavior evolves from a lifetime of influences which are adapted to form current

influenced behaviors. The life course perspective helps researchers view health behaviors from the realms of psychology, sociology, and human development. Periods of stability and change in behaviors occur over time and shape current health behaviors and health status. Individual factors (i.e. marital status, education level, etc.), behavior characteristics (i.e. smoking, alcohol use, etc.), and personal factors (i.e. preferences, talents, personality, etc.) moderate how behavior manifests itself. There are seven concepts that apply this life course theory to current health research.

Trajectories are stable patterns of health behavior, such as eating habits that have become well established. Practices build on one another over time and result in the current state of health. Transitions, turning points, timing in life, and strategies used to adapt to health practices are all naturally occurring events that come about over the course of life. As people go through a transition (i.e. graduation, moving away) or turning point (i.e. marriage, births) in their lives, their eating habits tend to change. On such transitional occasions, some individuals may find themselves overwhelmed and unable to maintain a previous eating and exercise behavior trajectory. Leaving home is one such transition for college students; the transition may destabilize eating and exercise behavior trajectories. Intervention and support at the college level would enable students to develop or maintain healthful habits, especially during transition.

Investigation is necessary for researchers to understand the role of eating and exercise behaviors from this life perspective theory. Research continues to help determine how nutrition and health behaviors are influenced during major life changing periods. Greater understanding may facilitate development of educational programs and environmental support structures for those in transition.

Devine (2005) builds further on the life perspective theory, applying it specifically to food choices and how they change. The life course perspective includes the context of time, social, and historical changes in one's life. Food choice is a stable life trajectory, and includes thoughts, feelings, strategies, and actions regarding the choice of food. In adulthood, food choice becomes relatively stable, reflecting historical and current life settings and changes. Young adults are considered a vulnerable group,

as they experience transitions and turning points; these individuals strive to establish independent patterns in their eating and health practices.

The social framework (i.e. gender, social class, ethnicity) is an element of the life course theory. Some have found that food choice may differ by gender; this has become an avenue for further research. To understand an individual's relationship to food, it is important to take into account the social context which helped form their food identity. Research is needed to determine periods in the life cycle that food trajectories become established, as well as periods in which individuals become more likely to make unhealthful behavior changes.

In an article by Segelken (2005), obesity is discussed from a life course perspective. Teaching a healthy lifestyle at a young age is viewed as an important factor in reducing obesity, as the habits learned in early childhood can set a pattern for future habits. Therefore, it is important for parents to model healthy habits such as eating nutritious meals, participating in exercise, and reducing the hours of television watched. Unhealthy practices surrounding food and exercise help set precedence for unhealthy habits later, contributing to the increased prevalence of metabolic syndrome in adults and children.

Looking at nutrition and health habits from a life course perspective takes into account many different aspects of health and how they interrelate. A goal of using this theory in the nutrition realm is to help researchers understand how health and food habits are influenced by historical, social, and temporal context. Transition periods such as coming to college, may mark a time of vulnerability when eating and exercise habits can be influenced and adapted. Ultimately, this research theoretical approach could be specifically applied to such goals as reducing obesity and incidence of chronic disease.

Students in Transition

Individuals living at home with their parents typically practice certain meal and exercise behaviors according to family practice and school routines. Routines and behaviors change during the transition of living at home to living at university. A student in transition must adapt to a new environment, which involves making new

health-related decisions. Eating and exercise behaviors change at university as students become monitors of their own health. Students experience provided campus meals, may no longer be part of a sports team, have changing schedules and free time, and form new social support groups. Contextual factors, such as gender differences, may shape and help explain some differences in behavior when faced with new stresses during a transition.

Branen and Fletcher (1999) give evidence that students' current eating habits were influenced by childhood behaviors learned from their caregivers. Most of the student participants lived away from home and were experiencing changes in life that affected eating habits. However, it was found that students practiced consistent eating habits which were guided by those learned during childhood. Forty-four percent of participants said they were 'often' or 'always' required to clean their plate at home; 69% reported that they currently cleaned their plates. Whether a student currently eats regularly scheduled meals was shown to depend on being fed regularly scheduled meals at home.

A study by Unusan (2006) examined Turkish university students' food preferences while living at home, and then upon coming to college. Mothers were asked to recall their student's food preferences and habits as a child, then the students provided information regarding current habits and preferences. Parental influence was a significant factor in current food preferences. While 69% of mothers reported that their child 'often' or 'always' ate vegetables, 77% of students eat vegetables currently. A significant increase in preference for bread was shown, while milk and milk products showed significant decreases in preference. Overall, conclusions from this study demonstrate that parental influence is a significant determinant of current student food preferences and habits.

Cason (2006) explains that family food practices and mealtimes can have a powerful effect on children's future health habits. It was found that those who had more family meals consumed more fruits, vegetables, and milk, and less fried foods and soda. In light of these positive findings, it is evident that 53% of adolescents do not have regular family meals. An environment such as the family, which fosters good health

habits, support during challenging times, and a feeling of togetherness, is likely to help improve the health of all involved. Ultimately, if positive health behaviors are taught during childhood, these behaviors are more likely to be continued into adulthood to improve many public health concerns, including diet quality and overweight.

Evidence is limited but research is consistent in showing that health habits learned from family or previous behaviors can affect current behaviors. Current food preferences and eating habits are significantly influenced by those learned as a child growing up. This evidence also shows that unhealthful learned habits also carry into adulthood; parents should be encouraged to teach their children the benefits of adopting healthy eating and exercise habits. Coping skills and a positive social network may help to support individuals as they face challenges to making healthful decisions. Studies have looked at college health behaviors, but limited work has been done to explore young adult behaviors from the life course perspective and how transition to college positively or negatively affects health.

In a study of female college freshman it was well-documented that leaving home and transitioning to college is associated with a weight gain unassociated with growth and maturity (Butler, Black, Blue, & Gretebeck, 2004). Females who moved from home to attend college were 2.6 to 5.2 times more likely to gain weight than those who did not leave home; the weight gain was 15% or more above ideal body weight. Female students gained weight, though they reported a reduction in caloric intake. Researchers were led to believe that during transition, participants reduced their level of physical activity. Report of increased fat-mass and decreased fat-free mass further supports the theory of reduced physical activity. This study suggested that college students may reduce their level of physical activity, rather than an increase in calories, and how physical activity reduction may more strongly predict weight gain.

University students transitioning to life away from home may be more inclined to gain weight, as their diet and exercise patterns adapt and change. In the study by Racette, Deusinger, Strube, Highstein, and Deusinger (2005), researchers documented a body weight increase in 70% of students between the beginning of their freshman year and the end of their sophomore year. The average weight-gaining participant gained

about nine pounds. Over the course of the study period, exercise participation did not change. However, it was shown that aerobic exercise declined while stretching exercise increased among students. Students did not consume adequate amounts of fruits and vegetables, and reported consuming fried and fast foods at an inappropriate level. These habits, if continued into adulthood, could help explain the rise in obesity among young adults.

Weight gain during the initial transition period has become a concern, especially as obesity and overweight increases in our society. The college years may have an important role in the trend toward obesity. During transition to college, students adapt to a new environment and new lifestyle away from home. Healthy habits should be encouraged, and universities should provide an environment conducive to positive health behaviors. Literature shows that initial college weight gain may result from reduced physical activity, but contributing studies also show that healthful diet is lacking. Further research should examine student perception of the factors influencing their eating and exercise decisions amidst the challenges of college transition.

The factors used to cope with stress have been shown to influence eating habits. The effect of stress on weight gain is unclear; however young adult populations are more likely to over-consume food during periods of stress (Laitinen, Ek, & Sovio, 2002). The transition to college contributes to stress; change in location, social support, and workload are some contributors.

Investigators Zellner, Loaiza, Gonzalez, Pita, Morales, Pecora, et al. (2006) conducted two experiments looking at the food selection of undergraduate students. Women tended to choose foods higher in calories, fat, or sugar; foods that they may usually choose to avoid. Findings suggest that women's inhibition to avoid sweet foods may be disengaged during stressful periods. Women reported overeating 46% of the time, while only 17% of men overeat while stressed. Additionally, most people who ate when stressed reported eating foods that they normally avoid, many times foods that are high in calories or fat.

It has been thought that stress-induced eaters who restrain from certain foods are more at risk for weight gain. Investigators performed a review of the literature, and

looked at the relationship between restrained eating, stress, and weight gain (Lowe, & Kral, 2006). Based on the review, it was found that certain individuals may be predisposed to overeating if they restrain from certain foods, then become overwhelmed. Investigators found that the cognitive load of a situation, rather than the actual stress, interferes with restrained eaters' food monitoring cues. As the restraining cues are disengaged, someone who normally abstains from certain foods may instead consume them. Results remain inconclusive about the relationship between stress, weight gain, and restrained eating.

Economos, Hildebrandt, and Hyatt (2008) found that over the course of their first year, all students perceived an increase in stress or life event changes relating to academic and living situations. In this study, males and females gained weight during college, but the average freshman weight gain may be around 5 pounds, rather than the supposed 15. Alcohol, often attributed to stress, was associated with weight gain among males. The study suggests that weight loss may also be associated with increased stress. It is possible that weight change may not be so much related to the quantity of stress, but how the student reacts to their perceived stressors.

The transition period from living at home to living at college, is often marked by an overwhelming period of stress that can affect health in various ways. Eating and exercise behaviors can change under stress; lack and structure of time, meeting new people, dining halls, and frequency of alcohol use may potentially be affected. Some individuals overeat during stressful times. Foods chosen are often those typically avoided or restricted; foods high in calories, fat, or sugar. Following restrictive eating patterns, then disengaging those habits during frequent periods of stress may lead to weight gain. Alcohol consumption is an issue of concern for college students, as consumption typically increases and may contribute to weight gain. However, students may be less likely to abuse alcohol if they receive support to participate in other activities.

College Student Weight Gain

As the United States experiences a rise in obesity incidence, some prevention strategies have attempted to identify critical periods of weight gain across the life span. Anderson, Shapiro, and Lundgren (2003) performed an initial evaluation to examine whether the transition from high school to college is such a critical period. The study found that student participants gained a significant amount of weight during their freshman year, and the gain tended to occur at the beginning of the year. It is worth noting that the number of students classified as overweight or obese increased noticeably during the first semester. In fact, the number of overweight or obese participants virtually doubled during the study period (8 months). Researchers state that the number of participants with larger weight gain may have chosen not to participate in the second half of the study, under-representing those who gained weight.

Levitsky, Halbmaier, and Mrdjenovic (2004) looked at freshman weight gain and its possible link to the obesity epidemic in America. Researchers confirmed that the rate of weight gain in this population of college freshman was significantly higher than that of the general population. Two linear regression models were generated to fit the weight gain data. In both models, 'all you can eat dining halls' and snacking and eating 'junk food' were factors explaining weight gain. The authors discussed that lifestyle factors and eating habits practiced at college significantly predicted weight gain. Researchers did not look at activity level in detail and males were under-represented in the sample.

Another study conducted by Hoffman, Policastro, Quick, and Lee (2006) set out to test the validity of the 'Freshman 15'. Although researchers found that three-fourths of participants gained weight during their freshman year, the mean weight gain was 7 pounds, as opposed to the hypothetical 15 pounds. Study participants were not overweight or obese initially. At the end of the study period, the average BMI had only increased by one unit (22 to 23); as a group, students were still not considered overweight or obese. Researchers did not take diet or activity records, so characteristics that distinguished individuals who gained, lost, or maintained weight could not be assessed.

A Canadian university study investigated college students' place of residence and change in eating habits early in their freshman year and again five months later. The most significant finding of this study was that vulnerability to weight gain exists as a function of place of residence and restrained eating (Pliner & Saunders, 2007). Students showed significant weight gain, but not all students shared the same vulnerability to gain weight. Those living on campus and who scored high in dietary restraint were shown to have substantially higher increases in weight gain than other groups. This study identified a specific group of students at risk for weight gain, and established diet as an independent risk factor. Students, whose diets changed dramatically in an 'unhealthy' direction, gained the most weight.

Another study looking at college weight gain in freshman by Mihalopoulos, Auinger, and Klein (2008) recruited 582 freshmen, to test the validity of the 'freshman 15.' Overall, students were found to gain weight. Over 50% of the students who gained weight, gained an average of 7 pounds. Though not the alleged 15-pound gain, investigators conclude that if individuals proceed with the same rate of weight gain, over a period of several years they would become obese. Freshmen were in fact, shown to have a weight gain 5.5 times higher than the general population.

A recent study focused on freshman women's eating and exercise behaviors, and their relationship to weight change (Jung, Bray, & Ginis, 2008). Results of the study found that all women decreased their caloric intake over a period of 12 months; however 66% of the women gained an average of 3.08 pounds. Diet and exercise patterns were assessed at four different times throughout the study, to give an accurate depiction of change in long-term patterns. Physical activity patterns remained similar to previous among women who lost weight; physical activity decreased in those who gained weight. This study did not ask students about barriers to maintaining or implementing healthy eating and exercise patterns.

In a review of the literature, between the years 1985 and 2006, 333 articles were found to refer to the 'Freshman 15' or freshman weight gain (Brown, 2008). Investigators thoroughly searched 23 databases to explore whether the weight gain is based on truth or based on popular assumption. Fourteen studies from peer-reviewed,

evidence-based journals yielded a total of 1858 subjects. The average weight gain among subjects over their freshman year of college was 4.6 pounds. One specific study asked students about their perception of weight gain over the course of the year. Though no measurable weight gain was found, the students self-reported a gain of four pounds. Overall, research beginning in 1985 until 2006 shows that the 'Freshman 15' is a myth. Students tend to gain weight, but not near the amount that is popularly assumed.

Crombie, Ilich, Dutton, Panton, and Abood (2009) conducted another review of 17 studies focused on methodologies used to predict weight change in freshman university students. Factors found to influence weight change in students include: initial BMI, eating behaviors and patterns, gender and ethnic differences, place of residency, and physical activity. This study found that overall weight changes ranged from 0.7-3.1 kg, again a smaller amount than is suggested by the freshman 15 myth. The review found that many studies are not specific on type of physical activity, which makes it unclear whether weight gain is from fat or lean muscle. Dietary restraint was found to be a major contributor to weight gain; however studies fail to distinguish between the forms of restraint. Overall, it was found that college students experience modest weight gain; more research regarding specific segments of this population prone to weight gain is needed.

The literature has shown that though there is evidence of a significant weight gain during the freshman year of college, this gain is not as large as once thought. Though the research has established that diet and exercise are factors that can contribute to weight gain, evidence is lacking that looks at specific influences. The relationship between eating and exercise behavior and how it influences college student weight gain is unclear.

An early longitudinal study looked at body composition changes from adolescence into adulthood (Guo, Chumlea, Roche, & Siervogel, 1997). Obese adolescents were found to have high probability of becoming obese adults. This study described the patterns of change in body composition of total body fat (TBF), % body fat (% BF), and fat-free mass (FFM). Patterns show that body composition is affected by an individual's level of maturity, which may continue into young adulthood. Rapidly

maturing adolescents tend to have significantly larger amounts of TBF, % BF, and FFM than those who are slow to mature. Therefore, it is possible that patterns and habits established as an adolescent may persist and, if habits are unhealthy, contribute to obesity during the college years. As an individual's growth slows, their metabolic rate slows. If the decrease in need is not met with decreased calorie consumption or increased physical activity, an individual has the propensity to gain weight.

In a recent study, Delinsky and Wilson (2008) show further evidence for significant weight gain among women in the first year of college. The amount of weight gained was approximately 3 pounds. There is evidence that dietary behavior changes during the freshman year; dietary restraint, body image disturbance, and disordered eating became issues among women during their first year away. Two-thirds of subjects reported at least moderate concerns with the freshman 15, and by the end of the study further evidence supported that many first-year women struggle with body image. A high attrition rate in this study caused potential bias and was considered a limitation. With further discovery of the relationship between the freshman 15 and disordered eating, researchers may advance the knowledge and understanding of those at risk for weight gain.

A study by Racette, Deusinger, Strube, Highstein, and Deusinger (2008) considered the importance of looking at weight and behavior changes over a longer time, from freshman to senior year of college. A questionnaire was given to students at the beginning of their freshman year, and again at the end of their senior year. As other studies have shown, researchers found that students' weight increases modestly but significantly from freshman to senior year. Weight gain at a rapid rate was found among freshman; however this rate slowed as participants proceeded through 4 years of college. During their freshman and senior years, nearly one-third of the student participants did not meet recommended exercise patterns. Furthermore, researchers were concerned to find that less than one-third of students met recommended servings for fruits and vegetables during freshman and senior year assessments.

A recent exploratory study by Cluskey and Grobe (2009) found that college students gained weight, with males more likely to show gains. This focus group

attempted to understand the student experience in attempting to adopt healthy eating and exercise behaviors during transition. Many students expressed that establishing and maintaining healthful behaviors was difficult without a routine and the support of others. Other reasons given included a lack of time management, food preparation skills, and motivation. Males and females agreed that healthful eating habits, rather than exercise, posed a greater maintenance challenge during college. The focus groups revealed that students were somewhat unconcerned with establishing healthful lifetime behaviors, although female participants more often sought strategies to foster healthful behavior development. This study provides framework for the current study to further investigate the students' perception of barriers to a healthful college lifestyle.

After a review of the literature concerning the freshman 15, it appears that this phenomenon is a myth. Though many studies have shown that students gain a significant amount of weight, it remains that the amount gained is in the range of 3-7 pounds. Understanding characteristics of students experiencing weight gain, and the difficulties perceived by college students should be a future research focus.

Researchers compared methods used for weight control among obese, overweight, and non-overweight adolescent males and females (Boutelle, Neumark-Sztainer, Story, & Resnick, 2002). Healthy and unhealthy weight control methods were defined by researchers; a direct relationship was found between overweight status and unhealthy weight control behaviors (i.e. use of laxatives, diet pills, vomiting). Overweight and non-overweight adolescents were found to have low consumption of fruits and vegetables, as well as inadequate exercise. Overweight adolescents were more likely to practice unhealthy weight maintenance behaviors and less likely to practice healthy behaviors. In fact, overweight females were twice as likely as non-overweight females to use unhealthy methods of weight control. This study is limited in that it cannot prove causal relationship between overweight status and unhealthy weight behavioral patterns.

A study by Levitsky, Garay, Nausbaum, Neighbors, and DellaValle (2006) included control and experimental groups of female freshman during two consecutive

fall seasons as researchers tested the effectiveness of daily weight monitoring to prevent weight gain. The experimental group weighed themselves daily and a Tissue Monitoring System (TMS) recorded changes in body tissue. The control group, weighed at the beginning and end of the semester, gained an average of 2 - 3.1 kg. The group who recorded weight daily gained -0.82 - 0.1 kg body weight. The significant weight gain of the control group enabled researchers to conclude that daily weighing helped experimental participants maintain their weight throughout their freshman year. Individuals, without being counseled on particular weight management strategies, were able to monitor and adjust their own weight and behavior according to their daily TMS reading. This study, however, only had 11 participants in the experimental group and 15 control participants.

A non-diet approach (NDA) to weight loss and maintenance is used to counter the prevalent concept of restrictive dieting for weight loss. Marchessault, Thiele, Armit, Chapman, Levy-Milne, and Barr (2007) interviewed Canadian dietitians to gain opinions of the effectiveness of this approach. Dietitians agreed that this approach includes emphasis on promoting a healthy lifestyle and long term changes that will improve their clients' health. It was noted that the NDA seeks to help clients establish positive relationships with their bodies and/or with food. Strategies given to clients include: normalize eating through regular meals without restrictive eating or overeating, avoid "good food, bad food", and advice to eat "mindfully". A combination of size acceptance and non-dieting takes the focus off of weight loss and asserts that implementing recommended healthy behaviors will improve quality of life regardless of weight. The researchers discuss a benefit of this theory; while traditional weight loss programs observe greater initial weight loss, most Health-at-Any-Size programs witness greater long term weight loss and improved psychological states.

Maintaining a loss of weight during an intervention is known to be a great challenge. Researchers had a group of 35 men and 69 women with an average BMI of 30.9 (Lally, Chipperfield, & Wardle, 2008). Participants in the intervention group were given a leaflet with simple advice regarding nutrition and activity recommendations; no professional contact took place. The leaflet contained information promoting weight

loss and maintenance such as walk 10,000 steps a day, choose reduced-fat foods, caution with portions, and get your 5 a day. After 8 weeks, study participants achieved significant weight loss as compared to controls; at 32 weeks the quality of life continued to improve for those continuing participants. Though the amount of time needed for participants to form healthier habits was greater than expected, it was still comparable to habit formation in other studies. This study did not present information regarding which strategies and behaviors helped participants the most in their weight maintenance, nor did they share information about barriers the participants faced in making behavior changes. Overall, this study showed that a simple handout containing weight loss information proved effective.

It has been shown that students typically gain weight during their freshman year of college. Weight maintenance has been a recent issue of special concern as our country faces an obesity epidemic. College-age students are a group of individuals who experience the greatest weight gain. It is, therefore, worthwhile exploring methods to promote weight maintenance and to explore strategies used by individuals who are successful in maintaining a healthy weight. Strategies such as daily weighing (Levitsky et al., 2006) and moderating diet and exercise have been suggested, while unhealthful practices include purging, laxative and pill use, and skipping meals (Boutelle et al., 2002). The literature shows that strategies may be implemented to promote behavior change; however research is lacking regarding the most successful behaviors to maintain weight. Research concerning the motivation behind behavior change and the barriers faced by those trying to maintain weight are also areas lacking for college students. Methods of behavior change may be uncomplicated, as with a leaflet (Lally et al., 2008), or effective through a non-dieting approach (Marchessault et al., 2007). As investigators learn to better support individuals, positive lifestyle choices will lead to better weight maintenance.

Stotts, Lohse, Patternon, Horacek, White, and Greene (2007) look at eating competence (EC) as a prevention method for obesity. Competent eaters have positive attitudes about food. Findings of this study conclude that as college students develop EC, males are more likely to eat recommended fruit servings and participate in vigorous

exercise. Women are less likely to have uncontrolled and emotional eating patterns as their EC increases. These discoveries lead to the conclusion that eating competence may help college students make healthier, more controlled decisions related to diet. Researchers consider these findings justification for promoting EC in young adults in the form of a curriculum.

The behavioral management approach works to combat obesity by providing individuals with positive behavior-change strategies (Johnston, Tyler, & Foreyt, 2007). Five strategies are typically used together and are successful at achieving short-term weight loss. These strategies include self-monitoring (i.e. self-weighing), stimulus control (i.e. leaving exercise clothes in plain view), cognitive restructuring (i.e. managing extreme beliefs/perceptions about weight), goal setting (i.e. identify attainable, measurable goals), and problem solving (i.e. identify and overcome obstacles to goal). This study demonstrates that behavioral management can be a positive approach, but more study must be done to determine how it fits into a long-term weight loss plan.

In an original article by Altantis and Ball (2008), research suggests that perception of overweight and underweight may be risk factors for medium and high levels of psychological distress and depression. Those who perceived themselves overweight were at significantly higher risk for psychological distress. A strong association between psychological distress and individuals who perceive themselves as underweight was also found. These results propose that those individuals whose perception of weight differs from social ideal are at more risk of psychological distress. Healthy attitude and a realistic perception of weight is a target goal for public health officials. Causality could not be determined in this study, and more research is needed to understand relationships between perception of weight, body acceptance, and psychological distress.

Behavioral management and weight perception are two components of weight maintenance. Investigators suggest that increasing eating competence in college students may enable them adopt healthier behaviors regarding diet (Stotts et al., 2007). Follow-up research should be done to decide how individuals can build their eating

competence. Behavioral management of eating and exercise is an approach that may assist individuals in monitoring their weight short-term (Johnston et al., 2007). Research to determine how the behavioral approach can work into long-term weight maintenance is still needed. Monitoring behaviors and helping individuals create a positive perception of their weight may help improve overall lifestyle. More study is needed to determine relationship regarding weight perception, realistic body acceptance, and depression (Altantis & Ball, 2008). Research implies that managing actual behavior is often not enough to maintain long-term weight loss (Johnston et al., 2007); furthermore these behaviors could lead to negative body perception, rather than competence (Stotts et al., 2007). Further research is needed, looking at college students' perception of their habits and their actual behaviors. Realistic acceptance and goals can help young adults adopt healthful attitudes and lifestyles to be practiced long-term.

In an early study Hodge, Jackson, and Sullivan (1993) concentrated their research on college freshman females. The two objectives set forth were 1) to determine the direction and amount of weight change needed, if any, and 2) to identify characteristics related to weight change (self-esteem, body image) over the course of 6 months. After 6 months the average weight was found to not differ significantly from initial weight (time 1=130.57 lbs; time 2=131.45 lbs). More participants were found to maintain weight than gain or lose weight, and no significant correlations were found between personal characteristics and those who changed weight. Those who lost weight, however, were found to have less favorable self-evaluations of physical appearance and health. It was also found that among women who lost weight, those more concerned with appearance, fitness, and health achieved less weight loss.

A study of 40 college female freshmen looked at the effects on weight status of a semester-long intervention course in nutrition science (Matvienko, Lewis, & Schafer, 2001). The study included a test at baseline, 4 months, and 16 months; a one-year follow up with just three subjects was also included. Report shows that the class helped improve student's knowledge of nutrition, energy metabolism, and energy balance. Those surveyed one year later were able to retain the information learned from the class. It was also found that 70% of the students did not change weight within the 16

months of study. The intervention proved to be a positive influence in helping participants with a higher BMI maintain their weight; controls meanwhile gained weight. This study shows the importance of educating individuals, however only the dietary component of weight maintenance was addressed.

A study at Cornell University by Levitsky, Halbmaier, and Mrdjenovic (2004) sought to determine the weight change in first freshman during the first semester; they also explore the factors that may attribute to weight gain. Researchers confirm the ‘freshman 15’; students gained 1.9 kg in the first 12 weeks. This amounts to 158.3 g/week, where other studies have predicted 76.57 g/week and 103.85 g/week. This study confirms that college freshmen are at risk for rapid weight gain in their first year; a greater risk than is exhibited in the general population. Two models explaining weight gain were highly significant. Both models found that students attributed weight gain mostly to number of evening snacks, number of meals consumed on weekends, consumption of junk foods, and recent dieting. On a college campus ‘all you can eat’ dining centers may contribute to the weight gain experienced among freshman. Further research is needed to investigate the diet and exercise barriers of maintaining weight from a student perspective.

Butler, Black, Blue, and Gretebeck (2004) contributed a work looking at diet, physical activity, and weight changes associated with freshman women transitioning to college. Research found that women’s body weight increased during the 5 month study period. Energy consumed actually decreased through the study, which indicates a decrease in physical activity, as the likely factor that contributed to weight gain. A reduction in physical activity is confirmed, as fat-free mass was shown to decrease and fat mass increase. Study results support the use of education programs in the areas of diet and exercise to help decrease risk of weight gain among college women at risk. More research is needed to further identify barriers to weight maintenance regarding exercise and diet.

In a study by Morrow, Heesch, Dinger, Hull, Kneehans, and Fields (2006), researchers used a dual-energy X-ray absorptiometry (DXA) machine to measure body composition and weight change in freshman women. Participants were measured during

the fall and spring semesters of the school year. Though body weight increased significantly between two testing periods, the average gain was 2.42 pounds. No significant changes in body composition or physical activity were found. This study suggests that the 'freshman 15' myth may cause students to adopt a negative view of body weight, encouraging future health problems. Limitations of this study include self-selected participants, none of which were obese (average BMI = 21.9). No nutritional data was collected, and about 50% of participants met the current recommendations for vigorous physical activity. Research is needed to determine more precisely the explanation for weight gain, and the barriers faced by students that cause weight gain.

Dawson, Schneider, Fletcher, and Bryden (2007) examine gender differences in health behaviors among Canadian college students. Ten of the 16 health behaviors queried show significant gender differences. Males were found to engage in more risky health behaviors such as alcohol and tobacco use. Positive findings revealed that males more frequently participated in physical activity and social activities, as compared to females. In this study, positive activities may contribute to males' perception of health status as 'excellent'. Women have been more likely than men to perceive themselves as susceptible to health threats, which could explain why more females chose to rate their health status as 'good'. More research is needed to investigate the changing roles of food and physical activity among new university students. Specific gender barriers perceived, associated with healthy eating and exercise, must also be further investigated.

A study looking at weight goals and perceptions among Hispanic and Anglo college females found that 30% of participants were overweight or obese (Shamaley-Kornatz, Smith, & Tomaka, 2007). Sixty-percent of the women, and 85% of overweight women expressed a desire to lose weight; these numbers were higher than previous studies. However, few of the participants followed expert recommendations for sustained and healthy weight loss; that is caloric restraint with physical activity. Hispanic women were found to more often engage in exercise than Anglo women; both groups of women expressed similar concern with weight. Study findings reveal that many participants resorted to unhealthy diet practices such as meal skipping and fasting

(76%), bingeing (46%), and extreme forms of dieting (17%). This study shows that individuals may more frequently practice unhealthy weight loss behaviors, rather than a combination of diet and exercise for healthful weight maintenance. Research is needed to delve into the barriers and issues faced by college individuals and weight.

Yager and O'Dea (2008) look at body image and eating disorders among college students. This study seeks to analyze university programs focused on education to improve body image and prevent eating disorders in an age where obesity is also very prevalent. This review of literature reveals that most studies are limited by small sample size and sole inclusion of females or psychology students. Successful education programs included media literacy and the use of Cognitive Dissonance Theory. This theory says that when there is a dissonance, or inconsistency, in one's health belief and their behavior, the individual will be motivated to overcome the inconsistency. Education-based programs that aim to improve individuals' ability to understand the difference between media promotion and healthy practices may help to overcome psychological barriers of body image and disordered eating. Use of computer technology has also proven to be successful, with online support groups for behavior change. More exploration is needed to focus on specific barriers to healthy weight, and effort must be put forth to implement support for overall healthy lifestyle.

The first year at university marks a transition period where young men and women are establishing their own health behaviors, which could have bearing on future health status. It has been found that gender influences perception of weight, as well as some health behaviors practiced by males and females (Dawson et al., 2007). Though women may be more aware and concerned of their health status, they may be less likely to adopt behaviors that support weight maintenance or weight loss (i.e. exercise, positive body image). It has been found that often those desiring weight loss or those most concerned with weight, are often those who are overweight are not able to maintain weight (Hodge et al., 1993). The issues and barriers that these individuals are faced with must be further examined in order to more fully address the issue of weight maintenance. There is also lacking evidence in the literature regarding males.

Student Diet and Exercise Behaviors

According to Healthy People 2010, overweight and obesity was on the top ten list of important public health issues to be addressed (American College Health, 2009). Obesity can involve a myriad of factors including genetic, dietary, and exercise behaviors. In their study, DeBate, Topping, and Sargent (2001) found that most of their college participants did not consume the food categories or portion amounts recommended in the food guide pyramid. In fact, 82.2% of respondents did not meet the recommended servings of fruits and vegetables within the previous 24 hour period. Their findings were also consistent with earlier studies stating that college men, on average, eat 2.5 fast food meals per week, while college women eat 1.9 fast food meals per week. A larger proportion of African Americans in the study were found overweight or obese. This population was found to consume lower percentages of fruits, vegetables, grains, and dairy as compared to white college students. The lack of consumption of essential nutrients may help explain the significantly greater weight gain among African Americans, especially females, during college.

Edwards and Meiselman (2003) conducted a study in England of first-year university students. Changes in self-reported nutritional intake and body weight were reported. Energy intake significantly declined in the period from September to January; however BMI did not change significantly. Decreased physical activity may explain the fact that the decline in energy intake did not cause weight loss. More analysis of this study would need to be carried out to find further insight of energy intake and expenditure balance.

There is evidence in the literature that the typical college diet lacks nutritional quality. Speculations to explain inadequacies include meal skipping, inadequate food variety, fast foods consumption, lack of nutrition awareness and understanding, and low self-efficacy (DeBate et al., 2001). Individuals may choose diet as to be means of weight maintenance and control (Cluskey & Grobe, 2009), which reinforces the importance of educating students regarding nutrition. The first year of college marks a time when changes occur in behavior and environment that may have profound effect

on eating habits (Edwards & Meiselman, 2003). Investigation must be continued to seek out the barriers that keep first-year students from making healthy dietary choices.

Many college students include little or no exercise in their daily routine, and as many as 46% may live sedentary lifestyles. An early study by Pinto, Cherico, Szymanski, and Marcus (1998) followed students longitudinally through their first year of college to assess whether a decrease in physical activity occurs. They also wanted to find out characteristics of those students who are at risk of being sedentary. Researchers found no significant reduction in exercise participation over the course of the study. Forty-two percent of students however, were either inactive or exercising below the recommended level. However, the percent of those reporting some exercise was higher than the national average. Students suggested monthly newsletters as an effective means to encourage active lifestyle. Further research regarding barriers to exercise should be carried out.

Gyurcsik, Bray, and Brittain (2004) completed a study with students who were in transition from high school to college. The researchers asked about barriers to vigorous physical activity using a multidimensional ecological framework, which includes five levels of barriers. Findings suggest first that students did not meet recommendations of 3 bouts of vigorous activity per week. Furthermore, students indicate that the barriers to physical activity fall into categories of intrapersonal, interpersonal, institutional, community, and physical environment; these components make up the multidimensional ecological theory. Twenty-five percent of the barriers were in the intrapersonal (or individual) category, while 75% of the barriers stated by students fell into the remaining four categories. This study implies that students in transition are faced with a multitude of barriers, and intervention programs should be prepared to address them. Research is needed regarding types of barriers and the characteristics of individuals that are faced with specific barriers.

Exercise and physical activity is beneficial in both physiological and psychological senses (Pinto et al., 1998); it provides many benefits, including weight control and maintenance. However, evidence has shown that as much as 75% of North

Americans do not engage in vigorous physical activity on a regular basis (Gyurcsik et al., 2004). It is possible that there is a trend of decreasing physical activity as individuals age; major transition points (such as moving to college) have bearing on health habits. University students represent a significant number of young adults, and represent a population that has been known to experience increased health risk factors (Gyurcsik et al., 2004). To understand why individuals, particularly during college, reduce amounts of physical activity, research regarding barriers to physical activity must be continued. "Research should focus on identifying specific and salient barriers to the adoption and maintenance of physical activity in specific populations," as stated by Gyurcsik et al. (2004, p. 131).

Healthy diet and exercise behaviors together may be a large contributor in reducing the prevalence of US overweight and obesity. Lowry and colleagues (2000) looked at undergraduate college students in colleges across the US, their participation in physical activity, and their food choices. It was found that 35% of students were overweight or obese, and 46% were currently trying to lose weight. Those who were trying to lose weight were more associated with behaviors such as vigorous activity participation, strengthening exercises, and consumption of fewer high-fat foods. Exercise and diet were both used as means of weight control by 54% of females and 41% of males. Only one in three students who were trying to lose weight remembered receiving information from their college regarding healthy physical activity or nutrition behaviors. This provides a challenge to universities to get involved in the health of their student body.

Health and nutrition views and practices of undergraduate college students were examined by Cason and Wenrich (2002). Students are known to adopt a diet high in fat, high in cholesterol, high in sodium, and lacking in fruit, vegetables and variety. Barriers to healthy behaviors were found to include: influence of friends not interested in healthy lifestyle, going out to eat or drink, time constraints and lack of time management, unhealthy food served on campus, and lack of motivation. Males were found to eat more than females, including fast food, snack foods, meats, and dairy products. Though students were aware of their unhealthful choices much of the time, they do not correlate

current habits with current health status. Furthermore, students did not plan on making future changes in their eating or exercise behaviors. There is need for programs or incentive for students to address and overcome their barriers to healthy eating and exercise behaviors.

A recent study assessed physical activity, diet, and overweight or obesity status among college students. Huang et al. (2003) found that most college students are not meeting recommendations for physical activity or dietary composition. More than 69% of students reported eating fewer than 5 servings of fruits and vegetables per day, and more than 67% of students obtained fewer than the recommended 20 grams of fiber per day. These results coupled with the fact that students participated in physical activity less often than three days per week. Huang reported consumption of fruit and vegetables was slightly higher than the national consumption (78.4% consume less than 5 servings); 16.1% of students engaged in no physical activity, while the national average for the same age-group was 22.4%. It is necessary to encourage healthy habits and interventions during college years, because behaviors and lifestyle is still in the formation process.

Driskell, Kim, and Goebel (2005) report on the differences in eating and physical activity habits between lower and upper-level university students. Eating habits worsen over the course of the college years, though students often perceive their habits as fair. Little difference was found in snacking behaviors of lower-level versus upper-level students. Students that chose no vegetable snack versus 1-2 vegetable snacks was 48.5% and 39.2%, respectively; while those choosing no and 1-2 cracker/granola bar/popcorn snacks was 33.5% and 47.9%. These results show that a greater percentage of students choose energy-dense snacks, verses snacks higher in vitamins and minerals and lower in calories. Factors influencing food choice included: convenience (53.4%), taste (42.9%), cost (40.3%), health (31.9%), weight control (23.5%), and family/friends (5.7%).

Forty-two percent of upper-level and 47.8% of lower-level students reported participating in aerobics exercises at least 3 times per week; 48.2% of lower-level and 36.4% of upper-level students engaged in this exercise for more than 31 minutes. These

results were slightly greater than national averages and recommendations from American College of Sports Medicine, and suggest that eating and exercise behaviors change little through the college years. Depending on students' established habits before college, universities should put more effort into penetrating barriers that students experience in making healthy eating and exercise choices.

Conclusions

A substantial number of young people readying themselves to enter the work force and become responsible adults; many choose to prepare themselves by attending college or university. Current trends have identified many rising health concerns, including overweight and obesity, lack of nutritious diet, and lack of physical exercise among college students. Those who are overweight during late adolescence have higher risk of being overweight in adulthood. More young people are choosing to attend college, and so experience the transition from adolescence to adulthood as they enter university. The transition to college is a high risk period for health marked by increased stress, new environment, and adapting to life away from home; it is the gateway to future health practices and habits. The college setting is, therefore, an ideal time to reach students and instill healthy eating and exercise habits.

Diet and exercise contribute to healthy weight maintenance, but are often met with challenges, keeping individuals from practicing the healthy behaviors in every day life. The relationship between reduced exercise and lack of nutritious diet provides an avenue for researchers to further investigate; more can be discovered regarding the connection with overweight/obesity. Habits and behaviors are formed during childhood and may have great influence on health habits as a young adult (Cason & Wenrich, 2002). As we progress in our understanding of student behaviors and changes that occur during transition, we can decide how to better address the challenges. This study contributes an exploration of student perception and lifestyle behaviors associated with weight management. Eating and exercise habits are the main areas of focus in this research. Current factors which influence eating and exercise behavior, as well as specific health behavior changes and perception of preparedness upon coming to

college are investigated. If young adults are able to establish healthy habits in early college years, these individuals may be likely to continue healthful practices for life.

MATERIALS AND METHODS

The purpose of this study was to investigate eating and exercise influences and changes upon undergraduate students before and after coming to college. This research attempts to support previous literature showing that upon transition to college, students experience challenges that deter them from practicing healthy eating and exercise behaviors. In order that students are supported by their college or university during transition, schools should strive to educate and raise awareness among students so they will be motivated to implement positive habits.

Study Participants and Setting

Four-hundred and seven male and female students enrolled in a Lifetime Fitness and Health lecture at Oregon State University (OSU) made up the total sample population. From the group of 407 students, a sample size of 247 individuals (n= 101 males; n= 136 females) completed surveys. The lecture is a Baccalaureate Core course, required for students across all fields of study. While open to all ages, enrollment is primarily freshman and newly admitted transfer students, living in their first year away from home. The researchers chose to survey one section of 407 participants, out of three total sections taught. The course was chosen to represent a cross-section of students at one point in time.

The students in the lecture class are considered a convenience sample of all majors, all racial/ethnic groups, male and female students over 18 years of age at OSU. The Lifetime Fitness course was chosen because most of the students taking the course are in their first or second year at university. The study population of interest includes a large group of particular individuals; those living away from home for one year or less make up the cohort of interest. These students are representing the typical student in recent transition from living at home to living at college.

Procedure and Protocol

The Lifetime Fitness and Health lecture course, section 001 was surveyed on Monday, February 9, at 10am. Researcher visited the classroom, where the survey was distributed and collected within 15 minutes of one class day. The researcher recruited five assistants to aid with collection on the day of survey distribution. Three-hundred and seventy-five copies of the survey instrument were brought to the auditorium classroom to hand out to willing student participants.

Ten minutes before class, the researcher and assistants began preparing and handing out the instrument to students coming into the classroom. Five assistants and the researcher had a designated entrance assignment, to ensure that all students would have the opportunity to obtain a survey. At the beginning of class, the researcher read the informed consent information to students, describing qualifications and rights of the students who voluntarily chose to participate. Students were notified about time for completion and directed to pass surveys to their aisle seats for speedy collection by assistants.

Before leaving the auditorium, the last survey page with any name and/or contact information was separated from each survey. Students had the option of offering contact information to receive results of the study. Those who chose to offer contact information were entered into a prize drawing; eight equal awards of \$25 gift certificates from the OSU Bookstore were given. The separation of contact information from survey responses enabled all students to remain anonymous.

Institutional Review Board Approval

Prior to distributing the survey instrument to students, the researcher received her Certification of Education for the Ethical Use of Human Participants in Research Projects through Oregon State University (OSU). An application packet was submitted to the Office of Research Integrity containing all relevant information regarding the upcoming survey distribution and study. As the survey contained minimal risk, this written application was approved by the OSU Research Office as exempt from full

board review. In addition, a waiver of informed consent was approved for participants 18-65 years of age. Researchers received full approval to proceed.

Survey Instrument Development

The survey was organized into four sections and an additional demographics section. Questions 1 and 2 asked the student to rate 10 current influences each upon eating and exercise behaviors: “Rank how these influences affect your eating/exercise behaviors while currently at OSU,” (Appendix C). Examples of influences included: learned family habits, having a large school workload, and sense of stress level. Questions 5 and 6 were the same question, only asked students to rate their influences prior to coming to college. The difference between response ratings of each influence was used to examine the change that occurred during transition to college (using paired-sample t-tests).

Recent literature findings were used to compile and create survey questions regarding student behaviors, influences, and barriers (Gyurcsik, Bray, & Brittain, 2004; Levitsky, Halbmaier, & Mrdjenovic, 2004; Nelson, Kocos, Lytle, & Perry, 2009; Nelson et al., 2009; Cluskey & Grobe, 2009). Reports prior to this research project reveal that have students often practice negative health behaviors during college. The current survey responses ask about the student’s perception of their behavior changes, what influences those changes, and whether the influences are positive or negative.

Questions 3, 4, 7, 8 were single-factor questions asking about motivation for healthy eating and exercise before and after college transition (Appendix C). Students were to respond, their degree of agreement or disagreement, about whether they are motivated to eat healthfully or exercise regularly.

The final sections, Questions 9 and 10, of the instrument were used to draw conclusions and correlations about student habits and behaviors. Question 9 was as follows: “How prepared were you before coming to OSU to deal with each of the following,” (Appendix C). Factors such as making healthy food choices and managing stress were rated by students. Question 10 read: “Comparing my behavior before coming to OSU to now, I currently,” (Appendix C). Students rated their frequency as

“more often” or “less often”; examples of health behaviors included drinking milk and eating late at night. These questions were used to analyze the students’ perception of their preparedness for college, and what health behaviors changed as a result of transition. Demographic information was also used to categorize students by gender, years away from home, place of residence, and weight status. Behaviors were correlated with these demographic characteristics to seek relationships among variables about students in transition.

All survey responses asked students to rate their answer on a Likert-type scale with 7 possible choices and a ‘Not Applicable’ option; the scale was chosen to represent a larger range of individuals’ feelings and beliefs. It has been shown that scales with 7-11 response options are more valid than scales with fewer options (Singleton & Straits, 2005). Though the survey was not considered highly invasive, questions regarding personal health habits and students’ weight were asked. Students always had the option of not providing an answer to any of the questions.

Measurements and Calculations

The four main sections of the survey were designed to gather information about students’ behaviors and influences from different key aspects: their perception of influences, their perception of preparedness, and their current habits. To find what factors influence students’ current behavior, students responded to 10 questions about current eating habits at college followed by 10 questions about current exercise habits at college. The same 20 questions were repeated, now asking about students’ eating and exercise habits before attending OSU. These questions allowed researchers to compare the same influence for both eating and exercise behaviors. For example, how do learned family habits influence eating behaviors and how do they influence exercise behaviors? Students were then asked 6 questions ranking their perception of preparedness for college. Fourteen brief statements followed, asking students to rank a list of behaviors indicating if these were practiced more or less often since coming to college. The final section of the survey requested demographic information including class standing, how many years away from home, height and weight, and gender.

The Likert-type scale for the positive and negative influences on eating and exercise before and after transition, included rankings of 0-7; 0= not applicable, 1 = very (-) influence, and 7 = Very (+) Influence. The survey provided a definition for positive, negative, and not applicable influences. A positive influence was defined as “helping, fostering, encouraging, motivating or serving as good role models”; a negative influence was anything “discouraging, distracting, impeding, demotivating or serving as poor role models”; and not applicable meant “not relevant or applicable to me, does not affect me” (Appendix C). The scale regarding preparedness for college ranged from 0-7; 0= not applicable, 1= very unprepared, 7= very well prepared. A range of 0-7 was also given for students to rank the frequency that they currently practice specific health behaviors; 0= not applicable, 1= much less often, 7= much more often. Self-reported height and weight, and reported gain/loss/maintenance was used by the researcher to calculate each student’s Body Mass Index (BMI). BMI was calculated using the National Heart Lung and Blood Institute website calculator (National Heart, 2009). Measurements used were height in feet and inches, and weight in pounds.

Data Analysis

Descriptive statistics were calculated for the demographic characteristics provided. Frequencies and means were calculated for each of the questions ranked on the Likert-scale. Spearman’s rho correlations were run to find associations between eating and exercise influences after coming to college. Correlations were also run to find if relationships exist among current health behaviors that have changed since coming to college. Demographic characteristics were used to report height and weight status among students, and to look at perception of weight fluctuation upon coming to college. Body Mass Index categories were as follows: underweight = $<19\text{kg/m}^2$; normal weight = $19\text{--}24.99\text{kg/m}^2$; overweight = $25\text{--}29.99\text{kg/m}^2$; obese = $>30\text{kg/m}^2$.

Paired-sample t-tests were run to determine significant differences in health behaviors before and after coming to college. Independent-sample t-tests were run to indicate significant differences between genders for perceived college preparedness. Pearson Chi-square t-tests were run to determine significant differences between

genders for 1) eating and exercise influences before and after college transition, and 2) current health behavior changes upon college transition. The Statistical Package for Social Science (SPSS, PASW Statistics version 17.0) was used to analyze data.

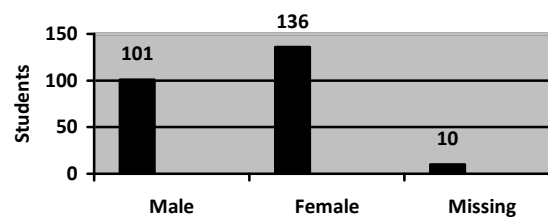
RESULTS

The purpose of this study was to explore how transitioning to a college environment may have influence upon the eating and exercise behaviors of college students. A survey was developed and used to evaluate the research objectives; data was collected from a sample of students attending Oregon State University (OSU) during the fifth week of winter term 2009. Students' perceptions of their eating and exercise behaviors before and after coming to college and their preparedness for managing eating and exercise behaviors during college were the primary research questions. Demographic information was collected to explore developing trends and characteristics among groups of individuals.

Demographic Characteristics of Participants

Surveys were collected from 247 undergraduate students who were enrolled in the Lifetime Fitness and Health class with an enrollment of 407 students (61% response rate). This enrollment reflects the typical student profile, as this course is required by all OSU students. Eighty-five students were not in attendance on the day of the survey, and of the students present, 23% (n= 75) declined participation. Males made up 43% (n= 101) and females were 57% (n= 136) of the sample (Figure 4.1); 10 students failed to identify their gender.

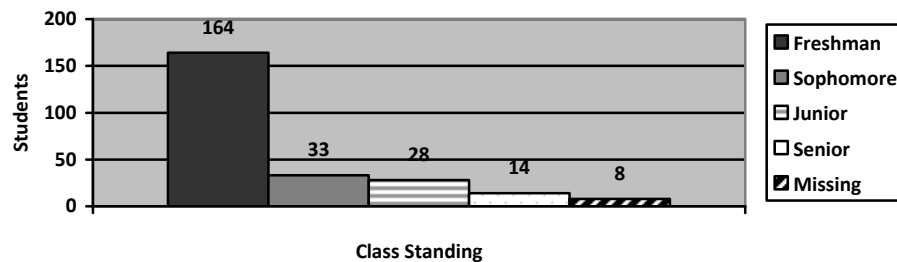
Figure 4.1: Undergraduate student participants by gender



Collected survey data displays males (n= 101), females (n= 136), and missing data (n= 10) make up the total sample (n= 247) of undergraduate students.

Students were asked to identify their class standing and the results are depicted in Figure 4.2. Freshman made up 69% of the sample (n= 164), followed by 14% sophomores (n= 33), 11% juniors (n= 28), and 6% seniors (n= 14); 8 students did not respond to this question.

Figure 4.2: Undergraduate student participants by class standing



Collected survey data displays total student sample is divided by class standing, freshman through senior or missing data.

Students were asked about the number of years that they have lived away from home and the response options included a range from one year or less to 5 or more years (Table 4.1). More than two-thirds of students (n = 190) had lived away from home one year or less (year 1); 16 students had lived away from home for 2 years (year 2); 14 students had lived away for three years (year 3); the remaining number of students (n=27) had lived away from home for more than three years (n = 18), or did not respond (n = 9).

Table 4.1: Student participants by number of years lived away from home

Years Lived Away from Home	Students (n= 247)
Year 1	190
Year 2	16
Year 3	14
Year 4	18

Students were asked to self-report their current weight and height, and that data was used to classify participants into a Body Mass Index category (National Heart, 2009) (Table 4.2). About 2% (n= 5) did not provide enough information; 3% (n= 8) were underweight; 70% (n= 165) were normal weight; 19% (n= 45) were overweight; 6% (n= 14) were obese. The percentage of males and females in each BMI category were similar, but a greater percent of males were found to be overweight (20%) or obese (8%), and a higher percent of females were normal weight (72%).

Table 4.2: Student participants by Body Mass Index (BMI) category and gender

BMI Category	Males n= 101 (%)	Females n= 136 (%)	Total n= 237
Underweight	3 (3)	5 (4)	8
Normal Weight	67 (66)	98 (72)	165
Overweight	21 (21)	24 (18)	45
Obese	8 (8)	6 (4)	14
Not enough Info	2 (2)	3 (3)	5

Note: Underweight = <19kg/m²; normal weight = 19-24.99kg/m²; overweight = 25-29.99kg/m²; obese = >30kg/m².

BMI categories were collapsed, merging under and normal weight individuals, and overweight and obese individuals (Table 4.3). More females than males were under or normal weight, while more males than females were overweight or obese. Overall, nearly 25% of students were overweight or obese while 73% were under or normal weight. Missing data made up 2% of students (n= 5).

Table 4.3: Merged BMI categories of students by gender

BMI Category	Males n= 99 (%)	Females n= 133 (%)	Total n= 232 (%)
Under/Normal Weight	70 (69)	103 (76)	173 (73)
Overweight/Obese	29 (29)	30 (22)	59 (25)

Students were asked to provide information regarding their perception of weight fluctuation since transitioning to college. Students were asked to categorize themselves since coming to college, as having gained weight, maintained weight, or lost weight (Table 4.4). Of those students who were away from home one year or less, 26% (n= 29 students) said they gained weight; 53% (n= 59 students) maintained weight; and 21% (n= 23 students) lost weight. Eighty-six percent of those away from home for 2 years reported that they had lost weight since coming to college; one student reported gaining weight and there were no reports of maintaining weight. Of those students away from home for 3, 4, or more years, more students said they had either maintained or gained weight, rather than having lost weight since first coming to college.

Table 4.4: Years lived away from home and student's perceived weight fluctuation since college transition

Year Away	Gained Weight n= 35 (%)	Maintained Weight n= 69 (%)	Lost Weight n= 31 (%)	Total n= 135
Year 1	29 (26)	59 (53)	23 (21)	111
Year 2	1 (14)	0	6 (86)	7
Year 3	2 (22)	7 (78)	0	9
Year 4	3 (38)	3 (38)	2 (25)	8

Researchers divided males and females according to perceived weight fluctuation since students' transition to college (Table 4.5). Among males, 31% (n= 31) reported to have gained weight, 52% (n= 53) maintained weight, and 17% (n= 17) lost weight. Among females, 26% (n= 35) reported to have gained weight, 51% (n= 69) maintained weight, and 23% (n= 31 females) lost weight. More females (53%) than males (47%) reported to experience a weight gain since coming to college; more females (57%) than males (43%) maintained weight; and more females (65%) than males (35%) lost weight.

Table 4.5: Perceived weight fluctuation since college transition by gender

Gender and Weight Fluctuation	Gained Weight n= 35 (%)	Maintained Weight n= 69 (%)	Lost Weight n= 31 (%)
Males n= 101 (%)	31 (47)	53 (43)	17 (35)
Females n= 135 (%)	35 (53)	69 (57)	31 (65)
Total n= 236	66 (28)	122 (52)	48 (20)

Influences upon Eating and Exercise Behaviors

Students responded to questions regarding their perception of various influences upon their eating and exercise behaviors both before and after transitioning to college. The purpose was to explore whether or not students perceive a change of influences as they transition to college, and whether the change or influence was positive or negative regarding keeping healthy behaviors. For unknown reasons, or possibly as a result of survey layout, many students failed to complete questions 3, 4, 7, and 8. For this reason, researchers decided to disregard these questions for analysis purposes.

Students ranked a list of influences using a numeric scale (1 to 7) to reflecting their perception of the strength of the influence. A mean score based on all respondents' rankings would reflect the relative importance of each influence. The Likert-type response scale assigned 1 as low or negative influence to 7 as high or positive influence; students could choose 4 for having neither positive or negative (neutral) influence. Students could choose 0 if the influence was not applicable to them at all (Appendix C).

After mean scores were determined, responses to the influences were collapsed into "negative" (assigning a 1, 2 or 3) or "positive" (assigning a 5, 6 or 7) scores. This analysis deleted responses of 4 or 0 from the calculation. The survey defined "positive", "negative", and "not applicable" as follows: a positive influence was defined as "helping, fostering, encouraging, motivating or serving as good role models"; a negative influence was anything "discouraging, distracting, impeding, demotivating or serving as

poor role models”; and not applicable meant “not relevant or applicable to me, does not affect me” (Appendix C). The frequency (percentages) of positive and negative influence scores were generated to help determine the impact or direction of each influence overall. Finally, correlation analyses were used to determine if any eating or exercise influences, or if current behavior and perception of preparedness were correlated.

Paired-sample t-tests were run to reveal any differences in perception of how each influence could impact eating or exercise behavior before versus after transition (Tables 4.6, 4.7). This tells us whether the influence changed with the transition to college. A significant difference ($p < 0.05$) in mean score was found in learned family eating habits/meals (before= 5.86, after= 5.55); peer pressure to eat certain foods (before= 3.99, after= 3.80); having a schedule that changes each term (before= 3.73, after= 4.22); and nutrition knowledge (before= 4.95, after= 5.47).

The dataset was divided by gender groups, and paired-sample t-testing within the two groups determined any differences in perception of eating and exercise behavior influences upon college transition. Only one significant difference was found between males and females. Females rated peer pressure as having a similar influence on eating behavior before versus after transition while males perceived that peer pressure had a slightly more negative effect after coming to college. Therefore, the significant decline in total mean score for peers, among all students is more reflective of males’ perception.

Table 4.6: Comparisons of eating behavior influences before and after college transition

Eating Behavior Influences	Before Transition Mean (s.d)	After Transition Mean	Mean of Differences (st. error)
Learned family eating habits/meals (n=241)	5.86	5.55	-0.315 * (0.081)
My friends' eating habits (n=240)	4.40	4.54	0.133 (0.091)
Peer pressure to eat certain foods (n=238)	3.99	3.80	-0.193 * (0.083)
Having a large school workload (n=238)	4.00	4.18	0.185 (0.113)
Having a schedule that changes each term (n=239)	3.73	4.22	0.490 * (0.121)
Having available free time (n=239)	4.41	4.61	0.197 (0.118)
Money available for food (n=234)	4.25	4.38	0.132 (0.131)
Food choices/meal available in dorm or on campus (n=238)	5.64	4.23	-1.408 * (0.156)
My nutrition knowledge (n=239)	4.97	5.97	0.515 * (0.076)
My sense of stress level (n=242)	4.19 (1.43)	4.26	0.066 (0.101)

* Indicates statistically significant difference ($p < 0.05$) using paired-sample t-tests

The same method was repeated to investigate influences upon exercise behavior after transition to college. Paired-sample t-testing explored differences in means among the influences on exercise behaviors among all students before and after college transition (Table 4.7). A significant difference ($p < 0.05$) was found in peer pressure (before= 4.26, after= 4.45); having a schedule that changes each term (before= 3.88, after= 4.34); having an exercise partner/group (before= 5.13, after= 5.37); access to exercise or gym facilities (before= 5.09, after= 5.64); and sense of stress level (before= 4.41, after= 4.66).

The dataset was also divided by gender, and paired-samples t-testing was done within gender groups. Three significant differences are noted among females that were

not significant among males. Females viewed having an exercise partner/group, access to exercise or gym facilities, and sense of stress as having a significantly more positive influence on exercise behavior after transitioning to college. The only significant difference for males was having a schedule that changes each term. Both males and females perceived their schedule to have a positive influence on their exercise behavior. Furthermore, among all students, peer pressure was found to have a significantly more positive influence on students after transition to college.

Table 4.7: Comparisons of exercise behavior influences before and after college transition

Exercise Behavior Factor	Before Transition Mean	After Transition Mean	Mean of Differences (st. error)
Learned family exercise habits (n=242)	5.14 (1.40)	5.04 (1.51)	-0.107 (0.080)
My friends' exercise habits (n=242)	4.87 (1.38)	5.03 (1.38)	0.161 (0.099)
Peer pressure (n=242)	4.26 (1.40)	4.45 (1.28)	0.198 * (0.085)
Having a large school workload (n=242)	4.12 (1.40)	4.04 (1.98)	-0.079 (0.122)
Having a schedule that changes each term (n=241)	3.88 (1.43)	4.34 (1.61)	0.461 * (0.126)
Having available free time (n=237)	4.80 (1.48)	5.00 (1.97)	0.198 (0.123)
An exercise partner/group (n=240)	5.13 (1.45)	5.37 (1.53)	0.237 * (0.109)
Access to exercise or gym facilities (n=240)	5.09 (1.61)	5.64 (1.47)	0.554 * (0.127)
Opportunity to exercise (n=241)	5.20 (1.50)	5.36 (1.61)	0.166 (0.111)
My sense of stress level (n=242)	4.41 (1.32)	4.66 (1.53)	0.248 * (0.096)

* Indicates statistically significant difference ($p < 0.05$) using paired-sample t-tests

Student responses to influences upon eating and exercise behaviors were collapsed and categorized as being positive, negative, or neutral influence. A response

of 1, 2 or 3 is a negative influence; a response of 4 is considered neutral influence; a response of 5, 6 or 7 is a positive influence; a response of 0 is not applicable. All respondent's collapsed data was used to generate a frequency and to compare the direction of influences before and after college transition. An influence was considered strong if the frequency reached 50% or greater of those choosing a positive, negative or neutral response score.

Table 4.8 compares frequencies of influences upon eating behavior before and after college. Students selected learned family eating habits/meals as a strong positive influence both before (84%) and after (83%) college transition. Friends' eating habits were positive influences for students (57%) only after college transition. Peer pressure to eat certain foods had a negative influence for students before (59%) and after (54%) college transition; peer pressure was considered less after coming to college. Many students (62%) felt that school schedule before college imposed no influential change on eating behavior; after transition to college, the frequency of students feeling a neutral influence decreased to 32%. Money available for food had a positive influence on students (51%) after coming to college; meals and food available on campus positively influenced students before (81%) and after (50%) transition, although a decrease was seen as students came to college. Nutrition knowledge is shown to have a positive influence on eating behavior before (70%), and more positively after (81%) transition.

Table 4.8: Frequency score comparisons of influences upon eating behavior before and after college transition among all students

Eating Behavior Influence	Before			After		
	Positive ¹ (%)	Negative ² (%)	Neutral ³ (%)	Positive ¹ (%)	Negative ² (%)	Neutral ³ (%)
Learned family eating habits/meals n= 234 (before) n= 242 (after)	84.3	7.4	8.3	83.1	7.8	9.1
Friends' eating habits n= 229 (before) n= 235 (after)	46.4	15.6	38.0	56.8	20.9	22.4
Peer pressure to eat certain foods n= 226 (before) n= 228 (after)	25.7	59.4	14.9	22.3	22.8	55.0
Having a large school workload n= 230 (before) n= 232 (after)	29.0	47.1	24.0	48.4	32.6	19.0
Having a schedule that changed each term n= 215 (before) n= 244 (after)	22.0	16.1	61.9	41.0	27.1	32.0
Having available free time n= 231 (before) n= 234 (after)	47.8	20.1	32.2	61.1	26.2	12.7
Money available for food n= 225	38.2	18.1	43.8	51.0	26.8	22.1
Food choices/meals available in dorms/on campus n= 232 (before) n= 213 (after)	80.5	8.8	10.8	50.3	27.8	22.0
Nutrition knowledge n= 229 (before) n= 233 (after)	69.7	10.1	20.3	80.7	7.5	11.9
Sense of stress level n= 233 (before) n= 235 (after)	39.4	24.1	36.5	45.3	29.4	25.3

¹ Collapsed variable; respondents chose 5, 6, 7 to Likert scale of 1-7, how positively influenced

² Collapsed variable; respondents chose 1, 2, 3 to Likert scale of 1-7, how negatively influenced

³ Respondents choosing 4 to Likert scale of 1-7, neither positive nor negative influence

Table 4.9 compares frequencies of positive, negative, and neutral influence upon exercise behavior before and after college. Learned family exercise habits showed increasing positive influence on student behavior from before (68%) to after (70%) transition. Friends' exercise habits are shown to have a positive influence over student behavior (before= 63%, after= 73%); more positive after transition. Before college, many students reported that school schedule had neutral influence over their exercise behaviors (62%); this number decreased (26%) after students came to college. Students found the following factors to have a more positive influence after college transition; they are listed as the frequency (before % vs. after %): available free time (61% vs. 67%), an exercise partner/group (66% vs. 74%), access to gym facilities (66% vs. 80%), and opportunity to exercise (69% vs. 76%). Approximately 58% of students reported that sense of stress level had a greater positive influence on their exercise habits after coming to college than before.

Table 4.9: Frequency score comparisons of influences upon exercise behavior before and after college transition among all students

Exercise Behavior Influence	Before			After		
	Positive ¹ (%)	Negative ² (%)	Neutral ³ (%)	Positive ¹ (%)	Negative ² (%)	Neutral ³ (%)
Learned family exercise habits n= 233 (before) n= 231 (after)	67.6	7.9	24.5	69.7	8.7	21.6
Friends' exercise habits n= 240 (before) n= 234 (after)	63.0	9.1	27.9	72.5	8.6	18.9
Peer pressure n= 228 (before) n= 232 (after)	35.2	11.4	53.4	46.3	8.7	45.0
Having a large school workload n= 239 (before) n= 235 (after)	32.2	25.9	41.8	42.9	45.7	11.4
Having a schedule that changed each term n= 221 (before) n= 235 (after)	22.2	15.8	62.0	42.5	31.4	26.1
Having available free time n= 229 (before) n= 234 (after)	61.1	16.9	21.9	66.8	24.6	8.6
An exercise partner/group n= 231 (before) n= 233 (after)	66.0	7.4	26.5	73.6	7.8	18.5
Access to exercise or gym facilities n= 232 (before) n= 233 (after)	65.5	11.8	22.9	79.8	5.8	14.4
Opportunity to exercise n= 234 (before) n= 233 (after)	69.1	12.4	18.6	76.2	12.8	11.1
Sense of stress level n= 234 (before) n= 235 (after)	39.7	16.9	43.4	57.5	22.4	20.0

¹ Collapsed variable; respondents chose 5, 6, 7 to Likert scale of 1-7, how positively influenced

² Collapsed variable; respondents chose 1, 2, 3 to Likert scale of 1-7, how negatively influenced

³ Respondents choosing 4 to Likert scale of 1-7, neither positive nor negative influence

Frequencies of the positive and negative influences upon eating and exercise behavior by gender were generated to reveal if differences existed between males females. Within each gender, influences were displayed if the before and after frequencies differed by more than 15%. Pearson Chi-square tests were run for all influences to test for significant differences in gender.

Table 4.10 displays positive or negative frequencies by gender for eating behavior influences that changed by more than 15% upon college transition. Among males, having a large school workload showed an increasing positive influence (before= 27%, after= 47%); males also felt less of a negative influence from their workload after transition (before= 72%, after= 53%). More males felt that nutrition knowledge was a positive influence after coming to college (74%) than before (58%); the frequency of males perceiving knowledge as negative decreased (before= 42%, after= 26%) with transition. Females also indicated that a large school workload was a more positive influence now (42%) than before (27%) The frequency of females feeling that school workload was negative upon transition (54%), had decreased compared to before transition (73%). Having available free time was perceived to be less of a negative influence after college (37%), compared to before (57%) among females. Females were more likely to perceive campus/dorm food choice as a negative influence after coming to college (57%) compared to the negative food choice influence before transition (23%). No statistically significant differences were found between male and female responses to the frequency of positive, negative and neutral eating behavior influences after transition.

Table 4.10: Positive or negative eating behavior influences by gender before and after college transition

Influences upon Eating Behavior	Male n = 101				Female n= 136			
	Before Transition		After Transition		Before Transition		After Transition	
	% (+) ¹	% (-) ²	% (+) ¹	% (-) ²	% (+) ¹	% (-) ²	% (+) ¹	% (-) ²
Having a large school workload	28	72	47	53	27	73	46	54
Having available free time	50	50	64	36	43	57	63	37
Food choices/meals available in dorms/on campus	80	20	47	53	77	23	43	57
Nutrition knowledge	58	42	74	26	74	26	84	16

¹ Collapsed variable; respondents chose 5, 6, 7 to Likert scale of 1-7, how positively influenced

² Collapsed variable; respondents chose 1, 2, 3 to Likert scale of 1-7, how negatively influenced

Table 4.11 displays positive or negative frequencies by gender for influences upon exercise behavior. Within each gender, influences are displayed that show more than 15% frequency difference in before and after scores. Among males, those perceiving friends' habits as a positive exercise behavior influence increased after (73%) transition compared to before (58%). There was a large increase in the frequency of males who perceived their school workload as having a negative influence after (47%) coming to college compared to before (25%). The frequency of males who perceived their schedule to have a negative influence increased after transition (30%) compared to before (13%). Males were more likely to perceive that stress was a positive influence on exercise behavior after coming to college (47%) versus before (31%). Among females, both frequencies increased for those who felt that school workload had a positive influence (before= 33%, after= 46%) or a negative influence (before= 27%, after= 46%). After coming to college, more females viewed their schedule as a positive influence (before= 20%, after= 43%) or a negative influence (before= 16%, after= 35%). Having access to gym facilities after transition was a more positive influence (79%) compared to the positive influence before transition (62%).

Finally, there was another large increase in frequency of females who felt that stress was a more positive influence on exercise habits at college (63%) than it was before college (44%).

Before and after frequencies between males and females were tested for any significant differences in gender perception. A statistical difference was found between males and females on several influences using Pearson chi-square testing. A significant difference between genders was found for those who viewed sense of stress level as a positive influence upon exercise behavior. Before transition, the frequency of males (31%) and females (44%) who felt positively influenced by stress before college differed significantly ($X^2 = 4.416$; $df = 1$; $p = 0.036$). Those males (47%) and females (63%) feeling positively influenced by stress to exercise after transition also differed significantly ($X^2 = 6.564$; $df = 1$; $p = 0.010$).

Table 4.11: Positive or negative exercise behavior influences by gender before and after college transition

Influences upon Exercise Behavior	Male n = 101				Female n = 136			
	Before		After		Before		After	
	Transition		Transition		Transition		Transition	
	% (+) ¹	% (-) ²	% (+) ¹	% (-) ²	% (+) ¹	% (-) ²	% (+) ¹	% (-) ²
My friends' exercise habits	58	12	73	6	63	7	71	10
Peer pressure	41	15	52	9	29	8	40	9
Having a large school workload	26	25	35	47	33	27	46	46
Having a schedule that changes each term	20	13	39	30	20	16	43	35
Access to exercise or gym facilities	65	10	77	6	62	13	79	4
My sense of stress level	31 ³	15	47 ⁴	21	44 ³	18	63 ⁴	25

¹ Collapsed variable; respondents chose 5, 6, 7 to Likert scale of 1-7, how positively influenced

² Collapsed variable; respondents chose 1, 2, 3 to Likert scale of 1-7, how negatively influenced

³ Indicates statistically significant difference ($p < 0.05$) between males and females before transition, using chi-square t-test

⁴ Indicates statistically significant difference ($p < 0.05$) between males and females after transition, using chi-square t-test

Spearman correlations were run to find associations between and among eating and exercise influences before and after college transition; many variables were correlated. Researchers narrowed the results to include only those that show a relationship of $r = 0.50$ or better, between eating and exercise influences after college transition (Table 4.12). Those students whose eating habits were influenced by a large school workload, were also likely to perceive their workload as influencing their exercise habits ($r = 0.649$). Those students whose eating habits were influenced by their school workload, perceived their exercise habits as influenced by their school schedule that changes each term ($r = 0.525$). A relationship was found between students whose eating habits were influenced by their changing schedule and those who perceived their exercise habits as influenced by their school workload ($r = 0.565$). Students who found their eating habits influenced by their changing schedule, were also likely to find their exercise habits influenced by their changing schedule ($r = 0.638$).

Those students who perceived that free time influenced their eating habits, also felt that it influenced their exercise habits ($r = 0.627$). Students who felt that money available for food influenced their eating habits, were also likely to feel that free time influenced their exercise habits ($r = 0.504$). When the sense of stress level affected students' eating behavior, those students were also likely to find their exercise behavior influenced by their school workload ($r = 0.648$). Students whose eating behavior was influenced by stress level, also perceived their exercise habits to be influenced by their changing schedule of classes ($r = 0.526$). Finally, those students who felt that their sense of stress affected their eating habits, also felt that it affected their exercise habits ($r = 0.588$).

Table 4.12: Strong correlations between eating and exercise influences after college transition

Positive Associations between Eating and Exercise Influences	Eating: Having a large school workload	Eating: having a Schedule that changes each term	Eating: having available free time	Eating: sense of stress level
Exercise: having a large school workload	0.649	0.565	-	0.648
Exercise: having a schedule that changes each term	0.525	0.638	-	0.526
Exercise: having available free time	-	-	0.627	-
Exercise: sense of stress level	-	-	-	0.588

* All correlations significant ($p < 0.01$) by Spearman's rho correlation test

Perceived Preparedness of Students

Students were asked to give their perception regarding preparedness for college. Students responded to the question, “How prepared were you before coming to OSU to deal with each of the following,” by selecting a scale number 1 (very unprepared) to 7 (very well prepared) (Appendix C). After living at least a few months away from home, students responded to how prepared they had been to deal with specific challenges of college. Researchers found overall means for each variable among all students and by gender; independent-sample t-testing was done to detect significant differences between males and females.

Table 4.13 displays means for all students and by gender, regarding their overall preparedness for college transition. Students as a group show means of 5.37 and 5.46 for making healthy food choices and managing time, respectively. These two factors show significant gender difference ($p < 0.05$); females felt significantly more prepared for both factors than males. Students felt their highest preparedness score (6.04) was overcoming peer pressure; females felt they were more prepared than males. Student mean score for balancing school with good eating habits was 4.92, and balancing school

with good exercise habits was 4.98. Females felt they were more prepared than males for balancing eating and exercise with school. Stress was the factor with the lowest mean score of 4.88 for all students; this was the only factor which males felt more prepared for than females.

Table 4.13: Comparisons of preparedness for transition to college among all students and by gender

How prepared were you before coming to OSU to deal with each of the following:	Overall Mean (s.d) n= 235	Gender Mean (s.d)	
		Male n= 99	Female n= 136
Making healthy food choices	5.37 (1.49)	5.14 * (1.44)	5.55 * (1.53)
Managing time	5.46 (1.47)	5.18 * (1.53)	5.67 * (1.39)
Overcoming peer pressure	6.04 (1.17)	6.03 (1.04)	6.04 (1.28)
Balance school with good eating habits	4.92 (1.54)	4.72 (1.46)	5.06 (1.58)
Balancing school with good exercise habits	4.98 (1.68)	4.78 (1.72)	5.11 (1.65)
Managing stress	4.88 (1.63)	4.92 (1.53)	4.88 (1.72)

* Indicates statistically significant difference ($p < 0.05$) between males and females using independent-samples t-tests

Student data was divided into categories according to their perception of preparedness for college transition. Students picked from a scale of responses, 1 (very unprepared) to 7 (very well prepared); 4 was neither prepared nor unprepared; response of 0 was not applicable (Appendix C). Student data was collapsed so that those students answering 1, 2, or 3 were considered unprepared, and those selecting 5, 6, or 7 were considered prepared for college transition. The difference between the two groups is made up of those students who chose not to respond, or those who picked a neutral

response. Nonparametric chi-square tests were run to test for significant differences between genders.

Table 4.14 displays the frequency of males and females who were prepared and unprepared for college transition. No significant differences were found with Pearson Chi-square testing between male and female responses. The majority of males and females perceived that they were prepared for dealing with all the provided factors upon transition to college. Females were more often prepared than males, except in overcoming peer pressure where males felt slightly more prepared (89%) than females (87%). Slightly more females than males felt unprepared in: making healthy food choices (13% vs. 12%) overcoming peer pressure (4% vs. 1%); balancing school with good eating habits (22% vs. 21%) and managing stress (23% vs. 19%). Males felt more unprepared than females in managing time (18% vs. 11%) and balancing school with good exercise habits (23% vs. 21%).

Table 4.14: Frequency of students who were prepared and not prepared for college transition by gender

Factors of Preparedness	Male n= 99		Female n= 136	
	% Prepared ¹	% Not Prepared ²	% Prepared ¹	% Not Prepared ²
Making healthy food choices	77	12	82	13
Managing my time	77	18	84	11
Overcoming peer pressure	89	1	87	4
Balancing school with good eating habits	62	21	68	22
Balancing school with good exercise habits	60	23	71	21
Managing stress	66	19	70	23

¹ Collapsed variable; respondents chose 5, 6, 7 to Likert scale of 1-7, how well prepared

² Collapsed variable; respondents chose 1, 2, 3 to Likert scale of 1-7, how unprepared

Behavior Change among Students

Researchers asked students about current eating and overall health behaviors, as compared to before coming to college. Students responded to the question, “Comparing my behavior before coming to OSU to now, I currently,” regarding frequency of practicing specific health behaviors (Appendix C). Students rated the frequency of their current behavior on a scale of 1 (much less often) to 7 (much more often), or 0 (not applicable). A response of 4 represents no change in behavior upon coming to college.

Mean scores of current health behavior change, as compared to behaviors before college transition, are displayed in Table 4.15. Overall mean scores are compared to those for males and females. Males indicated higher mean scores than females for: drinking milk (3.78 vs. 3.71), drinking soda (3.59 vs. 3.49), eating fast food (4.02 vs. 3.74), eating regular meals (4.17 vs. 3.69), eating snack foods (4.14 vs. 4.10), eating late at night (4.93 vs. 4.87), eating large quantities of food (4.10 vs. 3.86), and feeling in control of health (4.31 vs. 4.28).

Females had higher mean scores than males for the following factors: drinking coffee (4.50 vs. 4.41), drinking alcohol (5.05 vs. 4.96), eating fruits (4.20 vs. 4.08), eating vegetables (4.04 vs. 4.00), eating desserts (3.73 vs. 3.64), and exercising regularly (4.09 vs. 4.08).

Table 4.15: Current behavior changes as compared to before coming to college among all students

Comparing my behavior before coming to OSU to now, I more often/less often ... Less often More Often 1 7	Overall Mean (s.d)	Gender Mean (s.d)	
		Male n= range 75-100	Female n= range 111-136
Drink Milk n= 235	3.77 (1.59)	3.78 (1.48)	3.71 (1.65)
Drink coffee/coffee drinks n= 209	4.46 (1.58)	4.41 (1.46)	4.50 (1.67)
Drink soda or carbonated drinks n= 222	3.55 (1.66)	3.59 (1.63)	3.49 (1.70)
Drink alcohol n= 192	4.98 (1.39)	4.96 (1.48)	5.05 (1.28)
Eat fruits n= 242	4.16 (1.52)	4.08 (1.50)	4.20 (1.55)
Eat vegetables n= 242	4.04 (1.54)	4.00 (1.52)	4.04 (1.57)
Eat desserts n= 239	3.69 (1.30)	3.64 (1.36)	3.73 (1.27)
Eat fast foods n= 232	3.88 (1.55)	4.02 (1.63)	3.74 (1.48)
Eat regular meals n= 240	3.90 (1.25)	4.17 (1.18)	3.69 (1.29)
Eat snack foods n= 237	4.13 (1.33)	4.14 (1.25)	4.10 (1.38)
Eat late at night n= 237	4.87 (1.31)	4.93 (1.20)	4.87 (1.37)
Eat large quantities of food n= 236	3.97 (1.10)	4.10 (1.13)	3.86 (1.08)
Exercise regularly (5 times/wk) n= 238	4.08 (1.73)	4.08 (1.62)	4.09 (1.82)
Feel in control of health n= 239	4.29 (1.38)	4.31 (1.30)	4.28 (1.45)

Student responses were collapsed into two categories. Responses 1, 2, 3 are combined and represent those students who practice a health behavior less often since coming to college; responses 5, 6, 7 are combined and represent behaviors that are currently practiced more often after transitioning to college. Table 4.16 shows the frequency of males and females who eat certain foods or practice specific health behaviors more often or less often since coming to college. The difference is the number of respondents who chose 'no change' or those who did not complete the question. Pearson Chi-square testing was done to find statistically significant differences between frequency of male and female behavior habits.

In effort to manage data, frequencies were considered strong which reached 40% or greater of those choosing more often, less often, or no change in behaviors. The following are behaviors practiced less often since students came to college: 42% of males currently drink milk less often; 40% of males drink soda/carbonated beverages less often; 40% of males eat vegetables less often; 41% of males eat desserts less often; and 44% of females eat regular meals less often. The following describe behaviors practiced more often since coming to college: 41% of females drink coffee/coffee drinks more often; 45% of males and 51% of females drink alcohol more often; 41% of males and 42% of females eat fruit more often; 40% of males eat fast food more often; 46% of females eat regular meals more often; and 65% of males and 64% of females eat late at night more often.

Significant differences were found between males and females for two current health behaviors. Twenty-six percent of males say they eat regular meals less often, compared to 44% of females who eat regular meals less often ($X^2 = 7.872$; $df = 1$; $p = 0.005$). A significant difference was also found between males (31%) and females (19%) who eat large quantities of food more often $X^2 = 4.180$; $df = 1$; $p = 0.041$).

Table 4.16: Frequency of current eating and health behavior changes compared to before coming to college by gender

	Male ¹		Female ²	
Comparing my behavior before coming to OSU to now, I more often/less often ...	% More Often After Transition ³	% Less Often After Transition ⁴	% More Often After Transition ³	% Less Often After Transition ⁴
Drink Milk	30	42	23	39
Drink coffee/coffee drinks	35	14	41	17
Drink soda or carbonated drinks	29	40	21	35
Drink alcohol	45	8	51	5
Eat fruits	41	36	42	37
Eat vegetables	39	40	36	38
Eat desserts	23	41	28	35
Eat fast foods	40	38	29	35
Eat regular meals	38	26*	46	44*
Eat snack foods	31	26	21	29
Eat late at night	65	11	64	10
Eat large quantities of food	31*	22	19*	25
Exercise regularly (5 times/wk)	31	31	38	31
Feel in control of my health	37	23	38	29

¹ n for male chi-square frequencies range from 98-100

² n for female chi-square frequencies range from 134-136

³ Collapsed variable; respondents chose 5, 6, 7 to Likert scale of 1-7, more often

⁴ Collapsed variable; respondents chose 1, 2, 3 to Likert scale of 1-7, less often

* Indicates statistically significant difference between males and females (p< 0.05) using chi-square t-tests

Spearman's rho correlations were run to test between variables for preparedness and behavior changes. At the selected level of association ($r = 0.20$), a relationship was found between and among the following variables: those who claim they drink more alcohol since coming to college and those who drink more coffee ($r = 0.325$); those students who ate more fruit after coming to college were more likely to drink more milk ($r = 0.219$); those who exercised more regularly after coming to college were more likely to feel prepared to balance school with good exercise habits ($r = 0.210$); and as students

felt more in control of their health, they were more likely to drink more milk at college ($r = 0.255$).

Spearman's correlations, at a level of $r = 0.400$, show strong relationships between students who currently practice certain eating and health behaviors (Table 4.17). Students who drink soda or carbonated drinks are related to those who eat snack foods ($r = 0.401$); those who eat fruits are related to those who eat vegetables ($r = 0.717$); those who eat fruit are more likely to also feel in control of their health ($r = 0.412$); students who eat vegetables are related to those who feel in control of their health ($r = 0.406$); those who eat dessert are related to those who eat snack foods ($r = 0.459$); those who eat snacks are correlated with those who eat fast food ($r = 0.504$); students who eat late at night are related to students who eat large meals ($r = 0.404$); and students who regularly exercise also relate to those who feel in control of their health ($r = 0.506$).

Table 4.17: Correlations ($r > 0.40$) among current eating and health behaviors

Current Behaviors Practiced at College n= 237-241	Correlation (r)
Drink soda or carbonated beverages / Eat snacks	0.401
Eat fruits / Eat vegetables	0.717
Eat fruits / In control of health	0.412
Eat vegetables / In control of health	0.406
Eat desserts / Eat snacks	0.459
Eat snacks / Drink soda or carbonated beverages	0.401
Eat snacks / Eat fast food	0.504
Eat late at night / Eat large meals	0.404
Regular Exercise / In control of health	0.506

Spearman's correlations, at a level of $r > 0.200$, show relationships between students who currently practice certain eating and health behaviors (Table 4.18). Positive correlations were found to exist for the following behaviors: drinking coffee and drinking alcohol ($r = 0.325$); eating fruit and exercising regularly ($r = 0.362$); and

eating vegetables and those who exercise regularly ($r = 0.390$). Drinking soda was negatively correlated with eating fruit ($r = -0.214$); fast food consumption was negatively correlated with feeling in control of health ($r = -0.253$); eating fast food was negatively correlated with eating vegetables ($r = -0.256$); and eating fast food was negatively correlated with eating fruit ($r = -0.221$).

Table 4.18: Correlations ($r > 0.20$) among current eating and health behaviors

Current Behaviors Practiced at College n= 237-241	Correlation (r)
Drink coffee / Drink alcohol	0.325
Drink soda / Eat fruit	-0.214
Eat fruits / Regular Exercise	0.362
Eat vegetables / Regular Exercise	0.390
Eat fast food / In control of health	-0.253
Eat fast food / Eat vegetables	-0.256
Eat fast food / Eat fruit	-0.221

Conclusions

Research questions and hypotheses were put forth in this study to look at influences on eating and exercise behavior change, preparedness for college, and currently practiced health behaviors upon undergraduate students in transition. Research questions and hypotheses are as follows:

A. How do eating behaviors and perceived influences differ among students and by gender after coming to college compared to before college?

Ho 1) There are no significant differences among students in their perceived influence of eating behaviors after coming to college compared to before college.

Reject hypothesis

Ho 2) There are no significant differences by gender in their perceived influence of eating behaviors after coming to college compared to before college.

Fail to reject hypothesis.

B. How do exercise behaviors and perceived influences differ among students and by gender after coming to college compared to before college?

Ho 3) There are no significant differences among students in their perceived influence of exercise behaviors after coming to college compared to before college.

Reject hypothesis.

Ho 4) There are no significant differences by gender in their perceived influence of exercise behaviors after coming to college compared to before college.

Reject hypothesis.

C. What is the perceived preparedness for college, among all students and by gender?

Ho 5) There are no significant gender differences in students' perceived preparedness for college.

Reject hypothesis.

According to the current study results, researchers can reject null hypotheses 1, 3, 4, and 5; null hypothesis 2 cannot be rejected. Five significant differences in before and after college transition eating behaviors were found among all students: learned family eating habits/meals; peer pressure to eat certain foods; having a schedule that changes each term; food choices/meals available in dorms or on campus; and their nutrition knowledge. These results qualify for rejection of hypothesis 1, as significant differences were found in before and after transition influences between all students. Null hypothesis 2 cannot be rejected; no significant differences were found between males and females in their eating behavior influences before and after college transition. Five significant differences in before and after college transition exercise behaviors were found among all students: peer pressure; having a schedule that changes each term; an exercise partner/group; access to exercise or gym facilities; and sense of stress level. These results are sufficient to reject null hypothesis 3. Null hypothesis 4 can be rejected, as sense of stress level was found to influence males and females differently both before college and after transition. Null hypothesis 5 can be rejected, as two

significant differences were found in males' and females' perception of preparedness for college. The factors that differed between the genders are: making healthy food choices; and managing time.

DISCUSSION

This study explored eating and exercise behavior changes among students during the college transition. Three main objectives were explored regarding behaviors and influences of transitioning undergraduate students. The first was to explore student perception regarding their eating and exercise behaviors and influences, and how those behaviors changed after college transition. The second was to explore differences between genders in the factors that influenced eating and exercise habits and behaviors. The third question explored students' perceptions of their preparedness and challenges associated with adapting their behaviors upon coming to college. Demographic characteristics were also used to compare variables among students with the goal of identifying student sub-groups who have difficulty transitioning. Understanding students' health behavior changes, their perception of positive and negative influences, as well as their perception of preparedness for transition, would enable better mechanisms to be put in place to assist students with developing health behaviors in college.

Demographic Characteristics

Students enrolled in the Lifetime Fitness and Health class at OSU were selected to represent the student population on campus. Over two-thirds of the sample included students in their freshman year; most students had lived away from home for one year or less. Since the focus of this study involved the college transition and the survey covers material mostly pertinent to first-year students in transition, these statistics help validate that the study recruited target subjects. This study sample included 43% males and 57% females; while males make up less than half of the sample population, previous literature on college eating exercise and weight changes has shown abundant data regarding female population, so this data makes a contribution to lacking data for males.

Approximately 70% of the survey population reported normal Body Mass Index (BMI) scores; about 25% are overweight or obese. The percentage of students found to

be overweight or obese is much lower than the 2004 National Health and Nutrition Examination Survey III (Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006) and the study by Silliman, Rodas-Fortier, and Neyman (2004). Males were more likely to be overweight or obese, as compared to females; these findings are consistent with a study by Cluskey and Grobe (2009). More females were normal weight and about half of all females said they maintained their weight since coming to college. A recent OSU study shows that weight gain among males was more frequent, and males were less concerned about controlling weight gain than females (Cluskey and Grobe, 2009).

Of those who lived away from home for one year or less, over half of all students said they maintained their weight and over 25% of students said they gained weight. However, because BMI scores were largely normal, the weight gain among students appears to be within healthful range, assuming the accuracy of self-reported weights. Early weight gain is more common among college students (Racette et al., 2005). As students are away from home longer, there is increased weight maintenance and sometimes weight loss, but there is also an increase in those who report weight gain.

Influences upon Eating and Exercise Behaviors

Students were asked what influences at college have positive and negative impact upon their eating and exercise behaviors. The mean score (based on a 1-7 Likert scale; low or negative, to high or positive) for responses to eating behavior influences were found, to identify those that were important. Then, the data was collapsed to look at whether specific influences tended to be positive, negative, or neutral. Since the data asked about the influences both before and after coming to college, the influences of interest were those that changed significantly during transition. This discussion will focus on those influences that changed significantly and those that are strong positive, negative, or neutral influences.

A majority of students felt that family eating habits had a positive influence on their behaviors before and after college transition. The mean scores (before= 5.86, after= 5.55) show that students feel that family has between 'little positive influence'

and ‘somewhat positive influence’. Upon college transition, family influence declined significantly, but nevertheless students still felt their previous family habits to be a positive influence. Literature reveals that the family has a strong influence on a child’s eating behaviors (Cason, 2006; Story, Neumark-Sztainer, & French, 2002). Healthful habits learned from home are associated with a greater consumption of fruits, vegetables, and milk, and a lower intake of soda and fast food (Cason, 2006). Family mealtimes should be encouraged as parents raise their children; as shown in the present study, these habits may carry over during transition to college and later in life.

Over half of the students also reported that eating habits of friends was a positive influence after coming to college; this score increased slightly, but not significantly. Recent research suggests that the use of social support from friends and peers should be viewed as a way to prevent or try to reduce the number of students with overweight and obesity (Gruber, 2008). According to the present study, students reported peer pressure to be a more negative influence on eating behavior after the transition and considered peers a more neutral influence before college; this was not a large mean score difference (before= 3.99, after= 3.80) but the difference was found significant ($p < 0.05$). The more negative influence of peers on eating behavior could demonstrate that students feel more pressure from peers regarding healthy eating habits. Peers may be viewed as competition rather than a source of support, a role that the family may have fulfilled while living at home.

A large percent of students felt that their school schedule before coming to college was a neutral factor of influence on their eating habits. After college transition those with a neutral response felt more strongly that their schedule had either a more positive or more negative influence. The mean score difference indicated that more students moved from neutral influence to positive influence after transition. Depending on a students’ schedule and motivation (Cluskey & Grobe, 2009), students may find it easier, but some may find it more difficult, to practice healthy eating habits. One may have a routine schedule which allows for breaks and mealtimes, positively affecting their habits; but one could have a schedule that fluctuates, which may not necessarily foster healthy eating behaviors. A recent study confirms that lack of routine may be a

challenging factor for students to adopt healthy eating behaviors (Cluskey & Grobe, 2009).

Money available for food was a positive influence after coming to college, although mean score did not change significantly in paired-sample t-testing. At home, students are usually not as concerned with using their money to buy food, which could explain the neutral response before college. Upon transition, students may view the money available for food as more positive because they may work, or receive an allotted amount of money from their parents, and so have income to buy their own food. Among freshman students with meal cards, they may perceive having greater funds for food, making money for food less of an issue.

Students reported that the food available to them at college had a negative effect on their eating behavior, whereas it was a positive influence before college; this was a significant decrease ($p < 0.05$). Other studies report that campus dining and other environmental influences, such as all-you-can-eat dining halls, snacking and eating high-fat junk food, and eating larger meals are contributors to weight gain (Levitsky et al., 2004). Current results are also consistent with a study showing that students saw campus eateries as a barrier to making healthful choices (Cason & Wenrich, 2002).

Lack of knowledge about food choice and preparation skills are suggested to be factors that can deter healthful behaviors (Cluskey & Grobe, 2009). Students felt that knowledge about nutrition had a largely positive influence on eating behaviors before and after college transition. Adults who raise their children with awareness and teaching of nutrition instill a greater understanding (Unusan, 2005), which may carry over into healthful food patterns later. Subjects reported a fairly high frequency (81%) that nutrition knowledge was a positive influence on eating. This statistic does not mean they have more knowledge, but perhaps they are becoming more aware of the necessity or value of having nutrition knowledge. Unfortunately, the relationship between nutrition knowledge and actual health behavior is very weak, as shown by Story et al. (2002), so healthful behaviors and knowledge of nutrition should be promoted to students.

Influences on exercise behaviors can also play an important role in weight loss and maintenance; it provides psychological and physical benefits (Pinto, Cherico, Szymanski, & Marcus, 1998). College students typically do not meet recommendations for adequate physical activity, and this has been associated with weight gain (Racette, Deusinger, Strube, Highstein, & Deusinger, 2008; McArthur & Raedeke, 2009). Furthermore, it is thought that a reduction in physical activity, more so than increased calories, may lead to weight gain (Butler, Black, Blue, & Gretebeck, 2004). Student mean score responses and positive, negative, and neutral influence frequencies are discussed to identify specific factors that influence student exercise behavior.

Over two-thirds of students felt that learned family exercise habits had a positive influence before coming to college, which did not differ significantly as students transitioned. In fact, more students felt a positive influence from their learned family habits after transition. As students take responsibility for their exercise habits, learned behaviors may become more prominent than they were while directly under their parents' influence. However, with growing evidence of increased obesity among college students, it is worth noting that even with positive family influences, students may not always transfer these habits into practice at college.

The number of students that consider their friends to be a positive influence on exercise before coming to college increased after coming to college, though not significantly. This could be due to the fact that students are surrounded by friends more than family, and individuals feel encouraged by the social support lended by friends (Gruber, 2008). Recent literature describes how college students often feel unmotivated to exercise with a lack of social support, or no exercise partner (Nelson, Kocos, Lytle, & Perry, 2009; Cluskey & Grobe, 2009) In the current study, having an exercise partner or group was another positive influence that increased significantly (before= 5.13, after= 5.37; $p < 0.05$) after college transition; a larger percentage of students reported that it had a positive influence at college. Additionally, students state that lack of support from friends, and inactive friends create a barrier to exercise (Gyurcsik, Bray, & Brittain, 2004). Peers are not necessarily friends or exercise partners.

Before college, students reported either being influenced positively or neutrally by peer pressure. After transition, the percent of students feeling positively influenced by peers increased, which was consistent with the significant ($p < 0.05$) increase in mean score. Competition or cultural standards from peer pressure might serve as motivation to be physically active. Previous findings show that group-based programs and peer instructors would be helpful to students as they adopt an exercise routine (Pinto et al., 1998). Peers and friends may provide accountability and motivation, even when opposition presents itself. Peers can also distract college students from healthy behaviors (Cluskey & Grobe, 2009).

Another factor that was shown to significantly and positively influence student's behavior was access to gym facilities. According to the mean score (before= 5.09, after= 5.64), access is regarded as one of the most highly positive influences to exercise behavior. Lack of facilities and limited access and variety of facilities has been shown to be a barrier for students to exercise (Pinto et al., 1998; Gyurcsik et al., 2004). Universities usually provide fitness facilities to students, and the convenient campus location may encourage students to be physically active. Campus facilities combine peer and friend motivation with convenience, as they often offer group exercise classes and free training appointments to students.

Having a schedule that changes each term was shown to have a significant influence on students in a positive way upon coming to college. This may be the result of a more fixed schedule with less open time, as characteristic of school schedules before coming to college. It may be that as students can more readily implement exercise with a structured schedule. For example, students may plan in exercise sessions after or between classes, and so making it part of their routine. Stress may increase as students attempt to balance school with healthy behaviors. Their sense of stress level was viewed as having a significantly positive influence on students after coming to college, compared to before; over half of participants viewed it as a positive influence. It is possible that exercise becomes an outlet for release from difficult studies or schedules (Driskell, Kim, & Goegel, 2005). If students decide to exercise during stressful periods,

rather than practice other habits commonly observed (i.e. stress eating, overindulgence), it can become a healthful way to deal with stress.

A large percentage of students viewed available free-time and having the opportunity to exercise as positive influences; at least 60% of students felt a positive influence before and after transition for both factors. Time is an established factor necessary for exercise, and has been shown to be a barrier for students (Nelson et al., 2009). According to results, many students felt that they have available free-time and opportunity to exercise; however, students may not take the opportunity and free time to exercise.

Males and females reported some differences in their eating behavior influences upon coming to college. Frequencies of positive and negative influences upon eating and exercise behavior were generated by gender. No significant differences between males and females' eating behavior influences were found. Some responses within gender groups, however, showed a large change in before and after frequency, which help identify differences between male and female influences in a transition time.

A large school workload had a strong negative influence on male and female eating behavior before coming to college, suggesting that students' workload in high school may have been a greater obstacle to healthy eating behaviors than college workload. After transition to college, almost half of males and females felt their behavior was positively influenced by workload, while almost another half felt negatively influenced by this. This is puzzling, as unfavorable eating habits have been typically adopted when workload and stress increases (Nelson et al., 2009). One possible explanation is that the school workload, like routine, may put students in a mindset of improving themselves or being diligent, both in education and health practices. Transition to college may create a larger workload than high school, but students may have more free-time and feel that school obligations or time is less of a negative influence. Before coming to college over half (57%) of all females felt that free-time had a negative influence on their eating habits. After coming to college, the negative influence decreased (37%), and more females felt that free-time positively influenced their eating habits. This suggests the possibility that these students feel they

have more leisurely time to invest in making healthy decisions or practicing healthy behaviors, and are less tempted to grab convenient foods.

Upon transition, more females felt negatively influenced by the food options offered to them. On-campus eateries may not display the variety or the healthy options that are available, or students may be unaware of which items are healthy choices, which was found in Cluskey and Grobe (2009). Many of the eateries include fast food and calorie-dense foods, or all-you-can-eat buffet styles, factors attributed to college weight gain (Hoffman, Policastro, Quick, Lee, 2006; Levitsky, Halbmaier, Mrdjenovic, 2004). Females have been found to be more likely to use food to deal with emotions or stress (Dawson et al., 2007). Females also tend to have healthier diets than males (Gruber, 2008), and so it is possible that weight concerns and uncertainty about food choices make females express more concern and perceive that the environment is more negative than do males.

Knowledge about nutrition was a positive influence upon males' eating behaviors after coming to college. A larger percentage of females also felt that knowledge influenced them positively; however the change in this perception with the transition was less dramatic than for the males. The larger shift in the influence in nutrition knowledge for males may be due to females' tendency to be more concerned with nutrition, food, and weight (Gruber, 2008; Cason & Wenrich, 2002) throughout the lifespan. It seems that weight gain among college students may be slow but steady, especially over the first few months, and students are not always aware of this weight change. It is possible that by increasing knowledge through education experience and raising awareness may help students, especially males, become more health conscious early in their college careers when weight changes are greatest (Racette et al., 2005).

The frequencies of positive and negative exercise behavior influences were compared to explore gender differences before and after transition. A significant difference was found in the influence of stress upon exercise behavior before and after coming to college. Other influences previously found to differ by gender, cited in the literature, are discussed, even though current study results reveal no differences.

Males and females viewed peer pressure differently as an exercise behavior influence, both before and after transition. Both before and after coming to college, a greater percent of males viewed peer pressure as being a positive influence on their exercise habits. According to one study, influence from peers had the most impact on students' exercise habits (Cason & Wenrich, 2002). It has also been noted in the literature that females tend to exercise less often than males (Dawson et al., 2007). These findings show males and females may be affected differently by social support; females have been shown to be more influenced by those who are close to them (Gruber, 2008), rather than peers they don't necessarily know. College females were more likely to indicate that not having an exercise buddy was an obstacle to exercising (Cluskey & Grobe, 2009). The current study shows that after transition, the frequency of females being positively influenced by friends to exercise (71%) is much higher than the percent positively influenced by peers (40%). Almost half of all females felt a neutral peer influence at college, versus about a third of males. Males may tend to enjoy an environment of pressure or competition of peers, viewing it as motivation to exercise (Gruber, 2008; Cluskey & Grobe, 2009).

A larger percent of females than males felt that their workload was a positive influence on exercising. A large workload usually means more stress to be handled. A larger workload may also suggest that time management becomes important; and finding time to exercise is part of learning to establish a routine. Females may be more likely to exercise when stressed; findings reveal that more females than males feel that a large workload and their sense of stress level to be a positive influence on exercise. However, males tend to perceive more academic confidence than females (Economos, Hildebrandt, & Hyatt, 2008), and so may feel less affected by workload and stress. Overall, college life brings new experiences, decisions, and balancing acts, and it could be that individuals are choosing exercise as a way to relieve stress.

In the current study, significant associations were found to exist between specific eating and exercise behaviors of students in this study. Researchers have reported other associations among healthy eating and exercise behaviors and influences (Blakely, Dunnagan, Haynes, Moore, & Pelican, 2004; Dutton, Napolitano, Whiteley, &

Marcus, 2008). The strongest correlations were found to be related to schedule, workload, and stress.

There were several significant associations between the positive influence of heavy school workload and having a changing schedule both for eating and exercise behaviors. Students may feel the need to establish an eating and exercise routine and schedule when they have a larger school workload, which has been suggested before (Cluskey & Grobe, 2009). The impact of a changing schedule may allow students to find time during each term to practice positive eating and exercise behaviors, as opposed to being bound to a more fixed schedule prior to coming to college.

Similarly, it is not surprising that correlations were also found between the positive influences of stress, and having extra free time for both eating and exercise behaviors. Stress can serve as a motivation to exercise or eat better, and having free time would certainly allow for one to be able to spend more time doing so. A student who is more attentive to their school work may feel the stress/pressure of assignments and deadlines, and may prefer to keep structure to ensure that everything gets done. These individuals may thrive more on accomplishing school work, working well under pressure, and feeling a sense of routine. They may be more motivated to structure their exercise time and eating habits under stress, even as their school schedule changes each term. Students in this study seemed to be positively motivated to have structure in their day, keep a schedule, and work well under time constraints.

Perceived Preparedness: All Students and By Gender

There has been some investigation looking at student's transition to college, however little, if any, work has been done looking at student's perceived preparedness for the college transition. Among the myriad of changes occurring in students' lives during transition, they have expressed difficulty in adapting healthy eating and exercise habits (Cluskey & Grobe, 2009). The current study asked students to rate their preparedness for dealing with specific factors typical to college adaptation and living. As males and females deal differently with major life changes, it was of interest to find any variations between male and female's preparedness.

Overall, students felt they were prepared (mean= 5.37) to make healthy food choices upon coming to college. Females felt significantly more prepared than males, which parallels previous literature that females tend to select more positive and preventive lifestyle choices (Dawson et al., 2007). It has been suggested that females, more than males, receive higher levels of support for good dietary habits (Gruber, 2008). It could be that the females in this population felt slightly higher levels of support and were more decided in choosing healthful food. The high frequency of males and females that felt overall prepared to make healthful choices, and the low frequency of those feeling unprepared, may be partially explained by good influence or support given to eat healthy before coming to college.

Students felt they were overall prepared (mean= 5.46) to manage their time upon coming to college. A significant difference was found between males and females; females felt more prepared than males. Time management skills are an important to learn during college, and can be important regarding eating and exercise habits (Greaney et al., 2009). Students describe "... being pulled in all directions," (Nelson et al., 2009, p.289) at college, and so having time to make healthful decisions becomes a challenge to many. More males than females may perceive management of time as difficult. In this survey population the challenge of time management was not expressed largely, however this does not mean that students are not prepared or do not meet the challenge.

The highest score for perceiving a sense of preparedness was found among all students in overcoming peer pressure (mean= 6.04); males and females were close to equal in this perception. This finding is consistent with earlier findings that upon coming to college, students viewed peer pressure as being a positive influence on their eating and exercise behaviors. Overcoming peer pressure may be a matter of a change of mindset as students transition to college; realizing that peers can be a source of support (Gruber, 2008) rather than discouragement. Cluskey and Grobe (2009) found that peers were considered both positive and negative influences on both eating and exercise behavior.

There is difficulty in attempting to describe “healthy” or “good” in terms of food and eating habits, especially between genders. Researchers made the assumption that overall, students had an accurate definition of what constitutes positive and negative eating habits. Students felt that they were overall prepared to balance school life with good eating habits. A large but not significant difference was found between males and females; females felt more prepared than males. This finding parallels and supports an above conclusion that students felt prepared to make healthy food choices. A major barrier for students in making healthy food choices, however, is the food available to them on campus (Nelson et al., 2009). This may mean that when students come to college wanting to be, and thinking they are, prepared to make good choices, when faced with unhealthful options, they feel supported to choose the healthful foods.

Balancing school with healthful exercise habits is a struggle for many students upon coming to college (Cluskey & Grobe, 2009). In fact, it is well documented that a dramatic decline in physical activity typically occurs during the college years (Nelson et al., 2009). However, 60% of males and 71% of females surveyed, considered themselves prepared upon coming to college to balance school and good exercise habits. This relatively large percentage of students feeling prepared could indicate that this trend is shifting from the evidence in previous research; or that being prepared and actually practicing those behaviors are two different concepts. Previous study has shown that college males engage more frequently in physical activity as compared to females (Dawson et al., 2007), however current study shows that females felt more prepared to exercise than males. Together, we may conclude that college females have better intention to balance exercise with school, but college males have better probability in actually following through.

The factor for which students felt least prepared upon coming to college, was stress management (mean= 4.88). Still, surveyed students overall felt prepared for this element of college life; in fact males felt slightly more prepared than females. In the context of health behaviors, stress relief has been reported to be reason for college students to exercise (Driskell, Kim, & Goebel, 2005), but it has also been reported as

reason to overeat or eat ‘unhealthy’ foods (Zellner et al., 2006). The present study does reveal that males felt more prepared than females, which is supported by previous study. Females have been shown to report higher stress than male students, and males are more likely to exercise to relieve stress (Economos, Hildebrandt, & Hyatt, 2008). It may be that current students at OSU experienced encouragement and their stress was met with effective ways to cope and manage.

Behavior Change after Transition: All Students and by Gender

Health behaviors, including eating and exercise habits, are known to change during the transition from high school to college. As will be discussed, college students are likely to have the following characteristics: consume less than the recommended amounts of fruits and vegetables, consume increased amounts of fast food, consume below recommended amounts of milk, consume more snack foods, eat late at night, eat larger meals, skip/irregular meals, and get below recommended amounts of exercise.

This study derived a mean score for various eating and exercise behaviors with the frequency of behavior practice rated on a scale 1-7. The overall and gender means reveal whether students perceived themselves to be practicing each behavior more often or less often than before coming to college. According to data, more students claim that they drink milk less often now, than before they came to college (mean= 3.77), with more males than females indicating that they currently drink more milk at college. These results are consistent with literature findings that milk preference decreases with age and among college students (Unusan, 2006) and is less popular among females (Cason & Wenrich, 2002). According to MyPyramid (2009), milk is a major source of calcium for many individuals, and consuming milk is associated with overall better quality diet. Students may avoid milk because it is not readily available, or they find it undesirable; females may avoid milk due to concerns that it contributes to excess weight.

Coffee and gourmet coffee drinks have become widely popular among individuals (Homan & Mobarhan, 2006) and it seems that coffee shops become a part of the college cultural. In the current study, a greater percent of students said that they

drink more coffee now, and females reported drinking more coffee than males. Most coffee drinks contain caffeine, and students may view this ingredient as a stimulant to help them stay awake while studying, attending class, or doing homework. It has been proposed that coffee drinks with added sugar and calories could affect weight status (Shields, Corrales, & Metallinos-Katasaras, 2004).

A meta-analysis of the literature found that soda and carbonated beverage consumption has been linked to increased energy intake, lower overall quality of diet, and other health complications (Vartanian, L.R., Schwartz, M.B., & Brownell, K.D., 2007). The current study shows that more students say they consume soda and carbonated beverages less often (mean= 3.55) while at college; with males reporting less soda consumption. Soda has been correlated with snacking (Vartanian et al., 2007), which provides a possible explanation to the overweight trend of college students.

Alcohol consumption has become a crucial problem among college students, as it has the potential for students to develop dependencies and risky behaviors that could ensue into later adulthood (Yu & Shacket, 2001; Cason & Wenrich, 2002; Dawson et al., 2007; Economos et al., 2008; Nelson et al., 2009). In the current study, students felt that alcohol consumption had increased, more common among the females than males. Males have been reported to consume more alcohol than females (Dawson et al., 2007); but this current study suggests that initiating an increase in alcohol consumption at college is possibly more common among females. Previous research supports that alcohol consumption during high school predicts students' consumption during college; consequently, greater high school consumption is associated with larger college consumption (Yu & Shacket, 2001). A very low percentage of subjects reported drinking less often, which is cause for concern, as alcohol consumption is a factor in weight gain and other unhealthy behaviors.

Numerous studies show that college students do not meet consumption recommendations for fruits and vegetables (DeBate, Topping, & Sargent, 2001; Boutelle, Neumark-Sztainer, Story, & Resnick, 2002; Racette et al., 2005; Unusan, 2006; Brunt et al., 2008; Economos et al., 2008; Cluskey & Grobe, 2009). Students in this study were more likely to consume more fruit and fewer vegetables. More males

reported consuming vegetables more often, while more females reported consuming fruits more often, however there was no significant difference found between the genders. Previous report shows that throughout the first year of college, males' consumption of fruit and vegetables dropped, while females' rose, although not significantly for either (Economos et al., 2008). It was found that those students who ate fruits were more likely to eat vegetables, while both groups were less likely to eat fast food (see Table 4.18); this may mean that these students have an overall more healthful diet. Students who consume of fruits and vegetables were also more likely to feel in control of their health and exercise regularly; those who ate fruit were less likely to drink soda (Table 4.18). Individuals who are receiving adequate vitamins and nutrients are more likely to feel healthy and have more energy to accomplish tasks; they may also be more motivated to embrace other healthful habits.

Fast food consumption has also been known to be a habit among college students (Economos et al., 2008; Racette et al, 2005; Nelson et al., 2009; Cason & Wenrich, 2002; DeBate et al., 2001). This may be a combination of factors, including the low cost of fast food and its convenience. A larger percent of males than females claimed to eat more fast food upon coming to college, although the difference was not significant. A larger percentage of study females stated that they consumed less fast food now compared to the past. One study reported that males were more likely to consume fast food compared to females and offered the explanation of females' concerned for weight gain (Economos et al., 2002). Fast food consumption was found to be related to snacking. It appears that males are likely to consume more snacks since coming to college, and females are likely to consume snacks less frequently. Overall, many students seemed to feel that their snacking behaviors did not change (mean= 4.13). Snacking in excess, however, over time could result in weight gain and other potential health problems.

A significant difference was found between males and females in the frequency of regular meals consumed; with females consuming regular meals less often than males. This evidence is consistent with other studies that found frequent meal skipping to be a concern, especially for females (Story et al., 2002; Cason & Wenrich, 2002).

Meal skipping and restrained eating could lead to habits of overeating when one finally sits down to eat; weight gain and disordered eating are potential consequences of this cycle (Pliner & Saunders, 2008; Delinsky & Wilson, 2008).

Eating more often late at night was shown to be the behavior most frequently practiced among males and females (mean= 4.87); in fact, equal percentages of males and females reported this behavior occurring more often. Eating late at night was also correlated with eating large meals more often. The literature findings support that college students tend to habitually eat late at night (Driskell et al., 2005; Nelson et al., 2009; Levitsky et al., 2004). Students may eat more when doing class work, socializing, or drinking alcohol late at night. Males reported eating significantly larger quantities of food more often at college than did females. This difference in gender may be related to socializing or alcohol consumption, but is also a concern for weight gain as males have been reported to seem less concerned about weight gain in college than females (Cluskey & Grobe, 2009)

Males report with equal frequency both more and less regular exercise at college, while females are more consistent in reporting more regular exercise. Males and females report a mean of 4.08, which translates into a neutral score when asked, “do you exercise more or less often now at college?” It is well documented that exercise habits are below recommendations, or tend to decline among college students (Racette et al., 2005; Driskell et al., 2005, McArthur & Raedeke, 2009, Pinto et al., 1998; Boutelle et al., 2002; Racette et al., 2008). Exercise that was part of routine sports or team participation in high school is often missing in college, and contributes to a loss of physical activity with the transition (Cluskey & Grobe, 2009). Thus, those who no longer are on a sports team or have no practice requirements may have less activity. Those who were exercising independently may be more likely to practice maintenance habits. Those students who exercised regularly were also likely to feel more in control of their health. Students who balance their school schedules with physical activity may be better able to deal with the stresses of transition, or may be more attuned to routine.

It has been established that most undergraduate students at OSU are of normal weight and felt they were overall prepared for their transition to college. Eating

behavior influences did not significantly differ between males and females, but exercise behavior influences differed significantly by peer pressure, school workload, and sense of stress level. Health behavior changes since coming to college show that students are most likely to decrease milk consumption and increase alcohol consumption.

CONCLUSION

This research study was conducted to explore the eating and exercise behavior changes and influences among undergraduate Oregon State University students, as they transition to college. The research covered three main objectives: 1) to explore student's perception regarding their eating and exercise behaviors and influences, and how those behaviors changed after college transition 2) to explore differences between genders in the factors that influenced eating and exercise habits and behaviors 3) to explore student's perception of their preparedness and challenges associated with adapting their behaviors upon coming to college.

The subject sample included 101 males and 136 females of a potential pool of 407 students. Surveys were collected during winter term, approximately 16 weeks after students came to college. Previous research surrounding eating and exercise behaviors has shown a lack of male participants; in the current study, overall participation is 43% male. While most students (70%) in this sample claimed to be of normal weight, according to BMI score from self-reported height and weight; but close to 25% of students were found to be overweight or obese. The majority of participants were facing the transition as freshman in their first year away from home.

Five influences upon eating behavior were found to differ significantly for students upon coming to college. The influences that changed significantly may show that the college environment is more influential compared to their pre-college environment. Upon coming to college the influences that became significantly less positive factors driving healthy eating included family habits, peers, and food choice at college compared to food choice at home. One study supports current findings that peers have a positive influence on eating behavior (Gruber, 2008); however Cluskey and Grobe (2009) found that peers can be both a positive and negative influence. Previous literature shows that students are negatively influenced by campus food choices (Nelson et al., 2009; Cluskey & Grobe, 2009); it is possible that students do not know which options are more healthful. These results suggest that efforts are needed to help students find ways to choose healthful food options from those available. Students

also reported being positively influenced to make healthful eating decisions as a result of their changing schedule and their nutrition knowledge. A changing schedule may allow for flexibility in routine and more time for making healthful eating-related decisions. The results indicated that nutrition knowledge may be considered a positive influence; students become aware of the importance of such knowledge upon coming to college as they have to make more independent food choices.

Five significant differences were found in the influences upon exercise behaviors that were influential upon coming to college. Peer pressure to exercise, having an exercise partner, having a changing schedule, having access to facilities, and a sense of stress level were all perceived to positively influence exercise behavior. Males felt more positively influenced by peers than females. Females were more likely to report that their exercise behavior was positively influenced when college school workload is heavy. Females were more positively influenced to exercise as a result of having stress both before and after college transition, compared to males. Exercise may provide an outlet for stress; in this study, males rather than females were found to more likely engage in exercise for stress relief.

Many correlations were found that impact both eating and exercise behaviors; the strongest correlations included a changing schedule, a heavy school workload, and a sense of stress. This implies that there is value in establishing a routine during college; further study should be done regarding class load and level of involvement in other activities, to identify the impact it has upon health behavior of college students.

Overall, students felt the most prepared to overcome peer pressure and the least prepared to manage the stresses of college. Students in this sample reported high mean scores that indicate that they perceived being prepared to deal with each of the eating and exercise behavior influences at college. Students indicate being prepared to make healthy food choices, manage time, overcome peer pressure, balance school life with good eating habits, balance school life with good exercise habits, and manage stress. This study finding raises questions among researchers, as it has been found previously that students may not be prepared to deal with aspects of health during college transition (Cason & Wenrich, 2002; Crombie Ilich, Dutton, Panton, & Abood, 2008; Nelson et al.,

2009; Cluskey & Grobe, 2009). Our study was conducted mid-way through many students' freshman year, and it is possible that they may not sense being challenged yet. Significant differences between genders revealed that more females felt prepared to make healthy food choices, and to manage their time.

Since coming to college, students reported that the frequency of drinking soda and carbonated beverages decreased most, and drinking alcohol increased the most from their previous environment. Some other behavior changes showed significant differences between genders; males were likely to consume more regular meals at college, while females were less likely to consume regular meals at college. This is consistent with literature findings that females tend to struggle with unhealthful diet and weight-loss behaviors upon coming to college (Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006). A significant difference in gender response was also found for eating large quantities of food, with males reporting they now eat larger quantities of food more often, and females less likely to eat larger quantities. This is concerning because males have been shown to be less concerned about college weight gain than females, and are just as likely to gain weight in college (Dawson, Schneider, Fletcher, & Bryden, 2007; Cluskey & Grobe, 2009).

The strongest correlations among these reported behavior changes were found between consumption of fruit and consumption of vegetables ($r = 0.717$). Strong relationships were also found with those who consuming snack foods, soda or carbonated beverages, desserts, and fast foods. Finally, those who exercised regularly were strongly correlated to those who reported being in control of their health and less strongly correlated with fruits and vegetables. These correlations of current college health behaviors may suggest that upon college transition, students begin to diverge into health behavior patterns. Those who exercise regularly and eat fruits and vegetables may be more likely to practice other healthful behaviors, all of which lead one to feeling more in control of their health. Those who tend to have poor health behaviors, such as eating fast food or snacking, may fall into a routine of other less-healthful behavior patterns, or may reflect lower value of health as an overall lifestyle.

Implications and Future Direction

This study explores influences suggested from literature as having a positive and negative impact on college students' eating and exercise behaviors. Research has established that transition to college is a pivotal period during which students are adapting old behaviors and establishing new lifestyle habits. As students learn to balance college life with health habits, many barriers are present to prevent making healthful choices. The present study established that some influences upon eating and exercise habits have either negative or positive effects on behaviors, and that some influences have a neutral influence over student behavior. Future research could seek to link influences upon eating and exercise with specific health behavior changes, to help clarify which positively and negatively influence the impact of health behaviors. For example, eating fruits and vegetables may result from an individual's family upbringing or the students' current nutrition knowledge.

Follow-up research that uses observational trials with pre-college and post-college measures regarding students eating and exercise behaviors might help determine actual cause and effect of influences upon behaviors. More detailed investigations regarding the barriers to healthy eating and exercise behaviors need to be revealed, and student support services could work to build strategies to support healthy behavior on campuses. Colleges and universities may be better able to address these barriers in freshman orientation programs or dormitory groups which help transition incoming students.

Adding physical activity as an academic requirement might establish more regular exercise routines and help transition students whose previous activity was primarily from high school sports. These results could also be used to support the value of emphasizing to college students the relationship between nutrition and exercise in overall health. While many colleges may have required health courses or physical activity labs, students may benefit from taking a basic or applied nutrition course that addresses specific food choice and eating behavior problems in college life. Stress, alcohol, and weight gain have been consistently documented problems among college students that have yet to find resolution (Racette, Deusinger, Strube, Highstein,

Deusinger, 2005; Zellner, Loaiza, Gonzalez, Pita, Morales, Pecora, et al., 2006; Economos, Hildebrandt, & Hyatt, 2008). The college years are about developing the person in a variety of realms, including health. Development of positive or negative health behaviors will manifest in their future families, work lifestyles, and ultimately the well-being of our nation.

Further exploration of students' preparedness for college is also suggested. As elements of perceived unpreparedness are identified, programs can be implemented into high schools to prepare students more gradually for making positive health decisions, and to plan for the transition to college. The great affects of family togetherness and meals has been revealed by research, and could also be a largely effective means of improving health. Parents should be encouraged and supported to implement regular family mealtimes, and to establish positive behaviors early in life that will carry on later.

Limitations

The sample population for this study was considered representative of undergraduate students, primarily first year students, at Oregon State University in the northwestern part of the country. Therefore, results are limited to this university population, and may differ at other universities in the state, region, and country. Sample size was a limitation, and future research could consider surveying two or three sections of the Lifetime Fitness and Health course, or could follow students in a longitudinal study over time. Student responses to survey questions may not have been genuine, may have been dishonest, or they may have been misinterpreted them. It is possible that this survey was taken too early in the year, so health behaviors and students' ability to reflect on their college transition was somewhat limited. No causal relationships can be determined from this research, as it lacks an intervention and a control group.

BIBLIOGRAPHY

- American College Health Association. (2009). Healthy Campus 2010. Available at: http://www.acha.org/Info_resources/hc2010.cfm. Accessed September 1, 2009.
- American College of Sports Medicine. (2007). *Guidelines for healthy adults under age 65*. Available at: www.acsm.org. Accessed September 24, 2008.
- Anderson, D.A., Shapiro, J.R., & Lundgren, J.D. (2003). The freshman year of college as a critical period for weight gain: An initial evaluation. *Eating Behaviors*, 4, 363-367.
- Atlantis, E., & Ball, K. (2008). Association between weight perception and psychological distress. *International Journal of Obesity*, 32, 715-721.
- Blakely, F., Dunnagan, T., Haynes, G., Moore, S., & Pelican, S. (2002). Moderate Physical Activity and Its Relationship to Select Measures of a Healthy Diet. *Journal of Rural Health*, 20, 160-165.
- Boutelle, K., Neumark-Sztainer, D., Story, M., & Resnick, M. (2002). Weight Control Behaviors Among Obese, Overweight, and Nonoverweight Adolescents. *Journal of Pediatric Psychology*, 27, 531-540.
- 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, 1-12.
- Brunt, A., Rhee, Y., & Zhong L. (2008). Differences in Dietary Patterns Among College Students According to Body Mass Index. *Journal of American College Health*, 56, 629-634.
- Butler, S.M., Black, D.R., Blue, C.L., & Gretebeck, R.J. (2004). Change in Diet, Physical Activity, and Body Weight in Female College Freshman. *American Journal of Health Behavior*, 28, 24-32.
- Cluskey, M., & Grobe, D. (2009). College Weight Gain and Behavior Transitions: Male and Female Differences. *Journal of the American Dietetic Association*, 109, 325-329.
- Cason, K.L. (2006). Family Mealtimes: More than Just Eating Together. *Journal of the American Dietetic Association*, 106, 532-533.
- Cason, K., & Wenrich, T.R. (2002). Health and Nutrition Beliefs, Attitudes, and Practices of Undergraduate College Students: A Needs Assessment. *Topics of Clinical Nutrition*, 17, 52-70.

- Crombie, A.P., Ilich, J.Z., Dutton, G.R., Panton, L.B., & Abood, D.A. (2009). The freshman weight gain phenomenon revisited. *Nutrition Reviews*, 67, 83-94.
- Dawson, K.A., Schneider, M.A., Fletcher, P.C., & Bryden P.J. (2007). Examining gender differences in the health behaviors of Canadian university students. *Journal of the Royal Society for the Promotion of Health*, 127, 38-44.
- DeBate, R.D., Topping, M., & Sargent, R.G. (2001). Racial and Gender Differences in Weight Status and Dietary Practices Among College Students. *Adolescence*, 36, 819-833.
- Devine, C.M. (2005). A Life Course Perspective: Understanding Food Choices in Time, Social Location, and History. *Journal of Nutrition Education and Behavior*, 37, 121-128.
- Delinsky, S.S., & Wilson, G.T. (2008). Weight gain, dietary restraint, and disordered eating in the freshman year of college. *Eating Behaviors*, 9, 82-90.
- Driskell, J.A., Kim, Y.N., & Goebel, K.J. (2005). Few Differences Found in the Typical Eating and Physical Activity Habits of Lower-Level and Upper-Level University Students. *Journal of the American Dietetic Association*, 105, 798-801.
- Dutton, G.R., Napolitano, M.A., Whiteley, J.A., & Marcus, B.H. (2008). Is physical activity a gateway behavior for diet? Findings from a physical activity trial. *Preventive Medicine*, 46, 216-221.
- Economos, C.D., Hildebrandt, M.L., & Hyatt, R.R. (2008). College Freshman Stress and Weight Change: Differences by Gender. *American Journal of Health Behavior*, 32, 16-25.
- Edwards, J.S.A., & Meiselman, H.L. (2003). Changes in dietary habits during the first year at university. *Nutrition Bulletin*, 28, 21-34.
- Greaney, M.L., Less, F.D., White, A.A., Dayton, S.F., Riebe, D., Blissmer, B., et al. (2009). College Students' Barriers and Enablers for Healthful Weight Management: A Qualitative Study. *Journal of Nutrition Education and Behavior*, 41, 281-286.
- Gruber, K.J. (2008). Social Support for Exercise and Dietary Habits Among College Students. *Adolescence*, 43, 557-575.
- Guo, S.S., Chumlea, W.C., Roche, A.F., & Siervogel, R.M. (1997). Age- and maturity-related changes in body composition during adolescence into adulthood: The Fels Longitudinal Study. *International Journal of Obesity & Related Metabolic Disorders*, 21, 1167-1175.

Gyuresik, N.C., Bray, S.R., & Brittain, D.R. (2004). Coping With Barriers to Vigorous Physical Activity During Transition to University. *Family Community Health*, 27, 130-142.

Hodge, C.N., Jackson, L.A., & Sullivan, L.A. (1993). The “Freshman 15” Facts and Fantasies About Weight Gain in College Women. *Psychology of Women Quarterly*, 17, 119-126.

Hoffman, D.J., Policastro, P., Quick, V., & Lee, SK. (2006). Changes in Body Weight and Fat Mass of Men and Women in the First Year of College: A study of the “Freshman 15”. *Journal of American College Health*, 55, 41-45.

Homan, D.J., & Mobarhan, S. (2006). Coffee: Good, Bad, or Just Fun? A Critical Review of Coffee’s Effects on Liver Enzymes. *Nutrition Reviews*, 64, 43-46.

Huang, T.T.K., Harris, K.J., Lee, R.E., Nazir, N., Born, W., & Kaur, H. (2003). Assessing Overweight, Obesity, Diet, and Physical Activity in College Students. *Journal of American College Health*, 52, 83-86.

Johnston, C.A., Tyler, C., & Foreyt, J.P. (2007). Behavioral Management of Obesity. *Current Atherosclerosis Reports*, 9, 448-453.

Jung, M.E., Bray, S.R., & Ginis, K.A.M. (2008). Behavior Change and the Freshman 15: Tracking Physical Activity and Dietary Patterns in 1st Year University Women. *Journal of American College Health*, 56, 523-530.

Lally, P., Chipperfield, A., & Wardle, J. (2008). Healthy habits: efficacy of simple advice on weight control based on a habit-formation model. *International Journal of Obesity*, 32, 700-707.

Laitinen, J., Ek, E., & Sovio, U. (2002). Stress-related eating and drinking behavior and body mass index and predictors of this behavior. *Journal of Preventive Medicine*, 34, 29-39.

Levitsky, D.A., Garay, J., Nausbaum, M., Neighbors, L., & DellaValle, D.M. (2006). Monitoring weight daily blocks the freshman weight gain: a model for combating the epidemic of obesity. *International Journal of Obesity*, 30, 1003-1010.

Levitsky, D.A., Halbmaier, C.A., & Mrdjenovic, G. (2004). The freshman weight gain: a model for the study of the epidemic of obesity. *International Journal of Obesity*, 28, 1435-1442.

Lowe, M.R., & Kral, T.V.E. (2006). Stress-induced eating in restrained eaters may not be caused by stress or restraint. *Appetite*, 46, 16-21.

- Lowry, R., Galuska, D.A., Fulton, J.E., Wechsler, H., Kann, L., Collins, J.L. (2000). Physical activity, food choice, and weight management goals and practices among U.S. college students. *American Journal of Preventive Medicine*, 18, 18-27.
- Malinauskas, B.M., Raedeke, T.D., Aeby, V.G., Smith, J.L., & Dallas, M.B. (2006). Dieting practices, weight perceptions, and body composition: A comparison of normal weight, overweight, and obese college females. *Nutrition Journal*, 5. doi: 10.1186/1475-2891-5-11
- Marchessault, G., Thiele, K., Armit, E., Chapman, G.E., Levy-Milne, R., & Barr, S.I. (2007). Canadian Dietitians' Understanding of Non-Dieting Approaches in Weight Management. *Canadian Journal of Dietetic Practice and Research*, 68, 67-72.
- Matvienko, O., Lewis, D.S., & Schafer, E. (2001). College Nutrition Science Course as an Intervention to Prevent Weight Gain in Female College Freshman. *Journal of Nutrition Education*, 33, 95-101.
- McCabe, S.E., Boyd, C.J., Cranford, J.A., Slayden, J., Lange, J.E., & Reed, M.B., et al. (2007). Alcohol Involvement and Participation in Residential Learning Communities Among First-Year College Students. *Journal of Studies on Alcohol and Drugs*, 68, 722-726.
- McArthur, L.H., & Raedeke, T.D. (2009). Race and Sex Differences in College Student Physical Activity Correlates. *American Journal of Health Behavior*, 33, 80-90.
- Mihalopoulos, N.L., Auinger, P., & Klein, J.D. (2008). The Freshman 15: Is it Real? *Journal of American College Health*, 56, 531-533.
- Morrow, M.L., Heesch, K.C., Dinger, M.K., & Hull, H.R. (2006). Kneehans AW, Fields DA. Freshman 15: Fact or Fiction? *Obesity*, 14, 1438-1443.
- MyPyramid. United States Department of Agriculture. (2009). Available at: http://www.mypyramid.gov/pyramid/milk_why.html. Accessed: Aug. 28, 2009.
- National Heart, Lung, and Blood Institute. (2009). Obesity Education Initiative, National Institute of Health. Available at: <http://www.nhlbisupport.com/bmi/>. Accessed August 1, 2009.
- Nelson, M.C., Kocos, R., Lytle, L.A., & Perry, C.L. (2009). Understanding the Perceived Determinants of Weight-related Behaviors in Late Adolescence: A Qualitative Analysis among College Youth. *Journal of Nutrition Education and Behavior*, 41, 287-292.

- Ogden, C.L., Carroll, M.D., Curtin, L.R., McDowell, M.A., Tabak, C.J., & Flegal, K.M. (2006). Prevalence of overweight and obesity in the United States 1999-2004. *JAMA*, 282, 1519-1522.
- Pinto, B.M., Cherico, N.P., Szymanski, L., & Marcus, B.H. (1998). Longitudinal Changes in College Students' Exercise Participation. *College Health*, 47, 23-27.
- Pliner, P., & Saunders, T. (2008). Vulnerability to freshman weight gain as a function of dietary restraint and residence. *Physiology & Behavior*, 93, 76-82.
- Racette, S.B., Deusinger S.S., Strube, M.J., Highstein, G.R., & Deusinger, R.H. (2005). Weight Changes, Exercise, and Dietary Patterns During Freshman and Sophomore Years of College. *Journal of American College Health*, 53, 245-251.
- Racette, S.B., Deusinger, S.S., Strube, M.J., Highstein, G.R., & Deusinger, R.H. (2008). Changes in Weight and Health Behaviors from Freshman through Senior Year of College. *Journal of Nutrition Education and Behavior*, 40, 39-42.
- Segelken R. (2005). Researchers View Obesity from a Life Course Perspective. *Human Ecology*, 33, 14-17.
- Shamaley-Kornatz, A., Smith, B., & Tomaka, J. (2007). Weight Goals, Perceptions, and Practices Among Hispanic and Anglo College Females. *Hispanic Journal of Behavioral Sciences*, 29, 535-553.
- Shields, D.H., Corrales, K.M., & Metallinos-Katasaras, E. (2004). Gourmet coffee beverage consumption among collage women. *Journal of the American Dietetic Association*, 104, 650-653.
- Silliman, K., Rodas, K., & Neyman, M. (2004). A Survey of Dietary and Exercise Habits and Perceived Barriers to Following a Healthy Lifestyle in a College Population. *Californian Journal of Health Promotion*, 2, 82-91.
- Singleton, R.A., & Straits, B.C. (2005). Approaches to Social Research, Fourth Edition. New York: Oxford University Press.
- Story, M., Neumark-Sztainer, D., & French, S. (2002). Individual and environmental influences on adolescent eating behaviors. *Journal of the American Dietetic Association*, 102, S40-S51.
- Stotts, J., Lohse, B., Patternon, J., Horacek, T., White, A., Greene, G. (2007) Eating Competence in college students nominates a non-dieting approach to weight management. *FASEB Journal*, 21.

Unusan, N. (2006). University students' food preference and practice now and during childhood. *Food Quality and Preference*, 17, 362-368.

Vartanian, L.R., Schwartz, M.B., & Brownell, K.D. (2007). Effects of Soft Drink Consumption on Nutrition and Health: A Systematic Review and Meta-Analysis. *American Journal of Public Health*, 97, 667-675.

Wethington, E. (2005). An Overview of the Life Course Perspective: Implications for Health and Nutrition. *Journal of Nutrition Education and Behavior*, 37, 115-120.

Wharton, C.M., Adams, T., & Hampl JS. (2008). Weight Loss Practices and Body Weight Perceptions Among US College Students. *Journal of American College Health*, 56, 579-584.

World Health Organization. (2009). Obesity. Found at:
<http://www.who.int/topics/obesity/en/>. Accessed August 1, 2009.

Yager, Z., & O'Dea, J.A. (2008). Prevention programs for body image and eating disorders on University campuses: a review of large, controlled interventions. *Health Promotion International*, 23, 173-189.

Yu, J., & Shacket, R.W. (2001). Alcohol use in High School: Predicting Students' Alcohol use and Alcohol Problems in Four Year Colleges. *American Journal of Drug and Alcohol Abuse*, 27, 775-793.

Zellner, D.A., Loaiza, S., Gonzalez, Z., Pita, J., Morales, J., Pecora, D., et al. (2006). Food selection changes under stress. *Physiology & Behavior*, 87, 789-793.

APPENDICES

APPENDIX A: Informed Consent

TO: Mary Cluskey
Nutrition

IRB #: 4200 – Diet and Exercise Influences of Students in Transition (Student Researcher: Kerry Hart)

Level of Review: Exempt

Expiration Date: 1-28-10

Approved Number of Participants: 400

The referenced project was reviewed under the guidelines of Oregon State University's Institutional Review Board (IRB). The IRB has **approved** the:

(X) Initial Application () Continuing Review () Project Revision
with a (if applicable): (X) Waiver of documentation of Informed Consent () Waiver of Consent

A copy of this information will be provided to the full IRB committee.

- **CONSENT FORM:** All participants must receive the IRB-stamped informed consent document. If the consent is in a format that could not have stamp placement (i.e. web site language, email language, etc), then the language must be exactly as the IRB approved it.
- **PROJECT REVISION REQUEST:** Any changes to the approved protocol (e.g. protocol, informed consent form(s), testing instrument(s), research staff, recruitment material, or increase in the number of participants) must be submitted for approval before implementation.
- **ADVERSE EVENTS:** Must be reported within three days of occurrence. This includes any outcome that is not expected, routine and that result in bodily injury and/or psychological, emotional, or physical harm or stress.
- **CONTINUING REVIEW:** A courtesy notice will be sent to remind researchers to complete the continuing review form to renew this project, however – it is the researcher's responsibility to ensure that continuing review occurs prior to the expiration date. Material must be submitted with adequate time for the office to process paperwork. If there is a lapse in approval, suspension of all activity including data analysis, will occur.
- **DEVIATION/EXCEPTIONS:** Any departure from the approved protocol must be reported within 10 business days of occurrence or when discovered.

Forms are available at: <http://oregonstate.edu/research/osprc/rc/humansubjects.htm>.

If you have any questions, please contact the IRB Human Protections Administrator at IRB@oregonstate.edu or by phone at (541) 737-8008.



Elisa Espinoza
IRB Human Protections Administrator

Date: 1-29-09

APPENDIX B: Announcement to the Lifetime Health and Fitness Class

Good morning everyone, my name is Kerry Hart and I am a second year graduate student in Nutrition. I am working on my research to complete my thesis, and I need your help. I am asking you to take the next 15 minutes to complete this survey that I have formulated. There are no obligations; it is completely voluntary. You must, however, be at least 18 years of age.

You will be asked questions about eating and exercise habits now and when you lived at home with your parents. My research topic is looking at the transition period from high school to college.

You will not be compensated, but you do have the option of providing contact information to enter into a prize drawing. I will choose eight names randomly from those of you who completed surveys. Those chosen will receive a \$25 gift certificate to the OSU Bookstore. Your survey answers will be kept confidential and you will not be linked to your contact info; the sheet will be separated.

If you want to see a copy of the consent form for this survey, I have some up front.

As you finish your survey, please pass it and all blank surveys to the aisle seats at the end of your row. My assistants and I will come and collect them.

Thank you so much for your time, I really appreciate it!!

APPENDIX C: Survey Instrument: Eating and Exercise Behaviors in College

In what way does each of the following affect your eating behavior? (please circle one number for each influence)

POSITIVE (+): influences are defined as helping, fostering, encouraging, motivating or serving as good role models

NEGATIVE (-): influences are discouraging, distracting, impeding, demotivating or serving as poor role models

NA: Is not relevant or applicable to me, does not affect me

Q1: RANK HOW THESE INFLUENCES AFFECT YOUR EATING BEHAVIORS WHILE CURRENTLY AT OSU	Very (+) Influence	Somewhat (+) Influence	Little (+) Influence	No (+/-) Influence	Little (-) Influence	Somewhat (-) Influence	Very (-) Influence	NA
a. Learned family eating habits/meals	7	6	5	4	3	2	1	0
b. My friends' eating habits	7	6	5	4	3	2	1	0
c. Peer pressure to eat certain foods	7	6	5	4	3	2	1	0
d. Having a large school workload	7	6	5	4	3	2	1	0
e. Having a schedule that changes each term	7	6	5	4	3	2	1	0
f. Having available free time	7	6	5	4	3	2	1	0
g. Money available for food	7	6	5	4	3	2	1	0
h. Food choices/meals available in dorms or on campus	7	6	5	4	3	2	1	0
i. My nutrition knowledge	7	6	5	4	3	2	1	0
j. My sense of stress level	7	6	5	4	3	2	1	0

Q2: RANK HOW THESE INFLUENCES AFFECT YOUR EXERCISE BEHAVIORS WHILE CURRENTLY AT OSU	Very (+) Influence	Somewhat (+) Influence	Little (+) Influence	No (+/-) Influence	Little (-) Influence	Somewhat (-) Influence	Very (-) Influence	NA
a. Learned family exercise habits	7	6	5	4	3	2	1	0
b. My friends' exercise habits	7	6	5	4	3	2	1	0
c. Peer pressure	7	6	5	4	3	2	1	0
d. Having a large school workload	7	6	5	4	3	2	1	0
e. Having a schedule that changes each term	7	6	5	4	3	2	1	0
f. Having available free time	7	6	5	4	3	2	1	0
g. An exercise partner/group	7	6	5	4	3	2	1	0
h. Access to exercise or gym facilities	7	6	5	4	3	2	1	0
i. Opportunity to exercise	7	6	5	4	3	2	1	0
j. My sense of stress level	7	6	5	4	3	2	1	0

Q3: How much do you agree or disagree with this statement: I am currently motivated to eat a healthy diet. (circle one)

- | | |
|-------------------------------|-------------------|
| 1. Strongly Disagree | 5. Somewhat Agree |
| 2. Disagree | 6. Agree |
| 3. Somewhat Disagree | 7. Strongly Agree |
| 4. Neither Agree nor Disagree | |

Q4: How much do you agree or disagree with this statement: I am currently motivated to exercise regularly. (circle one)

- | | |
|-------------------------------|-------------------|
| 1. Strongly Disagree | 5. Somewhat Agree |
| 2. Disagree | 6. Agree |
| 3. Somewhat Disagree | 7. Strongly Agree |
| 4. Neither Agree nor Disagree | |

Q5: RANK HOW THESE INFLUENCES AFFECTED YOUR EATING BEHAVIORS BEFORE COMING TO OSU	Very (+) Influence	Somewhat (+) Influence	Little (+) Influence	No (+/-) Influence	Little (-) Influence	Somewhat (-) Influence	Very (-) Influence	NA
a. Learned family eating habits/meals	7	6	5	4	3	2	1	0
b. My friends' eating habits	7	6	5	4	3	2	1	0
c. Peer pressure to eat certain foods	7	6	5	4	3	2	1	0
d. Having a large school workload	7	6	5	4	3	2	1	0
e. Having a schedule that changed each term	7	6	5	4	3	2	1	0
f. Having available free time	7	6	5	4	3	2	1	0
g. Money available for food	7	6	5	4	3	2	1	0
h. Food/meals made and available at home	7	6	5	4	3	2	1	0
i. My nutrition knowledge	7	6	5	4	3	2	1	0
f. My sense of stress level	7	6	5	4	3	2	1	0

Q6: RANK HOW THESE INFLUENCES AFFECTED YOUR EXERCISE BEHAVIORS BEFORE COMING TO OSU	Very (+) Influence	Somewhat (+) Influence	Little (+) Influence	No (+/-) Influence	Little (-) Influence	Somewhat (-) Influence	Very (-) Influence	NA
a. Learned family exercise habits	7	6	5	4	3	2	1	0
b. My friends' exercise habits	7	6	5	4	3	2	1	0
c. Peer pressure	7	6	5	4	3	2	1	0
d. Having a large school workload	7	6	5	4	3	2	1	0
e. Having a schedule that changed each semester	7	6	5	4	3	2	1	0
f. Having available free time	7	6	5	4	3	2	1	0
g. An exercise partner/group	7	6	5	4	3	2	1	0
h. Access to exercise or gym facilities	7	6	5	4	3	2	1	0
i. Opportunity to exercise	7	6	5	4	3	2	1	0
j. My sense of stress level	7	6	5	4	3	2	1	0

Q7: How much do you agree or disagree with this statement: Before college, I was motivated to eat a healthy diet. (circle one)

- | | |
|-------------------------------|-------------------|
| 1. Strongly Disagree | 5. Somewhat Agree |
| 2. Disagree | 6. Agree |
| 3. Somewhat Disagree | 7. Strongly Agree |
| 4. Neither Agree nor Disagree | |

Q8: How much do you agree or disagree with this statement: Before college I was motivated to exercise regularly. (circle one)

- | | |
|-------------------------------|-------------------|
| 1. Strongly Disagree | 5. Somewhat Agree |
| 2. Disagree | 6. Agree |
| 3. Somewhat Disagree | 7. Strongly Agree |
| 4. Neither Agree nor Disagree | |

Q9: HOW PREPARED WERE YOU BEFORE COMING TO OSU TO DEAL WITH EACH OF THE FOLLOWING:	Very Well Prepared	Somewhat Prepared	A Little Prepared	Neither Prepared nor Unprepared	A Little Un- prepared	Somewhat Un- prepared	Very Un- prepared	NA
a. Making healthy food choices	7	6	5	4	3	2	1	0
b. Managing my time	7	6	5	4	3	2	1	0
c. Overcoming peer pressure	7	6	5	4	3	2	1	0
d. Balancing school life with good eating habits	7	6	5	4	3	2	1	0
e. Balancing school life with good exercise habits	7	6	5	4	3	2	1	0
f. Managing my stress	7	6	5	4	3	2	1	0

Q10: COMPARING MY BEHAVIOR BEFORE COMING TO OSU TO NOW, I CURRENTLY:	Much More Often	More Often	Slightly More Often	No change	Slightly Less Often	Somewhat Less Often	Much Less Often	NA
a. Drink milk	7	6	5	4	3	2	1	0
b. Drink coffee/coffee drinks	7	6	5	4	3	2	1	0
c. Drink soda or carbonated drinks	7	6	5	4	3	2	1	0
d. Drink alcohol	7	6	5	4	3	2	1	0
e. Eat fruits (i.e. apples, oranges, bananas)	7	6	5	4	3	2	1	0
f. Eat vegetables (i.e. lettuce, carrots, broccoli)	7	6	5	4	3	2	1	0
g. Eat desserts (i.e. pie, cake, baked goods, chocolate)	7	6	5	4	3	2	1	0
h. Eat fast foods (i.e. hamburgers, fries, pizza)	7	6	5	4	3	2	1	0
i. Eat regular meals	7	6	5	4	3	2	1	0
j. Eat snack foods (i.e. chips, cookies, party mix, candy)	7	6	5	4	3	2	1	0
k. Eat late at night	7	6	5	4	3	2	1	0
l. Eat large quantities of food	7	6	5	4	3	2	1	0
m. Exercise regularly (at least 5 times/wk)	7	6	5	4	3	2	1	0
n. Feel in control of my health	7	6	5	4	3	2	1	0

Q11: DEMOGRAPHIC QUESTIONS

The information provided here will help researchers understand our current student population more fully. Your honesty is very much appreciated. The information provided in this section and throughout this survey will be kept confidential and data will be reported as a group. Please select **one** answer for each question.

a. What is your current class standing?

- 1) Freshman 3) Junior 5) Other _____(specify)
2) Sophomore 4) Senior

b. What is your current age?

_____ Years

c. About how many years, altogether, have you been away from home? (check one please)

- 1) 0 (my first year away) 4) 3 years
2) 1 year 5) 4 years
3) 2 years 6) 5 or more years

d. While attending OSU, what is your place of residence? (circle one please)

- 1) Residence Hall/ Dorm 4) Off-Campus w/roommate 7) Other _____(specify)
2) Cooperative House 5) Off-Campus no roommate
3) Fraternity/Sorority 6) Live at parents' house

e. What is your current height?

_____ Feet _____ Inches

f. What is your current weight?

_____ Pounds

g. Since starting college have you gained weight, maintained the same weight, or lost weight? (check one please)

- 1) Gained weight
2) Maintained the same weight
3) Lost weight

h. Are you male or female? (check one please)

- 1) Male
2) Female

Your participation in this survey is greatly appreciated, thank you!

To enter for the **drawing** for one of eight \$25 gift certificates to OSU Bookstore: Provide your contact information below. We will contact the winners by the preferred method. Please check and complete the contact information. For confidentiality, this page will be removed from your survey before researchers leave Milam Auditorium.

- ☐ email: address _____
- ☐ cell phone: number _____
- ☐ text message: number _____

If you are interested in receiving the results of this research study, please indicate by checking the box and supplying your contact information.

- ☐ Yes, send me research results.

Name: _____.

E-mail address: _____.

