COMPARISON OF HEALTH BEHAVIORS IN ONE YEAR POST- BACCALAUREATE DEGREE WOMEN

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ABSTRACT

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Overweightness, obesity, and their associated comorbidities are growing health issues in the United States. In 2002, 52.8% of females ages 20-34 years old were overweight and, 28.4% of those were obese, placing them at risk for numerous diseases. Included in this age group is post-college women, who face numerous challenges as they transition from the undergraduate setting to the workforce or graduate school.

An electronic, anonymous survey containing questions regarding health habits during senior year of college and current health habits was emailed to 2,356 potential participants in July 2010 and August 2010. Participants were asked to provide their height, weight upon entering college, at college graduation, and current weight. Participants stated their current activity: full-time employment, graduation education, or part-time employment/unemployment. 116 participants completed the survey. Requirements for participation included graduation from a four-year college from May - August 2009, being a female, and being between the ages of 22-24 years.

Participants’ responses were compared with their current life activity using contingency table analysis to determine if their post-college course had any effect on women’s health behaviors post-college. The p value and Chi-Square value were determined for each table to determine if participants’ current life activities were significantly related to change in a specified health behavior. Two statistically significant correlations were found. There was a significant increase in mean BMI of all groups from entering college to college graduation ($p < 0.0001$), and stress level was found to correlate with current activity, with participants in graduate school experiencing significantly more stress at the time of the survey than participants who were full-
time employed, part-time employed, or unemployed, who experienced significantly less stress at the time of the survey \((p = 0.0331)\).

The increase in BMI from freshmen year to graduation has been well-documented in previous studies; however, changes in personal stress levels depending on one’s post-college life path is relatively new. More research should be conducted with a larger sample size to determine if there may be more statistically significant changes in other health behaviors that were missed with this limited sample size.
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CHAPTER I. INTRODUCTION

The term “Freshman 15” has gained notoriety on college campuses across the United States, and it is a source of self-consciousness for many college women. Students simply assume when they enter college that they will inevitably gain weight, and the weight gain often becomes a self-fulfilling prophecy. However, many students believe that after graduation, they will eat and drink less, exercise more, and lose the weight and poor health behaviors that they practiced during college. This is a dangerous assumption, as life after college presents many new challenges that can cause weight loss and the initiation of healthier habits to be delayed.

Statement of the Problem

Today’s post-college woman faces numerous emotional and physical health issues, but how these issues influence weight and health behaviors has not been documented. Does leaving the university setting help women achieve a healthier lifestyle, or do they continue the same health behaviors developed in college? It is possible that the new difficulties presented by post-college life may have a negative effect on a woman’s health. Research is needed to determine what changes, if any, occur in a woman’s weight and health behaviors once she leaves college.

Based on national health statistics, a significant change seems to be occurring from one age range to another. In 2002, 15.4% of females aged 12-19 years old were overweight; however, that same year 52.8% of females aged 20-34 years old were overweight while 28.4% were obese (Centers for Disease Control and Prevention [CDC], 2004). The health risks of being overweight or obese are well-documented. According to the Centers for Disease Control and Prevention, individuals who are overweight are at a higher risk for coronary heart disease, stroke, Type II diabetes, several forms of cancer, hypertension, dyslipidemia, liver and gallbladder
disease, sleep apnea, and gynecological problems, such as infertility (CDC, 2004). If the cause of this overall weight increase could be determined, an appropriate intervention could be developed to help prevent the occurrence of these diseases. Other health behaviors can contribute to the development of chronic diseases as well: smoking, the overconsumption of alcohol, a sedentary lifestyle, and being under constant emotional stress. Many young women exhibit one or more of these behaviors.

**Objectives**

The objectives of this study were as follows:

1. Determine if weight gain does occur in women after college, and if so, what changes in health behaviors may have caused it.
2. Determine if there are differences in weight changes and health behaviors between women in graduate school, full-time employed women, and part-time/unemployed women.
3. Recommend an intervention for the specific group if differences were found in weight changes and health behaviors among the three groups.

**Significance of the Study**

This study is significant because the results provide a snapshot of the health behaviors of post-collegiate women ages 22-24 years old. While studies, such as NHANES, provide a broad overview of large age groups (i.e. ages 20-34 years old), it does not provide a close look at when negative changes in health behaviors may have begun to occur. Additionally, because only women with bachelor’s degrees will be surveyed, the results may show whether or not having a college education is a protective factor against poor health behaviors.
CHAPTER II. REVIEW OF LITERATURE

While much research has been conducted on the health of American college students, little has been done to examine how leaving the college environment may affect young women’s weight and health behaviors. If health professionals were able to understand the circumstances that contribute to changes that occur in the years following college graduation, appropriate interventions could be developed. Presently, research has shown that many women do gain weight during their college careers (Edmonds et al., 2008). Also, many young women ages 20-34 years old already have one or more risk factors for heart disease or metabolic syndrome (CDC, 2004 & Ervin, 2009). Current research also indicates that high levels of stress may lead to less healthful eating habits and an increase in one’s body mass index (Unusan, 2006 & Kivimaki et al., 2006). Additionally, because young women view health and fitness as a much more physical entity than men, their attempts at “getting in good shape” may be based more on their appearance than actual health and well-being (Wright, O’Flynn, & Macdonald, 2006).

Changes in Health Behaviors during Women’s College Careers

Without parents or guardians to monitor their behavior and high school sports no longer an option, many women lose positive health behaviors developed during high school. A study conducted on students at Washington University in St. Louis, MO ($n = 204$) found changes in dietary and exercise patterns, with most women consuming less than the recommended daily five servings of fruits and vegetables and averaging less than 30 minutes of physical activities most days of the week (Racette, Deusinger, Strube, Highstein, & Deusinger, 2008). This resulted in a mean weight gain of $1.7 \pm 4.5$ kg among the 138 female participants.
A decline in physical activity during women's college careers may be a key reason that weight gain occurs. There may also be a knowledge deficit that prevents them from taking the initiative to begin an exercise program. A study conducted among male and female college students reported that 60% of participants (n = 636) did not know that the Centers for Disease Control and Prevention recommend that adults accumulate 30 minutes of physical activity on most days of the week for health benefits (McArthur & Raedeke, 2009). Women participating in this study were reported to exercise less than the male participants. Caucasian women participated in physical activity an average of 3.20 days per week, and African-American women participated in physical activity an average of 2.10 days per week. Women also reported enjoying physical activity less than men, and more women than men reported appearance as a motive to be physically active (McArthur & Raedeke, 2009). Additionally, self-reports from women regarding the amount that they exercise may be inaccurate. A 2008 study conducted among females (n = 1021) found that those participants who were at-risk for overweight or overweight overreported their physical activity by 17.7% and 19.4% (p < 0.05) (McMurray et al., 2008). The reason physical activity declines among women from beginning high school to college graduation may be because many do not find it to be a pleasant activity and may only do it for appearance reasons, not to decrease their risk of chronic disease (Kasparek, Corwin, Valois, Sargent, & Richard, 2008).

In addition to increased weight and decreased physical activity, college women may also engage in numerous risky health behaviors; namely, cigarette smoking and alcohol consumption. These activities both have potential for addiction, and their use may be interrelated. Since the 1980s, cigarette smoking has increased dramatically among young women. From 1992 to 1998, a 60% increase in smoking was reported in women aged 18 to 24 years old (Mackey, McKinney,
Unfortunately, women are more susceptible to becoming dependent on nicotine at lower levels of exposure due to higher sensitivity to nicotine’s effects. (Mackey et al., 2008). In addition to increasing women’s risk for lung cancer, heart disease, and respiratory diseases, nicotine addiction may also lead to early menopause, infertility, and osteoporosis (Mackey et al., 2008). Overall, smoking in college women is associated with low levels of physical activity, high levels of stress, being of Caucasian race, and alcohol consumption. This study did not find an increased use among African-Americans or other minorities.

Alcohol consumption is another potentially dangerous health behavior for college women. While many may tout the cardiovascular benefits of alcohol consumption, it is only in moderate amounts (1 standard drink per day for women: 12 oz. of beer, 5 oz. of wine or 1.5 oz. of 80 proof liquor) that these benefits may be seen. The benefits of alcohol are negated when an individual engages in a heavy episodic drinking pattern, which is often typical of a college student (Snow, Murray, Okechuwa, Tyas, & Barnes, 2009). In fact, 15.1% of women from the 2004 NHANES survey (n = 30,000 participants) reported engaging in binge-drinking (CDC, 2004). Also, the type of alcoholic beverage selected by young women may cause weight gain. Alcopops, which are sweetened alcoholic drinks, contain on average 220 calories. These are heavily marketed to female college students, as they taste much lighter and sweeter than other alcoholic beverages (Center for Science in the Public Interest [CSPI], 2004). Also, calorie information is not available on most alcoholic beverage containers, and when it is, it is difficult to find. This may prevent consumers from limiting their alcohol consumption. In fact, according to a Center for Science in the Public Interest poll, three in five people would make better drinking decisions about alcohol if they were provided calorie information; namely, drinking less alcoholic beverages overall (2004).
Changes in Weight during Women’s College Careers

While not all women gain the famous “Freshman 15”, research has suggested that many women do gain some weight during college. A study conducted at the University of Guelph \((n = 116)\) found that women participating in this four-year longitudinal study gained an average of 2.4 kg \((p < 0.001)\) while in college (Edmonds et al., 2008). However, these researchers also measured two other indicators of health: waist circumference and percent body fat. Waist circumference may be an important measurement to track, as abdominal obesity is a major risk factor for metabolic syndrome (Ervin, 2009). Average waist circumference increased from 76.9 cm to 79.4 cm \((p < 0.001)\), and average percent body fat increased from 23.8\% to 25.6\% \((p < 0.001)\) (2). Average energy intake did not increase; however, their levels of moderate physical activity decreased. Additionally, their time spent using a computer increased.

As mentioned in the previous section, another study conducted on female students at Washington University in St. Louis, MO \((n = 204)\) concluded that on average, women gained between 1.7 and 4.5 kg, with some gaining over 10 kg (Racette et al., 2008). This weight gain was attributed to decreased physical activity and low fruit and vegetable consumption. While weight gain or loss was highly variable, the failure to meet recommended exercise and nutrition guidelines could have long-term health implications that will affect women long after they leave college.

However, a study \((n = 379, 40\% \text{ female})\) conducted by Cluskey and Grobe (2009) suggested that although an appreciable amount of women do gain weight during their college careers (26\% of those participating in their research gained 2.3 kg or more), women were much more likely to make weight maintenance efforts. They were also more likely to lose or maintain
weight, with 40% of women doing so while only 36% of males did (Cluskey & Grobe, 2009).
However, the feedback from subjects provided valuable insight on what sort of preventative
wellness programs might work best for young adults. Many suggested that peer-led programs on
healthful living during college would be very beneficial and of interest to many students
(Cluskey & Grobe, 2009).

Changes in Weight and Health Behaviors Occurring Post-College in Women

After college graduation, women may enter the workforce, continue their education, or
take alternative routes, such as traveling or having a family. Each of these paths may come with
its own stressors, whether emotional, financial or physical. In addition to causing mental
distress, stress can have many negative effects on a woman’s health behaviors.

Financial strain may be a tremendous source of stress for many post-college women.
They may be faced with paying off college loans, purchasing their first car, paying bills for the
first time, or funding their continuing education. In a study conducted among Swedish citizens
aged 16 to 30 years old (n = 1044, 48% female), researchers found that restricted financial
resources during young adulthood did have some correlation to overweightness and obesity
(Novak, Ahlgren, & Hammarstrom, 2006). Both males (OR = 1.55, 95% CI = 1.10–2.19) and
females (OR = 1.78, 95% CI = 1.16–2.73) with low education (less than 11 years of schooling)
were at risk of overweight (Novak et al., 2006). Thus, a college degree may be a protective
factor in this instance. According to a longitudinal study on financial strain and mental well-
being of young women (n = 5237), those who had the highest degree of financial strain were
more susceptible to depression and anxiety (Dunn et al., 2008). Women with these maladies
have a higher mortality rate and may also engage in inappropriate coping behaviors. It was
found that depression and alcohol consumption were interrelated to overweightness and obesity in a study conducted among young adults \((n = 776, 49\% \text{ female})\). Alcohol abuse prospectively predicted obesity among women ages 24-27 years old \((OR = 3.84)\), and obesity predicted depression in women ages 27-30 years old \((OR = 2.14)\) (McCarty et al., 2009).

As many women make their way into the working world, they may be working longer hours in entry-level positions. This may come with negative health consequences. A study conducted among government employees \((n = 7965, 30\% \text{ female})\) found that women employed in positions with high job demands were more likely to have an increased body mass index over time \((p < 0.03)\) (Kivimaki et al., 2006). Another study conducted among adults \((n = 1,355, 53\% \text{ female})\) also found that psychosocial stress also led to significant weight gain. While only men who initially had a higher body mass index experienced an increase in weight, both normal weight and overweight women experienced an increase in their body mass index. Among women, weight gain was associated with job-related demands \((p < 0.001)\), perceived constraints in life \((p < 0.001)\), strain in relations with family \((p = 0.016)\), and difficulty paying bills \((p = 0.010)\) (Block, Yulei, Zaslavsky, Ding, & Ayanian, 2009). This may be due in part to the different physiological response that men and women have to cortisol, the stress hormone and its contribution to central adiposity (Kivimaki et al, 2006). Many women enrolled in graduate, law, or medical school also experience feelings of high demand, thus this stress effect may not be limited to women with full-time jobs. Regardless, occupational level is not necessarily associated with being overweight; even young women in a high-ranking position may feel high demand and be at risk for weight gain.

Another potential stressor and cause for weight gain may be tension in the relationships with family and friends. The previously mentioned study found that increasing strain in the
relationships with family and friends can lead to an increase in the body mass index in women (Block et al, 2009). Many college graduates may have to move a great distance away from their family and college friends to pursue a career or graduate school. Work or school demands may also leave less time to spend with family and friends, even if they are in the same city. Therefore, feeling alienated from one’s support system may be another cause of weight gain.

While women’s stress can come from many different sources, it can contribute to many coping mechanisms that can result in weight gain and other medical issues. For instance, one study ($n = 619$) found that university students who reported experiencing high levels of stress at the time of the survey consumed less fruits and vegetables, even when such foods were easily obtained (Unusan, 2006). Additionally, stress may change the food preferences of women. In a study on food preferences of women under varying levels of stress ($n = 40$), it was found that women under high levels of stress tend to favor sweet, high-fat foods, while women under low-levels of stress generally selected low-fat foods (Habnab, Sheldon, & Loeb, 2009). Women are also more likely to engage in overeating (Brown, Mishra, Kenardy, & Dobson, 2000). Any of these occurrences can lead to an increase in weight and a decrease in overall health. However, simply reducing feelings of stress is not enough to combat weight gain. A study conducted among overweight and obese women ($n = 225$) reported that while learning techniques to elicit the relaxation response did reduce depression ($p < 0.0001$) and interpersonal sensitivity ($p < 0.0001$) and increase self-efficacy for low-fat eating ($p = 0.016$), the mean weight among the women was unchanged (Katzer et al., 2008).

Whatever the source of increased weight may be for a woman, it can potentially have very negative consequences on her physical well-being. Young women aged 18-23 years old with above normal body mass indexes were reportedly more likely to have hypertension, asthma,
headaches, back pain, sleeping difficulties, and irregular periods (Edmonds et al., 2008). However, it has also been observed that young women are significantly less likely to visit their medical practitioner if either feeling ill, or for a regular check-up, which can put them at risk for having an undiagnosed medical condition (Edmonds et al., 2008). Although the threat for heart attack in a young woman is low, many already have cardiovascular risk factors. In a study conducted by the Centers for Disease Control and Prevention among 20-34 year old women, 53% of those surveyed were overweight, 28.4% were obese, and 9% already had high serum cholesterol (2004). Another study reported that among young women age 20-39 years of age (n = 488), 49.8% had abdominal obesity, 13.4% had an above normal fasting blood glucose level, 29.4% had low HDL cholesterol and 17.8% had hypertriglyceridemia, all of which are risk factors for metabolic syndrome (Ervin, 2009). Health issues that were formerly only a problem in middle-aged and elderly people are now being seen in women as young as 20 years old.

While one might expect high alcohol consumption to stop once a woman leaves the university setting, this has not been shown to be the case. Approximately 63% of young women 20-34 years old are presently alcohol drinkers, and more Caucasian women consume alcohol than African-Americans, Hispanics, or Asians (CDC, 2004). A study found that alcohol still plays a central part in young women’s social lives, and in many ways, alcohol is used to establish one’s self in a social setting. Many young women view drinking as empowering and confidence-boosting (Rudolfsdottir & Morgan, 2009). However, this can be risky, as alcohol still contains calories, and as previously mentioned, episodes of heavy drinking will negate the cardiovascular benefits of moderate alcohol consumption. This is quite unfortunate, as young women may benefit much more from moderate regular alcohol consumption than men (CSPI, 2004).
Additionally, the transition from a campus in a predominantly rural to a location in an urban county may also cause changes in alcohol consumption. A study conducted among adults \((n = 867,291)\) from 1995-2003 found that metropolitan counties experienced higher prevalence of heavy and binge drinking than rural counties in all years (Jackson, Doescher, & Hart, 2006). In 2003, 5.4% of those in rural counties were heavy drinkers (defined as more than two drinks per day for men and more than one drink per day for women), while 6.0% of those in urban counties were heavy drinkers (Jackson et al., 2006). Urban counties also had a higher percentage of binge-drinkers (defined as an individual consuming more than five drinks in one setting). While 16.5% of those in metropolitan areas engaged in binge-drinking, only 15.7% of those in rural counties engage in binge-drinking (Jackson et al., 2006).

### Unemployment, Weight, and Health Behaviors

Unfortunately, many graduates will be unable to find gainful employment following graduation due to current hard economic times. There has been research investigating the effects of unemployment on weight, but results have been conflicting. A study conducted by Arkes (2009) using the National Longitudinal Survey of Youth from 1994-2004 \((n = 24,310)\) found that females were overweight when the economy was weak, while more males were overweight when the economy was strong. Currently, the unemployment rate is quite high; therefore, this may be a time of weight gain for many women.

Temporary employment may not be a solution for preventing weight gain in women. A study that surveyed European men and women \((n = 18,092)\) reported that those who had temporary employment were 42% more likely to report poor health than those who had a more permanent, contracted position (Rodriguez, 2002). Although “perceived health status” was the
measurement used (no official medical data), this is still significant because those with unstable employment still feel worse than those with a steady job.

However, as previously stated, other studies have found that health improves during hard economic times. In a sample of 1,490,249 adult participants from the 1987-2000 years of the Behavioral Risk Factor Surveillance System, Ruhm (2005) found a 0.6% decrease in smoking for every percent point that unemployment rose. However, it is possible that this difference comes from an unemployed individual’s lack of spending money with which to purchase cigarettes. Ruhm (2005) also found that among 1,081,829 adult respondents, physical inactivity decreased 0.4% for every percent point that unemployment rose. These findings suggest that unemployed individuals may be more physically active. This seems plausible, as those without jobs would have more time to exercise during their day. Overall, it is difficult to predict what effect unemployment may have on a woman’s weight and health behavior because so many different results have been reported.

Young Women’s Views on Health and Fitness

The majority of women have a basic idea of how to be healthy: eat more fruits and vegetables, exercise more, etc. A 2006 study conducted by Wright, O’Flynn and MacDonald (n = 84, 54% female) found that most women interviewed believed that their weight was within their control, and for them to lose weight they needed to do some kind of physical activity. Additionally, only a minority (less than 17%) found it financially difficult to buy fruits and vegetables, low-fat foods or healthy low-fat snack foods (Wright et al., 2006). However, for many women, it is not a concern about eating healthful foods but more a concern for overall calorie consumption, which may prevent overeating but may also prevent them from obtaining essential nutrients through food.
In the previously mentioned study, health and fitness discussions were conducted among 45 young women aged 18-24 years old. The researchers found that the participants turned the sessions into a discussion of their appearance and how it was important to them (and for most, their appearance was important in some way). Additionally, young women are less likely to understand their own and others’ bodies individually, but as a comparison to their view of the desired body shape (Wright et al, 2006). It appears that many young women do not necessarily engage in physical activity and/or consume nutritious foods to prevent chronic diseases and improve their health, but rather to be viewed as acceptable by society.

This is problematic in that such a mindset could lead to extreme measures in an attempt to lose weight, which will most likely fail. A study conducted among women aged 18-20 years \((n = 69)\) old revealed that those engaging in multiple types of dieting, emotional eating, and self-restriction actually gained twice as much weight than those that did not report engaging in such behaviors (Lowe et al, 2006). This is yet again another example of how women may attempt to lose weight not from their own desires to be healthier, but to fit into what size they feel is appropriate. However, this type of weight control may vary across certain groups of women. For example, a 2009 study conducted among women \((n = 9,683)\) found that lesbians were significantly less likely to be dissatisfied with their body image (body weight: \(\beta = 0.64, 95\%\ CI = 1.10 - 0.18\); body shape: \(\beta = 0.83, 95\%\ CI = 1.27- 0.40\); overall: \(\beta = 0.74, 95\%\ CI = 1.14 - 0.32\)), restrict fats and sugars in their diet \((OR = 0.53, 95\%\ CI = 0.29-0.81)\), and more likely to engage in healthy weight maintenance techniques overall \((OR = 0.48, 95\%\ CI = 0.29-0.81)\) (Polimeni, Austin, & Kavanagh, 2009). Another study \((n = 148)\), reported that Caucasian women were significantly more likely to engage in unhealthy eating behaviors \((p < 0.05)\) and had
a lower ideal body weight than African-American women ($p < 0.05$) (Baird, Morrison, & Sleigh, 2007).

Differences in Socioeconomic Status, Race, and Marital Status

A study published by Truong and Sturm (2005) reported that socioeconomic status did not necessarily predict weight gain. This study used data from the Behavioral Risk Factor Surveillance System, a random-digit-dialed telephone survey with a total sample of 1.88 million adult respondents (ages 18 and older). Incomes were averaged, and those earning the highest 21.12% were designated the highest income group. Those earning the lowest 19.97% were designated the lowest income group. On average, the lowest-income group gained just as much weight as the highest-income group, although the lowest-income group gained it faster. While there was little difference in weight gain among socioeconomic groups, a large difference was found among those with a college degree and those with less than a high school diploma. Only a difference of 1.01 body mass index units was observed between the lowest- and highest-income groups, while a difference of 1.83 body mass index units was observed between the less-than-high-school-diploma group and the college-degree group (Truong & Sturm, 2005). However, the heaviest individuals in the lowest-income group gained more weight than did the heaviest individuals in the highest-income group (Truong & Sturm, 2005).

While socioeconomic status is not an indicator of weight gain, it does indicate one’s likelihood to engage in risky health behaviors. Individuals in a lower socioeconomic bracket are more likely to smoke cigarettes and engage in overconsumption of alcohol (Truong & Sturm, 2005). Therefore, a woman’s income after college may determine whether or not she continues with unhealthy behaviors established in college.
Race was found to play less of a role in weight gain over time (Truong & Sturm, 2005). In evaluating individuals that were Caucasian, African-American, Hispanic, or other, it was found that African-Americans gained the most weight among these groups ($p < 0.001$). Being African-American may not be a risk factor in itself for overweightness; however, persons of African-American descent have a reduced likelihood of losing excess weight (Truong & Sturm, 2005). Caucasians, Hispanics, and those of other races have similar rates of weight gain, which is evidence of a health disparity between African-Americans and other races.

A common occurrence in many young women’s lives may cause weight gain: marriage. A survey examining marital status and weight change of women ($n = 9,043$) over 10 years found that the 3% of women who were unmarried at the beginning of the study and married during the course of the study gained more weight than the 80% of women who were married or unmarried during the entirety of the study (Sobal, Rauschenbach, & Frongillo, 2003). However, being married is generally associated with better health. This better health may come from greater financial stability and emotional support, but is not a result of weight reduction.

**Eating Disorders and Disordered Eating in Women**

Unfortunately, eating disorders are a common health issue affecting young women. An eating disorder is marked by severe disturbances in eating behavior (i.e. extreme restriction of food intake or extreme overeating), extreme preoccupation with or concern about body weight or shape (National Institute of Mental Health [NIMH], 2006) and/or body image disturbance. According to the National Institute of Mental Health (2006), 0.9% of women will experience anorexia nervosa, 1.5% of women will experience bulimia nervosa, and 3.5% of women will experience a binge-eating disorder during their lifetime. Additionally, an unknown percentage of women suffer from disordered eating, meaning that they exhibit some characteristics of eating
disorders but do not meet the *DSM-IV* criteria for anorexia nervosa, bulimia nervosa, or binge-eating disorder (Budd, 2007).

While many women might desire to be thinner, a woman with an eating disorder or disordered eating behaviors likely has many social and psychological factors that contribute to the development of extremely unhealthy behaviors and thoughts. Research suggests that these factors begin in early adolescence. In a longitudinal study (*n* = 1,209) conducted by Sischo et al. (2006), it was found that females who disliked themselves at 13 years old were significantly more likely to have adopted disordered eating practices at 22 years old, especially those who felt anxious about their weight and appearance. Another study conducted by Bardy (2008) among university students (*n* = 319, 44% female) found that regardless of gender, young adults who were direct victims or witness of family violence were more likely to display eating disorder symptoms (*p* < 0.001). Disordered eating seems to be a coping device for some women to correct negative feelings towards themselves or their lives. Additionally, depression and anxiety are often associated with disordered eating. A 2005 study conducted by Overton, Selway, Strongman, and Houston (*n* = 30) reported that women with eating disorders seem to have an inability to manage emotional distress, which results in the over-regulation or under-regulation of emotion. Thus, their disordered eating behaviors become a way to manipulate how they experience their various emotional experiences. Substance abuse may also play a role in disordered eating behavior. A study conducted among 517 women found that the disordered eating behaviors became more severe as the number of substance classes abused increased (Piran & Robinson, 2006). Alcohol abuse was constantly associated with binge-eating, while the abuse of stimulants, amphetamines, and/or sleeping pills was associated with restrictive eating
practices and purging. Again, the substance abuse and disordered eating may both be associated with depression and anxiety.

A qualitative study conducted among recovering anorexics \( n = 24 \) suggested that the junior high and high school environment contributes to the development of poor self-esteem and disordered eating behaviors later in life. Several women in the study reported losing weight to receive more recognition and higher placement on their sports team – one was even encouraged by her swim team coach to lose weight so she would “move faster through the water” (Evans, Rich, & Holroyd, 2004). Female students seem to perceive that coaches and physical education teachers equate being thin with being athletic and healthy, and they feel the need to conform to this idea. Additionally, young women may feel that their teachers do not value them as individuals but only for their academic performance and to receive recognition, they must succeed. Other young women reported that their body image issues stemmed from their relationships with peers and trying to fit into the “right” cliques (Evans et al., 2004). Because it seems all of the more popular girls in their schools were thin, many of the women in the study felt that dieting was somewhat of a “rite of passage”, and indeed discussing diet and critiquing oneself is often a topic of conversation among schoolgirls (Evans et al., 2004). Additionally, students do not receive comprehensive education on healthy diets: the message has essentially been that fats and sugar are “bad”. One woman reported that she “honestly thought” that she was doing the right thing by eliminating all fat from her diet (Evans et al., 2004). If comprehensive health education was implemented in schools, young women would be able to make healthier choices for themselves and potentially avoid developing negative weight control practices.

An incorrect assumption often made by society is that individuals with eating disorders or disordered eating practices are extremely thin. A 2007 study conducted among women aged 18-
42 years old ($n = 4891, 13\%$ obese) by Darby, Hay, Mond, Rodgers, and Owen found that obese female participants had significantly higher levels of dietary restraint ($p < 0.002$), eating concern ($p < 0.010$), and shape concern ($p < 0.015$) compared to non-obese female participants. This shows that obesity may in part stem from a negative eating psychopathology and that treatments for obese women must be mindful of the woman’s mental health as well as physical health.

Conclusion

As evidenced by current research, more young women are becoming heavier and engaging in high risk health behaviors after college. As a result, women are beginning to experience negative health effects at an earlier age. However, it remains to be seen exactly what changes occur in a woman’s life from college to the post-graduate world that cause changes in both her body mass index and her biochemical values. Understanding the effects of lifestyle transition on today’s female college graduate may help health professionals’ development of successful intervention programs to prevent weight gain and provide more appropriate counseling to change diet and health behaviors.

The objective for this study was to determine which factors affect weight and health behaviors after college, and how they differ from their weight and health behaviors during their college careers. Additionally, the effects of the pathway taken after college (employment, graduate school or unemployment) on a woman’s health behaviors were examined. If it can be determined what might cause post-college weight gain and negative health behaviors, appropriate interventions could be recommended to be developed. These interventions could be put in place at colleges and universities to help students develop healthy behaviors that they can carry with them through their entire lives.
CHAPTER III. METHODOLOGY

Methods

Data was collected using an anonymous, optional online survey. The survey was created using www.surveymonkey.com, an online survey-hosting site. The survey was largely original; however, two questions have been derived from the Eating Attitudes Test-26 because this test has been found to be useful in identifying individuals at risk for or suffering from an eating disorder or disordered eating (Orbitello et al., 2006). Potential participants were contacted via email both in July and August 2010 and asked to follow a link to the survey website. Permission to conduct research with participants was granted by the Bowling Green State University Human Subjects Review Board (HSRB Project Number H10T225GE7). The invitation email is presented in Appendix A. The survey used is presented in Appendix B. The HSRB approval letter is presented in Appendix C.

Participants were asked to provide their height, their approximate weight upon entering college, their approximate weight at the time of college graduation, and their current weight. Using this data, the body mass index (BMI) of each participant was calculated for each time period. BMI is calculated by dividing an individual’s weight in kilograms by their height in meters, squared. The BMI is a useful measure of overweight and obesity; it estimates body fat and can assess an individual’s risk for disease. A higher BMI indicates a greater risk. A BMI of 25.0-29.9 indicates overweightness, and a BMI of 30.0 and above indicates obesity (Craig & Adams, 2009). The survey questions also obtained data about the participants’ current activity (full-time employment, graduate education, or part-time employment/unemployment), current physical activity and physical activity during their senior year of college, current fruit and
vegetable consumption and their fruit and vegetable consumption during their senior year of college, current cigarette smoking and cigarette smoking during their senior year of college, current alcohol consumption and alcohol consumption during their senior year of college, current stress level and stress level during their senior year of college, and current attitudes towards food and their attitudes towards food during their senior year of college.

Population

Only women who graduated from a four-year college or university in May or August 2009 and were ages 22-24 years old were invited to participate in the survey. Participants were obtained through the use of the alumni association list-serv for the graduates of 2009 from a medium-sized university in Ohio. Also, in order to get a better variety of subjects from different geographical areas, various chapters of the same Pan-Hellenic sorority were contacted to gain use of their list-serv for their graduates of 2009. Chapters that agreed to provide the email addresses of their 2009 alumni were from one medium-sized university and one small-sized university in Ohio, one small-sized university and one medium-sized university in North Carolina, one medium-sized university in Georgia, one medium-sized university in Tennessee, one medium-sized university in Alabama and one large-sized university in Michigan. For this study’s purposes, a “small-sized university” was defined as one with less than five thousand undergraduate students, a “medium-sized university” was defined as one with greater than five thousand but less than twenty thousand undergraduate students, and a “large-sized university” was defined as one with greater than twenty thousand undergraduate students.

The national organization of the Pan-Hellenic sorority was contacted and asked for the email addresses of all of members from the class of May or August 2009; however, their alumni
chairwomen said this was not permissible. Additionally, the alumni associations of five other medium-sized universities in Ohio were contacted, but no responses were received from them.

Data Analysis

The purpose of collecting this data was to determine what, if any, improvements or regressions were made in women’s health behaviors after leaving the college environment. Participants’ responses were also compared with their current life activity (full-time employment, graduate school, or part-time employment/unemployment) using contingency table analysis to determine if that had any effect on improvement or regression of women’s health behaviors after college. The p-value and Chi-Square value were used to determine if participants’ current life activities were significantly related to change in the specified health behavior.
CHAPTER IV. RESULTS AND DISCUSSION

Out of all potential participants, 116 women completed the survey, which is a low 5% return rate despite the email being sent twice to all potential participants. The current activity of participants is summarized in Table 1 below.

Table 1

*Current Activity of Survey Participants*

<table>
<thead>
<tr>
<th>Activity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate School</td>
<td>42</td>
<td>35.90</td>
</tr>
<tr>
<td>Full-Time Employment</td>
<td>58</td>
<td>49.57</td>
</tr>
<tr>
<td>Part-Time Employment or Unemployment</td>
<td>17</td>
<td>14.53</td>
</tr>
</tbody>
</table>

BMI

Participants’ BMIs were calculated from their reported weight and height during their freshmen year of college, at college graduation, and at the time of the survey. The BMIs were grouped together based on their current activity, and the mean was calculated. Participants’ BMIs were calculated because the BMI is a useful measure of overweight and obesity. It estimates body fat and can assess an individual’s risk for disease; a higher BMI indicates a greater risk. Comparing the mean BMIs of each current activity group showed firstly, if weight was gained in between time periods, and secondly, if women in each activity group could be more at risk for disease based on body fatness. The mean BMIs of all participants based on current activity group are summarized in Table 2 below.
Table 2

Mean BMIs of Survey Participants during Freshmen Year, at Date of Graduation, and at Time of Survey

<table>
<thead>
<tr>
<th>Current Activity Group</th>
<th>BMI (kg/m²)¹ at Given Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freshmen Year</td>
</tr>
<tr>
<td>Full-Time Employed</td>
<td>23.29 ± 4.95</td>
</tr>
<tr>
<td>Graduate School</td>
<td>22.39 ± 3.65</td>
</tr>
<tr>
<td>Part-Time Employed/Unemployed</td>
<td>23.80 ± 6.19</td>
</tr>
</tbody>
</table>

¹A BMI of 25.0-29.9 indicates overweightness, and a BMI of 30.0 and above indicates obesity (41).

Repeated measures ANOVA found that there was no interaction between groups and time ($p = 0.9490$) and no difference among the groups ($p = 0.5335$). However, there was a significant difference in mean BMI across time ($p < 0.0001$). A post-hoc test (the GLM procedure) was run to find where the differences across time occurred. The mean BMI of all groups was significantly higher at graduation than the mean BMI of all groups at freshmen year. There were no other statistically significant differences.

In concordance with the findings of other researchers, participants from all groups gained an appreciable amount of weight during their college careers (CDC, 2004; Racette, 2008; McArthur & Raedeke, 2009). However, because the women self-reported their weights, there is the possibility of underreporting. Underreporting of weight has been found to be more prevalent among college-educated women (Craig & Adams, 2009). If underreporting occurred, the increases in BMI could have been significantly larger than what are presented here. The data collected for this study contradicts the findings of Block et al. (2009), who found that their employed participants experienced an increase in their BMIs. They speculated that this increase was due to feelings of high strain and low control, so it may be that the participants of this current study feel more confident and in control of their environment.
Fruit and Vegetable Consumption

Because young women do not generally consume the recommended five servings of fruits and vegetables daily (Racette et al., 2008), participants were asked about their fruit and vegetable consumption. When asked, “During your senior year of college, do you feel that you ate the recommended 5 servings of fruits and vegetables on most days of the week?”, 25 participants (21.6%) responded “Yes”, and 91 participants (78.4%) responded “No”. When asked, “Currently, do you feel that you eat the recommend 5 servings of fruits and vegetables on most days of the week?”, 42 participants (36.2%) responded “Yes”, and 74 participants (63.8%) responded “No”. Overall, fruit and vegetable intake increased from the participants’ senior year of college to the time of the survey. This agrees with the findings of Unusan (2006), who found that university students tended to have a lower intake of fruits and vegetables, particularly during periods of stress.

The responses within the graduate school group, the full-time employment group, and the part-time employment/unemployment group were then analyzed to determine the difference in fruit and vegetable consumption from senior year of college versus one year post-college graduation and if there might be a relationship between a young woman’s current activity and her fruit and vegetable intake. The results are summarized in Table 3.

No relationship was found between the participants’ current activity and their reported fruit and vegetable consumption ($\chi^2 = 2.14, p = .3430$). A major contributing factor to how many servings of fruits and vegetables a young woman eats could be affected by financial and time constraints; fruits and vegetables tend to be more costly than processed foods, and some require cutting, cooking, or other forms of preparation.
Table 3

*Differences in Reported Fruit and Vegetable Consumption among Groups*

<table>
<thead>
<tr>
<th>Current Activity Group</th>
<th>Difference in Reported Fruit and Vegetable Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increase</td>
</tr>
<tr>
<td>Graduate School Group</td>
<td>5 (11.90%)</td>
</tr>
<tr>
<td>Full-Time Employment Group</td>
<td>13 (22.81%)</td>
</tr>
<tr>
<td>Part-Time Employment/Unemployment Group</td>
<td>4 (23.53%)</td>
</tr>
</tbody>
</table>

¹ Frequency of response (percentage of participants).

Physical Activity

Physical activity is another beneficial health habit; unfortunately, many young women do not enjoy it, or make it a regular part of their routine (Kasparek et al., 2008). Participants were asked about the average number of days per week that they engaged in at least 30 minutes of physical activity during both their senior year of college and at the time of the survey to determine if women increased their activity after college. The responses for all participants are summarized in Table 4 below.

Table 4

*Participants’ Reported Frequency of 30 Minutes or More of Physical Activity during Senior Year of College and at the Time of the Survey*

<table>
<thead>
<tr>
<th></th>
<th>Senior Year of College</th>
<th>At Time of Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>None</td>
<td>18</td>
<td>15.52</td>
</tr>
<tr>
<td>1-2 days per week</td>
<td>46</td>
<td>39.66</td>
</tr>
<tr>
<td>3-4 days per week</td>
<td>29</td>
<td>25.00</td>
</tr>
<tr>
<td>5-7 days per week</td>
<td>23</td>
<td>19.83</td>
</tr>
</tbody>
</table>
The data in Table 4 indicate that overall, participants appear to be engaging in more physical activity at the time of the survey than during their senior year of college; fewer participants reported no physical activity at the time of the survey. However, only 19.83% of participants were physically active for the recommended 30 minutes on most days of the week both during their senior year of college and at the time of the survey. Therefore, while physical activity level increased post-college, participants are still not meeting the Center for Disease Control and Prevention’s recommendations.

The responses within the graduate school group, the full-time employment group, and the part-time employment/unemployment group were then analyzed to determine their statistical significance (Table 5). No relationship was found between the participants’ current activity and their reported physical activity level ($\chi^2 = 8.06, p = .0894$). The participants in graduate school and full-time employment reported an increase in physical activity level, while those in the part-time employment/unemployment group reported a decrease. However, many women often overestimate how much physical activity they actually do daily; therefore, there is a risk that some of the participants in the full-time employment group or graduate school group over-reported (McMurray et al., 2008).

Table 5

*Differences in Reported Physical Activity among Groups*

<table>
<thead>
<tr>
<th>Current Activity Group</th>
<th>Difference in Reported Physical Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Decrease</td>
</tr>
<tr>
<td>Graduate School</td>
<td>6 (14.29%)</td>
</tr>
<tr>
<td>Full-Time Employment</td>
<td>10 (17.54%)</td>
</tr>
<tr>
<td>Part-Time Employment/Unemployment</td>
<td>6 (35.29%)</td>
</tr>
</tbody>
</table>

¹ Frequency of response (percentage of participants).
Cigarette Smoking

Participants were asked to indicate if they were cigarette smokers during their senior year of college and at the time of survey. Despite reports that cigarette smoking has increased dramatically since the 1980s among young women (Mackey et al., 2008), only 7 participants (6.0%) indicated that they currently were or had ever been smokers. Therefore, the data were excluded from analysis and discussion due to the small sample size.

Alcohol Consumption

Alcohol consumption is a popular activity on many college campuses, and after college, alcohol is just as widely available to women. Participants were asked how many servings of alcohol they had per week during their senior year of college and at the time of the survey (Table 6)

Table 6

<table>
<thead>
<tr>
<th>Servings of Alcohol per Week</th>
<th>During Senior Year of College</th>
<th>At Time of Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>None</td>
<td>20</td>
<td>17.24</td>
</tr>
<tr>
<td>1-3</td>
<td>25</td>
<td>21.55</td>
</tr>
<tr>
<td>4-6</td>
<td>21</td>
<td>18.10</td>
</tr>
<tr>
<td>7-9</td>
<td>17</td>
<td>14.66</td>
</tr>
<tr>
<td>10 or more</td>
<td>33</td>
<td>28.45</td>
</tr>
</tbody>
</table>

Comparing the data from women’s senior year of college to the time of the survey shows a decrease in participants’ alcohol consumption with the number of participants consuming 10 drinks or more per week declining by 21.55% post-college graduation. The majority of
participants fall into the moderate drinking category following college graduation, which is defined as 1 drink per day. This can have cardiovascular health benefits (Snow et al., 2009); therefore, many participants made a positive change after college concerning their alcohol intake. However, the percentage of women in this study who reported being alcohol drinkers during college and at the time of the survey is greater than the Center for Disease Control and Prevention’s reported 63% of women nationally who reported being alcohol drinkers (CDC, 2004). Alcohol likely still plays a central role in the social lives of this study’s participants, as has been similarly reported by Rudolfsdottir and Morgan (2009).

The responses within the graduate school group, the full-time employment group, and the part-time employment/unemployment group were then analyzed to determine their statistical significance (Table 7). No relationship was found between participants’ current activity and their weekly reported alcohol consumption ($\chi^2 = 4.14, p = .3874$). Overall, about 58% of participants decreased their alcohol consumption, and about 42% stayed the same or increased their alcohol consumption. However, despite a trend that the part-time/unemployed group stayed the same or increased consumption more so than the other two groups, there were no statistically significant differences in consumption changes among groups.

Table 7

<table>
<thead>
<tr>
<th>Current Activity Group</th>
<th>Difference in Reported Weekly Alcohol Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large decrease</td>
</tr>
<tr>
<td>Graduate School</td>
<td>9 (21.43%)¹</td>
</tr>
<tr>
<td>Full-Time Employment</td>
<td>17 (29.82%)</td>
</tr>
<tr>
<td>Part-Time Employment/Unemployment</td>
<td>2 (11.76%)</td>
</tr>
</tbody>
</table>

¹ Frequency of response (percentage of participants).
Food and Calorie Preoccupation

Participants were also asked to indicate how often they found themselves preoccupied with food and its calorie content. A significant percentage of women in the United States will struggle with an eating disorder (NIMH, 2008). While preoccupation with food and calories does not necessarily mean a woman will develop an eating disorder, it could be an indicator that she is at risk (NIMH, 2008). All participants’ responses are summarized in Table 8.

Participants’ preoccupation with food and its calorie content increased from their senior year of college to the time of the survey. The percentage of participants reporting that they were often, usually, or always preoccupied with food and its calorie content increased from 27.58% to 43.11%. While obsession over calories is not a positive health habit, it could account for or contribute to the participants’ decrease in BMI after college. Participants who reported an increase in preoccupation could be women who are having a difficult time adjusting to life after college. Inability to manage emotional distress is correlated with disordered eating practices, one of which is preoccupation with food and its calorie content (Overton et al., 2005).

Table 8

<table>
<thead>
<tr>
<th>Frequency of Preoccupation</th>
<th>During Senior Year of College</th>
<th>At Time of Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Never</td>
<td>20</td>
<td>17.24</td>
</tr>
<tr>
<td>Rarely</td>
<td>27</td>
<td>23.28</td>
</tr>
<tr>
<td>Sometimes</td>
<td>37</td>
<td>31.90</td>
</tr>
<tr>
<td>Often</td>
<td>14</td>
<td>12.07</td>
</tr>
<tr>
<td>Usually</td>
<td>12</td>
<td>10.34</td>
</tr>
<tr>
<td>Always</td>
<td>6</td>
<td>5.17</td>
</tr>
</tbody>
</table>
About 38% of participants reported an increase, about 49% reported no change, and 13% reported a decrease in preoccupation with food and its calorie content (Table 9). While women engaging in negative eating practices are generally more likely to gain weight (Lowe et al., 2006), such was not the case for these participants. Both the graduate school and full-time employment group had more participants report an increase in their preoccupation with food and its calorie content, and these groups had a lower mean BMI at the time of the survey than they did at the time of their college graduation. However, more members of the part-time employment/unemployment group reported no change or a decrease in preoccupation with food and its calorie content, and this group’s mean BMI increased from the time of college graduation to the time of the survey. Perhaps those who reported being more preoccupied with food and its calorie content were not engaging in practices such as restrictive eating and multiple types of dieting; thus, their weight control practices were safe and effective. No relationship was found between participants’ current activity and the frequency of their preoccupation with food and its calorie content ($\chi^2 = 1.32, p = .9708$).

Table 9

*Differences in Reported Preoccupation with Food and its Calories Content among Groups*

<table>
<thead>
<tr>
<th>Current Activity Groups</th>
<th>Difference in Reported Preoccupation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Much less to less</td>
</tr>
<tr>
<td>Graduate School</td>
<td>5 (11.90%)¹</td>
</tr>
<tr>
<td>Full-Time Employment</td>
<td>8 (14.04%)</td>
</tr>
<tr>
<td>Part-Time Employment/</td>
<td>2 (11.76%)</td>
</tr>
<tr>
<td>Unemployment</td>
<td></td>
</tr>
</tbody>
</table>

¹ Frequency of response (percentage of participants).
Stress Level

Lastly, participants were asked to rate their current stress level and their stress level during their senior year of college on a scale of 1 to 5, with 1 being the lowest level of stress and 5 being the highest level of stress. Stress from all sources can lead to weight gain and negative coping mechanisms, such as drinking or binge eating (Kivimaki et al., 2006 & Block et al., 2009). All participants’ responses are summarized in Table 10 below.

Table 10

Participants’ Reported Stress Level\(^1\) during Senior Year of College and at Time of Survey

<table>
<thead>
<tr>
<th>Stress Level Rating</th>
<th>During Senior Year of College</th>
<th>At Time of Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>3.45</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
<td>18.10</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
<td>27.59</td>
</tr>
<tr>
<td>4</td>
<td>38</td>
<td>32.76</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
<td>18.10</td>
</tr>
</tbody>
</table>

\(^1\) 1 indicates the lowest level of stress; 5 indicates the highest level of stress

Overall, stress levels declined for these participants. The majority of participants reported a moderate level of stress (3 rating) at the time of the survey. Lower feelings of stress may have protected some participants from an increase in BMI following college graduation; cortisol, the stress hormone, has been suggested to play a role in weight gain and central adiposity (Kivimaki et al., 2006). The data were analyzed for statistical significance; the results are summarized in Table 11 below.
Table 11

Differences in Reported Stress Levels among Groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Much less stress</th>
<th>Less stress</th>
<th>No change</th>
<th>More stress</th>
<th>Much more stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate School</td>
<td>5 (11.90%)¹</td>
<td>6 (14.29%)</td>
<td>10 (23.81%)</td>
<td>12 (28.57%)</td>
<td>9 (21.43%)</td>
</tr>
<tr>
<td>Full-Time Employment</td>
<td>20 (35.09%)</td>
<td>13 (22.81%)</td>
<td>7 (12.28%)</td>
<td>12 (21.05%)</td>
<td>5 (8.77%)</td>
</tr>
<tr>
<td>Part-Time Employment/Unemployment</td>
<td>7 (41.18%)</td>
<td>5 (29.41%)</td>
<td>3 (17.65%)</td>
<td>2 (11.76%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

¹ Frequency of response (percentage of participants).

Stress levels were found to be related to current activity in this group of participants ($\chi^2 = 16.72, p = .0331$). Participants in graduate school were more likely to have an increase in their stress level from senior year of college to the time of the survey; participants that are employed full-time, employed part-time, or unemployed are more likely to have a decrease. It is surprising that participants in the graduate education group did not experience an increase in mean BMI following college. It has been found that women experiencing feelings of high demand, high strain, and low control are more likely to gain weight, regardless of whether or not they were a normal weight or already overweight (Kivimaki et al., 2006 & Block et al., 2009). Additionally, in spite of reporting a decrease in stress levels, participants in the part-time employment/unemployment had an increase in mean BMI; however, this increase was not statistically significant.

Despite slight changes in mean BMI following college graduation, fruit and vegetable consumption, physical activity, alcohol consumption, and preoccupation with food and its calorie content, the only significant change that occurred from college graduation to the time of the survey was in reported stress levels of participants. While there was a significant change in
mean BMI from freshman year to college graduation, this occurrence has been well-documented by previous studies.
CHAPTER V. CONCLUSION

Young women graduating college face many mental and physical health issues, and how they face these issues can affect their weight and well-being. Overweightness or obesity combined with poor health habits can put women at risk for coronary heart disease, stroke, Type II diabetes, several forms of cancer, hypertension, dyslipidemia, liver and gallbladder disease, sleep apnea, and various gynecological issues. Therefore, maintaining a healthy weight and lifestyle can greatly aid in disease prevention.

The only significant change in the BMIs of the participants occurred over time. Participants in all groups had a higher BMI at graduation than during their freshmen year. While BMI for each group did change slightly at the time of the survey, these changes were not statistically significant. No group had the same mean BMI at the time of survey as they did freshmen year, which suggests that despite some weight loss following college, participants were unable to lose all the weight gained during their college years.

Participants in graduate school at the time of the survey were found to have an increased level of stress at the time of the survey compared to their senior year of college. Participants that were full-time employed, part-time employed, or unemployed reported a decreased level of stress at the time of the survey compared to their senior year of college. Those who reported being employed may have felt more stress during their senior year of college due to job-searching in a struggling economy, and after securing a job, they felt relieved and thus, a lower level of stress in their lives.

No statistically significant changes were found in participants’ fruit and vegetable consumption, physical activity level, alcohol consumption, or preoccupation with food and its
calorie content. Lack of significant changes in behaviors is likely due to a low return rate (less than 5%) on the survey; this is the biggest limitation of the study. This may be because the survey was sent via email to participants from an unfamiliar email address; it may have appeared to be spam and been deleted by many participants. Additionally, an undetermined number of members of the alumni association of the medium-sized university in Ohio were not the required age for taking the survey.

In order to increase online survey return rate for future studies, a pre-survey email should be sent to participant to inform them of what they will be receiving and who is sending it. It may also be helpful to offer a monetary incentive if possible. More research to investigate changes in health behaviors in post-college young women should be done using a larger sample size. Interviews with participants would provide valuable qualitative research that could aid researchers in determining more exact causes in weight fluctuations and changes in behaviors. Face-to-face meetings with participants would also allow for accurate measurement of their heights and weights. Additionally, health behaviors should also be examined in young women who did not attend college to see if higher education has a protective effect against weight gain and negative health behaviors. Race and marital status should be taken into consideration in future research; there will be more variability in these criteria with a larger sample size. Changes in health behaviors following college should also be investigated in men to determine if there are differences in how men and women adjust to life following college graduation.

Based on this study’s results, it does not appear that an intervention can be developed to prevent weight gain in post-college women; no statistically significant increases were seen in any of the groups’ BMIs. However, a significant increase in the reported stress level of participants in the graduate school group suggests that stress management interventions may be needed in
graduate, law, and medical schools in the United States. These could be implemented at orientation and include instruction on time management techniques, positive thinking strategies, relaxation techniques, and where additional help is available on campus (i.e. an advisor or counselor). While this may not seem like a major intervention, stress management can help female graduate students maintain their mental well-being.
REFERENCES


Hello! My name is Elizabeth Hood, and I am a graduate student at Bowling Green State University in the School of Family and Consumer Sciences. I am conducting my thesis research on 22-24 year old women’s health one year after graduating college, and I was hoping you would be a part of my project. Just follow this link [https://www.surveymonkey.com/s/WG7R5BV](https://www.surveymonkey.com/s/WG7R5BV).

Carefully read the informed consent document on the first page of the survey and if you decide you do not want to participate, simply clear your browser cache and page history and close the window. If you would like to participate, please fill out the short survey regarding your health habits. It will take less than 10 minutes and would be a tremendous help to me. There are no anticipated risks to completing this survey; however, you may want to complete it on a private computer as employers may be able to monitor your activities on office computers. Also, be sure to clear your browser cache and page history when you are finished. Should you choose not to participate, it will not affect your grades, class standing or relationship to BGSU or any other institution in any way. Please feel free to contact me with any questions or concerns at ehood@bgsu.edu or 937-272-7220. You may also contact my advisor, Dr. Julian Williford, at jwillif@bgsu.edu or 419-372-7833. For information on participants' rights, contact the Chair of the Human Subjects Review Board at 419-372-7716 or at hsr@bgsu.edu. However, please do NOT take this survey if you are not between the ages of 22 and 24 years old. Thank you very much for your time and input - it is greatly appreciated and valuable!
APPENDIX B: 1 YEAR POST-COLLEGE WOMEN’S HEALTH SURVEY

Age:
1. 22 years old
2. 23 years old
3. 24 years old
4. I am younger than 22 years old or older than 24 years old (this option will take them out of the survey).

Date of college graduation:
1. May 2009
2. June 2009
3. July 2009
4. August 2009
5. Sept. 2009
6. I did not graduate from college during those times (this option will take them out of the survey)

Height (in inches)________

1. Please select which option best describes your current activity:
   a. Graduate education (medical school, law school, graduate school, dietetic internship, etc.)
   b. Full-time employment
   c. Part-time employment
   d. Unemployment

2. Did you actively seek post-college employment during your senior year of college?
   a. Yes
   b. No

3. Did you actively seek post-college employment after college graduation?
   a. Yes
   b. No
   i. If “yes” to #2 or #3, how long did it take you to obtain your 1st job?
      1. Less than 3 months
      2. 3-6 months
      3. 7-9 months
      4. 10-12 months
   ii. If yes to #2 or #3, how long have you been at that job?
      1. Less than 3 months
      2. 3-6 months
      3. 7-9 months
      4. 10-12 months
      5. I am no longer at that job.
4. Did you seek admission to a graduate education program during senior year of college and/or after college graduation?
   a. Yes
   b. No
      i. If yes, were you admitted?
         1. Yes
         2. No

5. Approximately what was your weight in pounds when you entered college as a freshman? ________

6. During your 4 years at college, did you gain weight?
   a. Yes
   b. No
      i. If yes, how much?
         1. 1-5 pounds
         2. 6-10 pounds
         3. 11-15 pounds
         4. 16-20 pounds
         5. 21 pounds or more
      ii. If yes, were you able to lose any or all of that weight?
         1. Yes
         2. No

7. Approximately what was your weight in pounds when you graduated college? ________

8. What is your current weight in pounds? ________

9. Currently, on average, how many days per week do you engage in 30 minutes or more of physical activity?
   a. None
   b. 1-2
   c. 3-4
   d. 5-7

10. During your senior year of college, on average, how many days per week did you engage in 30 minutes or more of physical activity?
    a. None
    b. 1-2
    c. 3-4
    d. 5-7

11. Currently, do you feel that you eat the recommend 5 servings of fruits and vegetables on most days of the week?
    a. Yes
12. During your senior year of college, do you feel that you ate the recommended 5 servings of fruits and vegetables on most days of the week?
   a. Yes
   b. No

13. Are you currently a smoker?
   a. Yes
   b. No
   i. If yes, how many cigarettes per day?
      1. 1-3
      2. 4-6
      3. 7-9
      4. 10 or more

14. Were you a smoker during your senior year of college?
   a. Yes
   b. No
   i. If yes, how many cigarettes per day?
      1. 1-3
      2. 4-6
      3. 7-9
      4. 10 or more

15. Currently, on average, how many servings of alcohol do you have per week? A serving of alcohol is 12 oz. of beer, 5 oz. of wine or 1 ½ oz. of 80 proof liquor.
   a. None
   b. 1-3
   c. 4-6
   d. 7-9
   e. 10 or more

16. During your senior year of college, on average, how many servings of alcohol did you have per week?
   a. None
   b. 1-3
   c. 4-6
   d. 7-9
   e. 10 or more

17. On a scale of 1 to 5, how would you rate your current stress level? 1 indicates a low level of stress, 3 indicates a moderate level of stress and 5 indicates a high level of stress.
   a. 1
   b. 2
   c. 3
18. On a scale of 1 to 5, how would you rate your stress level during your senior year of college? 1 indicates a low level of stress, 3 indicates a moderate level of stress, and 5 indicates a high level of stress?
   a. 1
   b. 2
   c. 3
   d. 4
   e. 5

19. During your senior year of college, how often did you find yourself preoccupied with food and its calorie content?
   a. Never
   b. Rarely
   c. Sometimes
   d. Often
   e. Usually
   f. Always

20. Currently, how often do you find yourself preoccupied with food and its calorie content?
   a. Never
   b. Rarely
   c. Sometimes
   d. Often
   e. Usually
   f. Always

Thank you very much for your time and input. It is greatly appreciated.
APPENDIX C: HUMAN SUBJECTS REVIEW BOARD APPROVAL LETTER

April 15, 2010

TO: Elizabeth Hood
FCS

FROM: Hillary Harms, Ph.D.
HSRB Administrator

RE: HSRB Project No.: H10T225GE7

TITLE: Changes in Weight and Health Behaviors in Women One Year Post Baccalaureate Degree

You have met the conditions for approval for your project involving human subjects. As of April 15, 2010, your project has been granted final approval by the Human Subjects Review Board (HSRB). This approval expires on February 24, 2011. You may proceed with subject recruitment and data collection.

The final approved version of the consent document(s) is attached. Consistent with federal OHRP guidance to IRBs, the consent document(s) bearing the HSRB approval/expiration date stamp is the only valid version and you must use copies of the date-stamped document(s) in obtaining consent from research subjects.

You are responsible to conduct the study as approved by the HSRB and to use only approved forms. If you seek to make any changes in your project activities or procedures (including increases in the number of participants), please send a request for modifications immediately to the HSRB via this office. Please notify me in writing (fax: 372-6916 or email: hsrb@bgsu.edu) upon completion of your project.

Good luck with your work. Let me know if this office or the HSRB can be of assistance as your project proceeds.

Comments/Modifications:
Please add the text equivalent of the HSRB approval stamp to the “footer” area of the online consent document. Please provide the Board with the survey web address once it has been created.

c: Dr. Julian Williford
Research Category: EXPEDITED #7
APPENDIX D: HUMAN SUBJECTS REVIEW BOARD MODIFICATION APPROVAL LETTER

July 1, 2010

TO: Elizabeth Hood
PCS

FROM: Hillary Harms, Ph.D.
HSRB Administrator

RE: HSRB Project #: H10T225GE7

TITLE: Changes in Weight and Health Behaviors in Women One Year Post Baccalaureate Degree

The Human Subjects Review Board (HSRB) has reviewed the requested modifications you submitted for your project involving human subjects. Effective July 1, 2010 the following modifications have been approved:

1. Remove the words “Weight and” from the project title.
2. Change to questions regarding age and date of graduation.
3. The words “continuing education” to be replaced with “graduate studies”.
4. Addition of several questions to the survey.

You may proceed with approved project activities as you wish. If you seek to make any additional changes in your project activities, complete the Request for Modifications/Addendum application and submit it to the HSRB via this office. Please notify me in writing upon completion of your project (fax: 419-372-6916 or email: hsr@bgsu.edu).

Good luck with your work. Let me know if this office or the HSRB can be of assistance as your project proceeds.

COMMENTS:

C: Dr. Julian Williford