THE FRESHMAN 15: WEIGHT CHANGE IN RELATION TO BODY IMAGE AND BODY MEASUREMENTS

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THE FRESHMAN 15: WEIGHT CHANGE IN RELATION TO BODY IMAGE AND BODY MEASUREMENTS

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THE FRESHMAN 15: WEIGHT CHANGE IN RELATION TO BODY IMAGE AND BODY MEASUREMENTS

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Holly Skinner, the youngest daughter of Richard and Darlene Skinner, was born December 22, 1982, in Bremen, Georgia. She graduated from Bremen High School in the top ten of her class in May 2001. She attended Auburn University in Auburn, Alabama, and graduated cum laude with a Bachelor of Science degree in the College of Human Sciences in May 2005.

THESIS ABSTRACT

THE FRESHMAN 15: WEIGHT CHANGE IN RELATION TO BODY IMAGE AND BODY MEASUREMENTS

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Freshmen students entering their first year of college are faced with stress and change, and possible changes in body weight and body image. A common and highly publicized notion among college students is the high risk of gaining the dreaded "Freshman 15" which refers to the potential for excessive weight gain during freshman year. The objective of this study was to longitudinally examine changes of body weight in relation to changes in body circumference measurements, body satisfaction, and appearance investment. The three-dimensional body scans provided non-contact, accurate body measurements of participants.

Subjects included 26 females and 10 males. Each subject was measured for height, weight, and percent body fat using standard techniques at the beginning of fall

and end of fall semester 2006, and at the end of spring semester 2007. Body Mass Index (BMI) was calculated from measurements. Subjects completed a questionnaire probing body image, which included body satisfaction/dissatisfaction (BASS) and cognitive investment in appearance (ASI-R) for each data collection period. Additionally, body measurements were taken each time using a 3D body scanner. Specific body measurements studied were the bicep, neck, bust/chest, waist, hips, and thigh circumferences.

Mean weight gain for all subjects for the academic year was 3.8 pounds. Female and male subjects were divided into (1) weight gain and (2) weight loss/no change groups. For the female subjects in the weight gain group for the academic year, the mean weight gain was 5.6 pounds, with measurement increases in the hips and waist, a mean BASS score of 3.4, and a mean composite ASI-R score of 3.56. For the female subjects in the weight loss/no change group for the academic year, the mean weight loss was 2.67 pounds, with measurement decreases in the bust, hips, thighs, and neck, a mean BASS score of 3.81, and a mean composite ASI-R score of 2.98. For the male subjects in the weight gain group for the academic year, the mean weight gain was 6.23 pounds, with measurement increases in the thighs, hips, bicep, waist, and chest, a mean BASS score of 3.48, and a mean composite ASI-R score of 3.03.

Findings of average weight gain less than 15 pounds aligned with the limited literature on the topic. Some subjects gained weight during each semester, while others gained and lost. The most noticeable change in body image measures was an overall decline in cognitive investment in appearance during the academic year.

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CHAPTER I. INTRODUCTION

Prevalent in the popular press, the “Freshman 15” is a common phrase used to describe the dreadful idea that college freshmen will gain an average of fifteen pounds of body weight in their first year of college (Cohen, 2006; Marchione, 2006; O'Donnell, 2006; Oz, 2006; Singer, 2006). This idea of weight change has pervaded college campuses for decades and still inundates the minds of freshmen believers. It is so widespread that Daphne Oz, author of the recently released book, “The Dorm Room Diet,” specifically targets college students dealing with weight change and promotes healthy eating habits (2006).

It is difficult not to notice the idea of the “Freshman 15,” as the incidence of obesity in the United States has increased over the last two to three decades for men and women of all ages, racial and ethnic groups, and educational levels, according to recent reports from the Centers for Disease Control and Prevention (CDC, 2007b). The CDC provides data from the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), and two National Health and Nutrition Examination Surveys (NHANES) show that, “among adults aged 20–74 years the prevalence of obesity increased from 15.0% (in the 1976–1980 survey) to 32.9% (in the 2003–2004 survey)” (2007b, p.1). The two surveys also show increases in weight gain among children and teens. For those aged 12–19 years, the overweight category has increased from 5.0% to

17.4% (CDC, 2007b). The obesity epidemic has emerged more in certain regions of the United States, particularly in the south Atlantic and southeastern central areas (CAS, 2003; Mokdad, Ford, Bowman, Dietz, Vinicor, Bales, & Marks, 2003). In a report by a public health advocacy group, the Trust for America's Health (TFAH), the state of Alabama is ranked second in the nation in obesity rates, behind only Mississippi (2006). Alabama's adults who were obese in the period 2003-2005 totaled 28.7 percent of the state (TFAH, 2006). Along with Mississippi and Alabama, the other three high obesity states were West Virginia, Louisiana, and Kentucky (TFAH, 2006).

Multiple environmental and social forces act on freshmen college students' behavior and could affect possible weight change. These forces include the processes of adapting to a new lifestyle. For example, freshman students are typically away from parental guidance and free to eat what they want. There are many eating temptations. Black (2007, p.1) states that freshmen students "can pile on the portions in the dining hall, eat dinners of french fries and ice cream, and indulge in sugary and salty snacks to fuel late-night study sessions." Students may increase their energy intake (i.e. additional calories) and/or decrease their physical activity (Hoffman, Policastro, Quick, & Lee, 2006). Many students tend to exercise less after high school because their changing daily routines could affect the time spent on physical activity (Buckley, 2005). "Making the transition from home and high school to university can be difficult -- university students are busy with class, homework and socializing, more so than high school" (Ritter, 2006, p. 1).

The pressure of acclimating to college can trigger weight change. People sometimes eat or fail to eat in response to anxiety, homesickness, sadness, or stress

(Hartsoe, 2006; Mancini, 2007). They may begin or increase the use of alcohol and drugs (*Freshman Fifteen*, 2007; Waehner, 2007). Such behaviors intensify the problems young people deal with on a day-to-day basis.

Weight change could affect body image and body satisfaction. In the new environment, social interactions occur that may affect the importance freshmen students place on appearance. The body image construct is a dynamic concept that can be defined to incorporate various meanings. For this study, Cash's (2002) definitions of body image investment and evaluation (body satisfaction/dissatisfaction) was used as the focused construct of body image. The two body image elements of investment in and evaluation of appearance function as central organizers of the cognitive, emotional, and behavioral processes of environmental events (Cash & Pruzinsky, 2002). One's cognitive investment in appearance is an important facet of the body image construct (Cash, 2002; Cash & Pruzinsky, 2002). Psychologists suggest that the cognitive investment in appearance (mental picture of one's physical body components) is perceptually based and that perception is essentially real for the person (i.e. potentially an accurate representation of the measurable, pre-existing, external reality) (Blood, 2005; Henriques, Hollway, Urwin, Venn, & Walkerdine, 1984). Due to changing, surrounding forces, freshmen college students may experience distress about their bodies that are caused by concerns about physical appearance.

As Oz (2006, p.25) aptly phrased it, "the *idea* that tremendous weight gain is unavoidable as a freshman has a powerful hold on many young women;" the failure and struggle of young women to attain the perfect, 'ideal body image' their first year in college could perpetrate body dissatisfaction. A study by Heatherton and colleagues

(1997) found that body image concerns increase with increasing body weight. Furthermore, increased body weight is the strongest predictor of weight dissatisfaction in women. Body dissatisfaction becomes the issue as a young woman compares her perception of actual body size with the internalized notion of cultural ideals, interpersonal experiences, physical characteristics, and personality attributes (Blood, 2005). American culture seems to have established a 'sociocultural' norm to which women are supposed to strictly adhere (Blood, 2005; Cusumano & Thompson, 1997; Fallon, Katzman, & Wooley, 1994); when not followed or modeled, negative body attributes of self-monitoring and self-objective behaviors can result (Fredrickson & Noll, 1998). Previous research shows that many young women in America have a history of eating disorders due to dissatisfaction with their bodies (Fredrickson & Noll, 1998; Heatherton et al., 1997; Orbach, 1978, 1988).

Most of the research relating to the "Freshman 15" and college women has concentrated on the relationship between the regularity with which they consume unhealthy foods and beverages. Little is known about the psychological impact the college adaptation process has on their bodies, e.g., if it triggers positive or negative body image transitions, and thus affects body satisfaction or dissatisfaction (body image evaluation) and investment in physical appearance. A longitudinal investigation could explore links between exposure to the college environment, body satisfaction/dissatisfaction, and body image investments. Such a study could examine whether not there really is a "Freshman 15" and what its impact might be. If needed, findings could enhance the ability to counter possible negative impacts.

Men tend to be relatively satisfied with their bodies when compared to women (Forbes, Adams-Curtis, & Rade, 2001; Rozin, Trachtenburg, & Cohen, 2001). Studies show that women diet more (Liebman, Cameron, & Carson, 2001; Wardle, Haase, & Steptoe, 2004) and are more frustrated with their bodies than men (Lokken, Ferraro, Kirchner, & Bowling, 2003; Rozin et al., 2001; Smith, Thompson, & Raczynski, 1999; Yates, Edman, & Aruguete, 2004).

Although there is more research on body image and body satisfaction related to women than men, awareness of issues in young men's body images is increasing, including contributors to body dissatisfaction (Cash & Pruzinsky, 2002). Pope, Phillips, and Olivardia (2000) provided a foundation for heightened concerns about male preoccupation with physical appearance. Clearly, women are no longer alone when it comes to wanting thinness and perfect body shape. Historically, shame and fear of public humiliation drove men with body dissatisfaction and eating disorders (due to body image anxieties) away from acknowledging their concerns (Bottamini & Ste-Marie, 2006). Research on male body image has increased, yet it is still relatively limited in scope (Olivardia, Pope, Borowiecki, & Cohane, 2004). A possible explanation for this deficiency of research is a lack of appropriate measures to tap into concerns unique to men. In this study, the addition of 3D body scanning technology facilitated a better understanding of where weight change occurs in freshmen men, enhancing the ability to explore the psychological impact on self-perception and help pinpoint issues related to the body image construct.

Few researchers have explored the "Freshman 15" phenomena, environmental and social (lifestyle) factors associated with weight change, and issues might differ across

gender. Research is quite sparse and does not fully support the finding that freshmen gain a significant amount of weight over their first year at college. For example, a study at Cornell University (2004) only explored the first semester of weight change in freshman students, and was limited to using just one method of traditional weight measurement, a Healthometer scale. To date, no studies have longitudinally assessed changes in body shape and size, creating a basis for investigating possible changes in the body image construct and the cognitive investment in appearance.

With today's technology, researchers can now use scan data to understand possible changes in weight in relation to body image and investment in appearance. The addition of three-dimensional body scanning technology brings a new way to see where weight change may occur in the gender specific areas, and how this might relate to the longitudinal body image constructs. This adds a visual component to weight change and body fat data that are calculated by standard weight measurements and Body Mass Index (BMI), a calculation in which weight is divided by height (CDC, Body Mass Index Home, 2007a). Three-dimensional body scanning is becoming a standard practice for research that involves body shape change, as well as body measurement change (Bougourd, Dekker, Ross, & Ward, 2000; McKinnon & Istook, 2002; Simmons & Istook, 2003; $[TC]^2$, 2008a; Wells, Treleaven, & Cole, 2007). "With the use of 3D body scanners, body measurement techniques can be non-contact, instant, and accurate" (Simmons & Istook, 2003, p. 306). Three-dimensional body scanning provides many more aspects in capturing measurements by using an electronically derived image-based method as compared with the traditional manual approaches that are particularly problematic or unreliable (Bougourd et al., 2000). Measurements of 3D body scans are

extracted in seconds and are consistent when measuring a large number of locations or landmarks on the human body. Additionally, it is a more desirable method of measuring the human body, with the privacy of individuals in that no physical contact has to be made, unlike traditional measures (Simmons & Istook, 2003).

Statement of Purpose

The purpose of this study was to longitudinally assess the "Freshman 15" construct by investigating young men's and women's size and shape changes, body image constructs, and cognitive investments in appearance. By using the 3D body scan technology, body scan images could accurately determine size and shape change for each gender. Along with individual physical attributes (weight, BMI, and shape), the research developed an assessment of freshmen college students' evaluative experiences of their physical appearances: measured constructs (body image thoughts and appraisals, and emotions associated with appearance) and evaluated overall appearance satisfaction. Male and female subjects were analyzed together and separately.

Research Questions

1. Is there a change in weight over the longitudinal observations?
2. If there is weight change, do body measurements change at the bicep, neck, bust/chest, natural waist, hips, or thighs?
3. Does the perception of body satisfaction related to weight gain or weight loss change over the three observations?

4. Is there a change in cognitive appearance investment, and if so, is it related to weight gain or weight loss over the three observations?

Definition of Terms

Body Image Construct: Made up of two central organizing, attitudinal body image elements (body image evaluation and body image investment) (Cash & Pruzinsky, 2002).

Body Image Evaluation: "Satisfaction or dissatisfaction (e.g., positive-to-negative appraisals) with one's body, including evaluative beliefs about it" (Cash & Pruzinsky, 2002, p.38).

Body Image Investment: "Cognitive, behavioral, and emotional importance of the body for self-evaluation" (Cash & Pruzinsky, 2002, p.38).

Body Mass Index (BMI): BMI gives a dependable indicator of body fat and is used to determine a weight category and any health risks. A number is calculated from a person's weight and height. The formula for calculating BMI:

$$\frac{weight(lbs)}{[height(in)]^2} * 703 = BMI$$

(CDC, Body Mass Index Home, 2007a).

Body Satisfaction/Dissatisfaction: Satisfaction or dissatisfaction with one's body also referred to as body image evaluation (Cash & Pruzinsky, 2002).

3D Body Scanner: "The three-dimensional body scanner is a tool that captures information about the surface of the body using multiple laser or white lights and CCD (Charge-Coupled Device) cameras. Electronic circuitry and a microprocessor unload the data which are processed, saved as a file, and visualized as a three-dimensional image on

a computer monitor" (Explore Cornell, 2003, ¶ 4). This image is a three-dimensionally accurate copy of the subject and can be manipulated and viewed on a computer screen. The one used in this study was the $[TC]^2$ NX12 Body Scanner developed by the Textile/Clothing Technology Corporation in Cary, North Carolina.

Cognitive Investment in Appearance: The mental processing of one's physical appearance through thought, experience, and the senses (Cash & Labarge, 1996).

CHAPTER II. REVIEW OF LITERATURE

This literature is separated into two main sections and sub-sections: (1) analysis and theoretical framework [(a) freshman 15 studies, (b) developmental influences on body image, (c) body image construct and assessment, (d) cognitive investment in appearance, (e) proximal events and processes, (f) gender differences in body awareness, and (g) body image and weight-related issues]; and (2) techniques and technology for assessing body shape/weight placement [(a) Waist-to-hip Ratio, (b) Body Mass Index, (c) assessments and perceptions of body sizes and shapes, and (d) body scanning]. Each section explains the significance of the literature to the research described in this thesis. The literature will also explore research studies completed in the past and will relate them to the current studies. Definitions of body image vary greatly and stem from a range of different theoretical orientations. The focus and interest of this work derives from certain beliefs about the importance, meaning, and influence of appearance in one's life. Two basic elements, body image investment and evaluation, and the cognitive investment in appearance, are the foundations of the body image construct for this study.

Analysis and Theoretical Framework

Freshman 15 Studies

First year students commonly know of the "Freshman 15" as a college phenomenon, and it is frequently cited in the popular press; however, little scientific evidence supports this issue. The research is limited but some suggests not all freshmen tend to gain the average of 15 pounds. While weight change in female freshmen students has been documented often, studies have not thoroughly documented weight change in male freshmen students. Moreover, various factors associated with weight change in both genders have not been significantly documented.

Researchers at Cornell University, Levitsky, Halbmaier, and Mrdjenovic (2004), conducted a correlational study in order to quantify the weight gain of freshmen. A total of 60 students were sampled (51 females and 9 males). They found that students significantly increased their mean weight (4.19 ± 5.29 lbs.) over a 12-week period. That is 11 times the expected weight gain for the typical 17- or 18-year-old, and nearly 20 times the weight gain for the average adult. According to the two linear regression models generated from the analysis of the questionnaire, the first linear regression model accounted for 58% of the variance. This model indicated that eating in the 'all-you-can-eat' dining halls accounted for 20% of the variance in weight gain. Snacking and eating high-fat 'junk food' accounted for another 20%. When the initial weight was used as a covariate in the second linear regression model; the consumption of junk foods, meal frequency and number of snacks accounted for 47% of the variance (Levitsky et al., 2004). The researchers concluded, "the study clearly demonstrated that significant weight gain during first semester college is a real phenomenon and can be attributed to tangible

environmental stimuli" (Levitsky et al., 2004, p.1435).

Researchers, Duncan and Simpson, conducted an unpublished study of the "Freshman 15," at the University of Guelph, which only used female freshmen students (Ritter, 2006). They found that while the female students gained weight over the course of the first year, their weight gain was not as dramatic as in the Cornell study by Levitsky and colleagues (2004) of the first 12 weeks. They also measured body fat and waist circumference. This study found that weight gain in more than 100 first-year college women was an average of about five pounds over the course of the year. This was not even half of the purported "Freshman 15." The researchers note that weight gain issues still significantly exist for new, incoming college students.

At Rutgers, the State University of New Jersey in New Brunswick, researchers measured changes in body weight and percentage of body fat among 67 freshmen college students (35 females and 32 males) (Hoffman, Policastro, Quick, & Lee, 2006). The subjects were those that had completed a college-wide health assessment in the first semester of their freshmen year. The students sampled from this assessment were then used in the researchers' study of weight gain during the freshman year. A limitation to this study is that the students were only measured and documented for weight gain the second semester (spring) of their freshmen year, providing data only for those who gained weight over those months. The researchers measured weight and percentage of body fat using a Tanita BF-578 digital scale with bioelectrical impedance (BIA – to measure body fat percentage). The mean change in body weight was 2.86 lbs. (1.3 kg), and the mean change in percentage of body fat was 0.7% for the group. For the students in the study who gained weight, the mean increase in body weight was 6.82 pounds. (3.1

± 2.4 kg) and the percentage of body fat was 0.9 ± 3.8% (Hoffman et al., 2006).

Researchers Graham and Jones (2002), investigated whether the perception that freshmen gain 15 pounds during their first year of college is related to either actual or perceived weight gain. Questionnaires and health data were completed by 49 freshmen at a small Midwestern liberal arts college at the beginning and end of the year. The questionnaire asked the subjects about their eating attitudes and behaviors, body image, demographic data, exercise habits, and awareness of and concern about the "Freshman 15." The Eating Attitudes Test (Eat-26) developed by Garner and Garfinkel (1979) was used to measure eating attitudes, and the Body Shape questionnaire developed by Evans and Dolan (1993) was used to measure concerns about body image. The freshmen's average age was 18.5 years; 39 were women and 10 were men. Their findings revealed no significant weight gain at the end of the year, yet an average of 1.5 pounds in weight loss was documented. The researchers claimed that the "Freshman 15" was a myth but played an important role in perpetrating negative attitudes toward weight (Graham & Jones, 2002). "Freshmen who were concerned about gaining 15 pounds were more likely to think about their weight, have a poorer body image than others, and categorize themselves as being overweight" (Graham & Jones, 2002, p.171).

Developmental Influences on Body Image

Past events and experiences that influence how individuals come to think, feel, and act, in relation to their body are the developmental factors that shape body image. Important among these developmental factors are cultural socialization, interpersonal

experiences, physical characteristics, and personality attributes. A mixture of types of social learning also implants body image schemas and attitudes.

Developmental factors relate to socialization regarding the meaning of physical appearances that begin at childhood, continue in adolescence, and through adulthood. Seminal body image experiences develop as person-environment transactions occur in the situations of individuals' cognitive, social, emotional, and physical development (Cash & Labarge, 1996).

The basic precept of the cultural socialization perspective is that cultural values influence individual values and behavior. The more discrepant one's self-evaluation is from the cultural ideal, the greater the dissatisfaction with appearance (Cash & Pruzinsky, 2002). Body image dissatisfaction can have devastating effects on psychological and physical health. In cultural socialization, a culture conveys standards about appearance by which physical characteristics are and are not socially valued. Hargreaves and Tiggemann (2002) confirmed that the media creates and communicates what it means to possess or not possess certain characteristics. The media is highly influential in cultural acceptance as individuals strive to attain societal expectations by dieting, exercising, or using beauty and fashion products. Not only do cultural messages express normative notions about attractiveness or unattractiveness, they also articulate gender-based expectations. These cultural expectations tie "femininity" and "masculinity" to certain physical attributes. When these cultural expectations are internalized, the cultural values cultivate body image attitudes, which encourage individuals to react to life in particular ways (Cash & Pruzinsky, 2002).

Additional research suggests that young men and women adopt different cognitive strategies to cope or deal with the American emphasis of a thin body image or "the culture of slimness" (Thompson, Heinburg, Altabe, & Tantleff-Dunn, 1999). The North American society's media images of men and women are omnipresent. A meta-analysis of attractiveness and body image utilized 222 studies, which indicated that the gender differences in body dissatisfaction are increasing, with women becoming more dissatisfied than men (Feingold & Mazzella, 1998).

The interpersonal experiences and physical characteristics of individuals affect body image development. The attractiveness and social acceptability of an individual's physical appearance impacts how the individual is perceived and treated by others. Research proposed by Lerner and Jovanovic (1990), demonstrated how well one's appearance matched social standards of physical attractiveness by developing a "goodness-of-fit model." This model suggests that body image evaluations may stem from social feedback and self-appraisals. Many physical characteristics from childhood to adulthood can alter one's goodness-of-fit with personal and social expectations. For example, variations in physique and muscularity, awkward adolescent changes, and disfigurements all play roles in changing body appearances. Aging brings other changes including aging of skin, loss of hair, and other ongoing changes to the body.

The way we see ourselves in comparison to others, the feedback from peers, romantic partners, and strangers uniquely influence our self-concept and how we view our physical appearance (Cash & Pruzinsky, 2002). These influences are our interpersonal relationships. Self-objectification is a factor that supplies some of these third person perspectives that so greatly influence the personal ideas of our bodies. A

growing body of literature suggests that others' opinions of our bodies greatly impact the way we feel about our body images (Rosen, Orosan-Weine, & Tang, 1997; Thompson et al., 1999). For example, a simple passing comment can either elevate or diminish our mood and self-confidence. Hearing "You look wonderful!," makes one feel uplifted or renewed, but hearing, "You look tired today," may make one feel more fatigued and self-conscious.

There are three crucial interpersonal processes that play important roles in the development of body image (Cash & Pruzinsky, 2002): 1) *reflected appraisals* 2) *feedback on physical appearance* 3) *social comparison*. *Reflected appraisals* refer to the belief that others' opinions of us persuade how we think of ourselves. Perceptions of others' evaluations of physical attractiveness impact self-evaluations that persuade us to appraise our bodies in particular ways (Rieves & Cash, 1999; Tantleff-Dunn & Thompson, 1995).

Feedback on physical appearance refers to the development of others' perceptions of us. This feedback may come from parents, siblings, peers, romantic partners, coaches, employers, or even complete strangers. Feedback includes teasing, criticism, confusing comments, and even subtle body language. Regardless of the source, any negative feedback about one's appearance can be damaging. Researchers have documented the negative consequences associated with feedback. In a longitudinal investigation, Cattarin and Thompson (1994) found that teasing is one of the most commonly reported causes of body dissatisfaction. Not only has frequent teasing been linked to higher levels of body dissatisfaction but also to higher levels in eating disorders, depression, and lower self-esteem in both adolescents and college females.

The third interpersonal process of *social comparison* refers to a practice in which self-appraisals of physical attractiveness are formed by the tendency to compare one's physical appearance to others. This theory suggests that the comparison results in body image disturbance by the individuals comparing themselves to people they view as more physically attractive than them. Some researchers suggest that it is merely the general tendency of comparison that yields such disturbance alone (Cattarin, Thompson, Thomas, & Williams, 2000; Rieves & Cash, 1996; Thompson et al., 1999). Research suggest that the occurrence of appearance comparison as a predictor of body image explains a more distinctive variance than does maturational status, teasing history, or internalization of socio-cultural pressures for thinness and attractiveness.

In a chapter from the book, "Body Image: A Handbook of Theory, Research, and Clinical Practice," Tantleff-Dunn and Gokee noted a key aspect of interpersonal relationships and body image as follows: "body image development is a lifelong process inevitably influenced by the significant others who play the most central roles at different times in our lives" (Cash & Pruzinsky, 2002, p. 110, chap. 13). Therefore, interpersonal processes of body image affect people at different ages, such as children by parental persuasions, adolescents by interactions with peers, and adults by romantic partners.

The influence of peer groups, through much feedback on physical appearance to adolescents or even adults, provides concerns with body image. Teasing, for example, is an experience extremely common to adolescents and some adults. Rieves and Cash (1996), in a study of social development factors, found evidence that peers and friends are some of the worst perpetrators of teasing and are responsible for negative body image formation for an individual subjected to teasing and other interpersonal comments related

to their body. This negative body image formation links to greater concerns with dieting behaviors and physical appearance. Researchers note that such feedback may not always be direct, but the perceptions that an individual draws in their mind in relation to others notions, also provides body image concerns.

Levels of peer acceptance are accounted for as the peers establish the sociocultural norm. These studies found that boys, less often than girls, acknowledge that thinness increases likeability, and the extent to which the individual holds that concern predicts the level of weight and body image anxiety (Paxton, Schutz, Wertheim, & Muir, 1999). Also dealing with appearance-related feedback, peers' modeling behaviors may pressure negative body image and eating disorders. For example, studies of college-age women found that women within friendship organizations/sororities or peer groups were similar in the degree to which they were concerned about body image and engaging in dieting behaviors (Crandall, 1988). Crandall's findings suggest that members of peer groups influence one another. A question in further examination concerning the organized peer groups would be whether these individuals reflect pre-existing body image attitudes.

Romantic partners seem to have a significant impact on how individuals feel about themselves, their bodies, and their relationship itself. In romantic relationships, much time is spent together; experiences are shared; and often these relationships allow each partner to be vulnerable in a way that they rarely are with other human beings. Perceptions of how partners feel about one another's looks and their feedback on each other's appearance relates to body dissatisfaction (Tantleff-Dunn & Thompson, 1995). Greater body dissatisfaction is connected with lower relationship satisfaction. Rieves and

Cash's (1999) research proposed that men place a greater importance on physical attractiveness than women, and that as a result, men's relationship satisfaction is linked considerably to satisfaction with their partner's shape. As an effect, the women's perception of this can create body dissatisfaction and an increase in eating disorders. The study by Tantleff-Dunn and Thompson (1995) actually opposed this idea, advising that both men's and women's perceptions of the opposite sex's body ideals are inaccurate, that women essentially perceive that their romantic partners prefer thinner figures than their actual perception.

Strangers and/or the opposite sex: The divergence in how individuals think they should look to be considered to be attractive and how they actually think they look can lead to body dissatisfaction. In accumulation of distress about appearing attractive to others, strangers may more directly influence body image by providing feedback on physical appearance (Cash & Pruzinsky, 2002). Strangers' feedback is often more restrained than critical and not as significant as closer interpersonal relationships like romantic partners and peer groups. Researchers document that body language, such as facial expressions, topics of conversation, levels of friendliness, and preferential treatment to attractive individuals, does transmit information to individuals on how they view their own physical appearance and body image (Cash & Pruzinsky, 2002).

In chapter 13 from the book, "Body Image: A Handbook of Theory, Research, and Clinical Practice," Tantleff-Dunn and Gokee stated, "what others think and do matters; but more importantly, perceptions of what others think and prefer regarding physical appearance influence how we think about our bodies and our body image" (Cash & Pruzinsky, 2002, p. 115). Research on interpersonal influences is limited to

understanding the importance individuals place on the opinions of others but does not explore the impact on individuals. An additional investigation must take place in order to discover why some individuals develop body image disturbances and other individuals do not. The American culture places such a great emphasis on physical attractiveness and the unrealistic accomplishment of thinness in women and muscularity in men that answers to appearance-related values and behaviors are bound to the society's pressures.

Other influential factors of body image attitudes are the attributes of individual personality (Blood, 2005; Cash & Pruzinsky, 2002). Positive and negative self-esteem may be the most critical of these factors (Jones & Buckingham, 2005). Perfectionism, public self-consciousness, and a need for social approval are all personality attributes that may influence the formation of body image, depending on the individual's personal interactions. Cash's (2002) research suggests that personality factors pertain to certain gender-based attitudes and values. Females who endorse traditional gender attitudes in relationships with males tend to be more invested in their appearance, internalize cultural standards of beauty more severely, and hold more faulty assumptions about their looks. Some body image researchers correlated the estimations of the body with a range of personality measures that reflected on the causal relationship between psychological traits such as low self-esteem and depression, also referred to as 'body image disturbances' (Garner, Garfinkel, Stancer, & Moldofsky, 1976). Prior to these studies, Secord and Jourard (1953) worked with personality theories and believed that an individual's attitudes towards his or her body are critically significant to any theory of personality. They developed 'The Body Cathexis Scale' in order to measure the level of satisfaction or dissatisfaction with one's body. They claimed that the assessment of the body and the

self correspond to each other by the same degree (Secord & Jourard, 1953). This claim formed a link between body cathexis and self-concept.

Half a century later, the scale is still being used in experimental body image research and to assess more depictions of physical appearance (Blood, 2005; Thompson, 1990).

Body Image Construct and Assessment

Body image has multidimensional definitions with unlimited interpretations and meanings. These definitions stem from a range of different theoretical orientations, including phenomenology, neurology, experimental psychology, psychoanalysis and feminist philosophy. According to Cash and Pruzinsky (2002, p.38), "the cognitive, behavioral, and emotional importance of the body for self-evaluation" refers to *body image investment.* "Satisfaction or dissatisfaction with one's body, including evaluative beliefs about it," refers to *body image evaluation* (Cash & Pruzinsky, 2002, p.38). Body image evaluations develop from the degrees of differences or similarities between self-perceived, physical characteristics and personally valued appearance ideals (Cash & Szymanski, 1995).

Looking back at historical perspectives on body image and comparing them to contemporary perspectives led the way to understanding how humans relate to their bodies. One enduring perspective is the belief that body image plays a primary role in understanding human experience: "the vital role of body image means that it has the potential to dramatically influence our quality of life. From early childhood on, body

image affects our emotions, thoughts, and behaviors in everyday life" (Cash & Pruzinsky, 2002, p.7).

The body image construct is built around the basis of self-schemas related to one's appearance. In an early defining study, Markus (1977) identified self-schemas as "cognitive generalizations about the self, derived from past experience, that organize and guide the processing of self-related information contained in an individual's social experience" (p. 64). Markus offered the idea that a person who is schematic of their body and appearance will process important information differently than a person who is not schematic (1977). Cash and Labarge (1996) developed the original Appearance Schemas Inventory (ASI) to assess these body image self-schemas that reflect one's core and the influence of one's appearance in life.

Research following Markus's self-schemas provided that body image is established through the evolving mental representation of the "body self" (Krueger, 1989). Body self and its image is created and lives within the actual territory of the body. Krueger also believed that we experience life through the body in actuality and that, some people make their bodies a narrator of what words cannot say. The body self emerges through a developmental order of events progressing from images to words to arranging patterns that regulate the total self-experience. Body image is the integral component of self-image and the basis of self-representation; it becomes the cumulative set of images, fantasies, and meanings about the body. Along with Krueger, other neurophysiological researchers, over the last few decades, have produced leading data on the development of body image and the differentiation of the mental self as a bridge between mind and body (McDougall, 1989; Meissner, 1997a, 1997b; Meissner, 1998a, 1998b). The foundation of

the psychological self is the sense that we as human beings reside inside our bodies, and bring a unity of mind and body with evolving unison of body self and image. The psychological self evolves with the use of symbols and language to communicate internal experiences. Krueger explains that the capacity to recognize and reflect on how our own mind is unique from others develops by ages 6-8. He noted that this capacity to reflect on our own experience and behavior and also envision others' feelings towards us, the intents, desires, knowledge, beliefs, and thinking, leads to an assimilation of the body self (1989). In chapter 4 from the book, "Body Image: A Handbook of Theory, Research, and Clinical Practice," Krueger elucidates the three phases in the development of the body self: An early psychic experience of the body, the early awareness of a body image that combines inner and outer experience, and the assimilation of the body self as a container of the psychological self (Cash & Pruzinsky, 2002).

Negative body image has many implications, and is often equated with the terms *body dissatisfaction* and/or *discontentment with some aspect of one's physical appearance* (Cash & Pruzinsky, 2002). Negative body image often correlates with certain physical characteristics such as weight, shape, and facial features. In some cases this may refer to specific physical features and not the body in its holistic aspect. Some researchers articulate that people may maintain overall feelings of physical acceptability but; dislike their upper torso or level of muscle tone, etc. Two approaches to categorizing negative body image have been identified. One approach is evaluating each specific physical attribute separately (such as rating their dissatisfaction of the lower torso, mid-torso, weight, etc.), and the other is evaluating the physical attributes with an overall combination of appearance dissatisfaction. These approaches are identifiable in three

Psychology Today surveys -- the first in 1973 by Berscheid and her colleagues, the second in 1986 by Cash and colleagues, and the third in 1997 by Garner. The three sets of the *Psychology Today* survey reports indicated that negative body images were increasing in both men and women (Berscheid et al, 1973; Cash et al., 1997; Garner, 1997).

By concentrating on isolating and identifying specific body parts to be measured, other researchers have also developed instruments to assess body image from the body-specific areas. Such instruments are the Body Esteem Scale (Franzoi & Shields, 1984) and the Body-Image Satisfaction Scale (Marsella, Shizuru, Brennan, & Kameoka, 1981). This generation of body image measures has concentrated more on isolating and identifying specific components of body image that may be present in multiple populations, rather than focusing on differentiating diagnostic categories from normal controls. The Body Esteem Scale rated how individuals felt about parts or functions of their bodies on a 5-point Likert scale that ranged from 1 = strong negative feelings to 5 = strong positive feelings. The Body-Image Satisfaction Scale also rated individuals' satisfaction with particular body sites.

Cash and Henry (1995) published a survey of women's body images. Respondents (803) completed a validated Multidimensional Body Self-Relations Questionnaire (MBSRQ), and of these results, the percentages of women reporting any degree of dissatisfaction or negative body image with various body areas/attributes were: mid-torso – 51%, lower torso – 47%, upper torso – 25%, weight – 46%, muscle tone – 37%, height – 13%, and face – 12%. The MBSRQ is one of the most comprehensive body image assessments available. In addition to subscales that explore subject

satisfaction with body parts, the MBSRQ also assesses appearance, fitness, health, and illness with other subscales.

Focusing on specific physical features to define negative body image may not fully capture the body image gestalt in some cases. This discontentment with parts of the body may not retain holistic feelings of body image satisfaction/dissatisfaction or physical acceptability (Cash & Pruzinsky, 2002). In Cash and Henry's (1995) survey of American women, a subscale of the MBSRQ (Appearance Evaluation) was used to assess overall body image. By using this subscale, overall body image dissatisfaction (48% of the sample) was found lower than the 1997 *Psychology Today* results (Garner, 1997).

Other studies add substance to the notion that negative body images are increasing in both men and women. Most of these, to date, are cross-sectional studies. Feingold and Mazzella (1998) performed a cross-sectional meta-analysis of body image research, from the pre-1970s to 1995. They examined gender differences on a range of evaluative body image measures. There were 222 coded studies, and the analyses confirmed that the effect sizes (female-to-male variance ratios and standardized mean differences) for gender became more differentiated over time. Men and women became increasingly diverse in how they evaluated their appearances. In conclusion, the results suggested differences in gender: (1) women's but not men's body image had become more negative, or (2) both sexes' body images had worsened, with women's discontent increasing more precipitously.

Some research provokes interest in the proposition that young women's body images may actually be improving. By using over 15 years of archived MBSRQ data collected at Old Dominion University, a cross-sectional investigation was conducted by

Cash, Morrow, Hrabosky, and Perry (2004). The researchers observed changes in multiple facets of body image among 3,127 male and female college students from 1983 through 2001. The same standardized assessment was used in 22 studies conducted within Old Dominion University. The four MBSRQ subscales examined were: Appearance Evaluation, Body Areas Satisfaction, Overweight Preoccupation, and Appearance Orientation. From the 1980s to the early 1990s, young women's appearance evaluation, body satisfaction, and overweight preoccupation worsened significantly, but it progressively improved significantly in the late 1990s. Men's body images remained relatively stable over the time periods and were more positive than those of the women. They also had lower appearance investment than the women. The only significant change for men was their decline in overweight preoccupation following the 1980s.

Szymanski and Cash (1995), developed the Body Image Ideals Questionnaire (BIQ), influenced by Higgins's self-discrepancy theory (1987). His theory implies that inconsistent beliefs about the self produce psychological discomfort (such as shame and guilt). This self-discrepancy theory provides a structure for linking patterns of discrepancy to distinct negative emotional responses (Higgins, 1987). Szymanski and Cash's (1995) BIQ asks subjects to assess how discrepant they are from their individual physical ideals (on height, weight, bodily proportions, overall appearance, etc.), and to rate how significant each physical ideal is to them. Hence, subjects who report a greater investment in the attainment of their physical ideals had more negative dissatisfaction scores. By determining the personal importance individuals' express concerning physical ideals, high and low ratings of negative body images were evident.

In order to integrate inadequate adaptation for the self-evaluations on one's life, Cash and Fleming (2002), developed the Body Image Quality of Life Inventory (BIQLI). The BIQLI measures the levels of positive and negative consequences of one's body image on 19 components of psychological functioning and well being (such as self-concept, mood, social interactions, life satisfaction, etc.) Cash and Fleming sampled college women with the BIQLI. They discovered that the percentage of women who expressed negative body image on the BIQLI demonstrated less characteristic rates of body dissatisfaction. "The results further revealed that women in the sample reported more positive than negative consequences of their body image for various domains of life" (Cash & Fleming, 2002, p. 455).

Cognitive Investment in Appearance

An important facet of the body image construct is established and recognized as the cognitive investment in appearance (Cash, 2002; Cash & Pruzinsky, 2002). Human beings examine their own physical appearance thousands of times throughout life. When appearance does not conform to internalized body image, we notice the effect, as from the sight of our familiar appearance does much to reassure us about our identity (Rumsey & Harcourt, 2004). For as long as records have existed, some individuals have invested in their appearance more readily than others. The majority of the human race actively attempts to influence the way we look, whatever our personal beliefs may be. We either conform to the sociocultural perceived norms of appearance or fail to do so by expressing individuality (Newell, 2000).

Blood (2005, p. 24), stated that "the fundamental proposition is that an individual's information-processing procedures – thought – can accurately represent external reality." External physical appearance provides powerful cues for individual identity and recognition by others (Frith & Gleeson, 2004). A strong potential risk for body image distress is the degree to which individuals are cognitively invested in their physical appearance (Blood, 2005; Rodin, Silberstein, & Streigel Moore, 1985). "Appearance-related concerns are reaching epidemic proportions in western society, with people increasingly preoccupied, and in many cases dissatisfied with the way they look" (Rumsey & Harcourt, 2004, p. 83). Due to this dissatisfaction with one's physical appearance, people invest in multiple self-changing behaviors such as taking dietary regimes, exercising to change body shape, beauty products, and cosmetic surgery.

Cash (1993) investigated individuals engaging in a low calorie diet program and compared them to age- and weight- matched control subjects. The results indicated that the individuals seeking treatment were more strongly invested in their appearance and had more body image distress. Those that sought weight loss treatment were distressed by their body image. This suggested the importance they placed on appearance.

Cognitive measures attempt to capture certain dimensions of body image concerns with appearance-specific body areas. The original ASI "was a 14-item instrument developed by Cash and Labarge (1996) to assess body-image investment vis-à-vis certain beliefs or assumptions about the importance, meaning, and influence of appearance in one's life" (Cash: ASI-R Brief Manual, 2003, p.1). The ASI-R, according to Cash's ASI-R Brief Manual (2003, p.4) also states that, "the ASI-R is an improved, psychometrically sound replacement for the original ASI. The empirical results suggest an important

distinction between the two ASI-R subscales of Self-Evaluative Salience and Motivational Salience." The Self-Evaluative Salience subscale assesses an individual's beliefs about how their looks influence their personal or social worth and sense of self. The Motivational Salience assesses the importance placed on maintaining appearance through grooming behaviors. These two subscales both aid in discovering the differences in genders, as well as self-attentional focus, emotional/identity investment in appearance, and the internalization of social stereotypes regarding appearance. The ASI-R is comprised of 20-items, which provide statements about the beliefs people may or may not have about their physical appearance and its influence on life (Cash, 2003). The decision is based upon a 5-point Likert scale: 1 = strongly disagree, 2 = mostly disagree, 3 = neither agree nor disagree, 4 = mostly agree, and 5 = strongly agree. Six of the 20 items are reverse scored. The Self-Evaluative subscale is based on the mean score of 12-items, and the Motivational Salience subscale is based on the mean score of 8-items.

Proximal Events and Processes

Proximal events and processes, according to Cash and Pruzinsky (2002), are factors that involve current life events and consist of sustaining influences on body image experiences. These factors are appearance-schematic processing and activating events, internal dialogues, self-regulatory actions, and body image emotions (Cash, 1997; Cash & Pruzinsky, 2002; Cash, Santos, & Williams, 2005; Thompson et al., 1999).

Appearance-schematic processing and activating events based on cognitive-behavioral perspectives develop from related events that activate self-evaluations of one's looks (Cash, 1997). Appearance-schematic people tend to place more importance on and

pay more attention to information relevant to appearance. Activating events may entail, body exposure, mirror exposure, social scrutiny, social feedback or comparisons, wearing certain clothing, weighing, exercising, mood states, or changes in appearance.

Internal dialogue, or as Cash (1997) termed it, “private body talk,” involves emotion-laden automatic thoughts, inferences, interpretations, and conclusions about one’s looks. Internal dialogues among individuals with problematic body image attitudes and schemas (more so than those with normal body image attitudes and schemas) tend to be habitual, faulty, and dysphoric. Thought processes may reflect various errors or distortions, such as magnification of perceived defects, minimization of assets, emotional reasoning, and biased social comparisons (Cash, 1997; Thompson et al., 1999; Williamson, Muller, Reas, & Thaw, 1999).

To manage or cope with distressing body image emotions, Cash (1997) identified self-regulatory actions and reactions for individuals engaging in cognitive behaviors to adjust to environmental events. Adjustive or coping reactions include avoidant and body concealment behaviors, compensatory strategies, and appearance correcting rituals. These maneuvers serve to maintain body image reinforcement, as they enable the individual to temporarily escape, reduce, or regulate any negative body image discomfort. In addition to using these coping reactions, individuals also engage in adjustive, self-regulatory behaviors to control evaluative body image.

Despite a vast and growing literature on coping processes, little research has examined coping specifically in relation to body image. In an initial exploratory investigation, Cash (1997) developed a 39-item self-report measure, the Body Image Coping Strategies Inventory. He asked 369 college women and men how they

characteristically managed or coped with situations that challenged or threatened their body image experiences. Factor analysis identified three internally consistent subscales: Avoidance—makes an effort to avoid the threat to thoughts and feelings about body image; Appearance Fixing—makes an effort to change appearance by concealing, camouflaging, or 'fixing' a physical characteristic perceived as disturbing to the individual; and Positive Rational Acceptance—actions that focus on positive self-care or rational self-talk and acceptance. Cash (1997) found that dysfunctional body image schemas were significantly associated with the use of Avoidance and Appearance Fixing coping but not with the use of Positive Rational Acceptance coping. In addition, compared to Positive Rational Acceptance coping, Avoidance and Appearance Fixing coping patterns were more strongly associated with higher levels of body image discontentment across a range of situations for both sexes. A notable finding of dysfunctional body image schemas and faulty coping strategies was the vigorous interaction between reinforcing negative self-evaluations and body image distress.

Cash, Santos, and Williams (2005) examined the reliability and validity of the Body Image Coping Strategies Inventory (BICSI) based on the initial research of coping and body image behaviors to further the ongoing assessment. Their research investigated how individuals characteristically managed threats or challenges to their body image experiences. A sample of 603 male and female college students completed the BICSI and other body image inventories. The same three coping subscales used in Cash's (1997) initial exploratory research were used. Regression analyses indicated that multiple coping strategies predicted individuals' body image quality of life. The women in the study,

compared to the men, used all coping strategies more, especially the Appearance Fixing coping strategies.

Gender Differences in Body Image Awareness

Women are much more likely than men to experience body image concerns, regardless of age. Body image is so widely seen as a 'woman's issue' that many studies include only women on the assumption that these issues are not critical for men.

The social construction perspective is useful in understanding women's body experience and how different cultures, including Western culture, create meaning for them (Blood, 2005; Garrett, 1998; McKinley, 1998). Western culture constructs a duality between mind and body; women are associated with the body and men with the mind. Men's bodies are defined as the standard against which women's bodies are judged, and women's bodies are constructed as deviant in comparison. The female body the media portrays as attractive is slim and muscular, a body type more common in men than in women (Etcoff, 1999; McKinley, 1998). An unattractive cue to the mature female body would be fat on the hips and thighs. For women, all of the biological developmental milestones of puberty, pregnancy, and menopause have the potential to increase body fat. Women typically gain approximately 10 pounds per decade throughout the life span (Kalodner & Scarano, 1992). The perceived deviance of the female body may create a negative perspective for women's body experiences and images.

A study by Tiggemann and Lynch (2001) revealed that women's desires to be thinner do not diminish across age spans, nor does their preoccupation with being overweight, or their satisfaction with appearance. The ideal shape presented in the media

has become thinner over the past 30 years, yet women have actually become heavier in weight. As an apparent consequence of this weight change from the supposed ideal body size and shape, many women have experienced dissatisfaction with their body size and shape. This is so common that researchers call it “a normative discontent” (Rodin et al., 1985; Tiggemann & Lynch, 2001).

Western culture continues to place high value on physical beauty and perfection. It must be recognized that women often experience anxiety if they feel their bodies do not measure up to the current Western ideal of female beauty (Blood, 2005). Within body image research, a woman’s body is viewed as an object and the impression of body image is known as a quantifiable construct (Blood, 2005). In researchers’ quest for the truth about women’s bodies, they utilize the leading forms of knowledge in Western society, those that are informed by counting, weighing, and measuring (Garrett, 1998). This is evident in the researchers’ claims to be able to accurately measure a woman’s experience of her body by getting her to estimate the perceived width of her body parts, such as her hips, thighs, chest and face in order to determine her level of body image dissatisfaction (Garrett, 1998).

Self-objectification is defined as a theory indicating that physical appearance is based on a socialized idea that women treat themselves as objects to be evaluated. Therefore, self-objectification refers to the fact that women value their own bodies from a third-person perspective (observable body attributes) rather than from a first-person perspective (non-observable body attributes) (Fredrickson & Noll, 1998). The socio-cultural norm for a perfect body image in young women serves as a dictator for the third-person perspective. Fredrickson and Noll (1998) found that self-objectification positively

related to increased experiences of body shame or body dissatisfaction. Therefore, the exposure of young women to the college environment and social factors could promote a higher level of body satisfaction or dissatisfaction. Body dissatisfaction occurs as a young woman compares her perception of her actual body size with the internalized notion of the cultural ideals, interpersonal experiences, physical characteristics, and personality attributes.

Many men want to alter their body image, as do women, according to Pope, Phillips, and Olivardia (2000). Men are frequently obsessed with body shape and muscularity. Other researchers highlight the idea that lack of exercise versus compulsive exercise, and appearance obsessions are common problems of body shape concerns faced by men today (Anderson, Cohn, & Holbrook, 2000). Such body shape concerns provide a standpoint for their body image and body satisfaction/dissatisfaction awareness. These two studies found that the desire for men to meet the current appearance standards led many of them to spend excessive amounts of time attempting to change their appearance, and in some cases to take extensive risks in doing so (such as using steroids). A form of body image anguish may emerge in young men as a vague sense of concern regarding body weight or shape. This lost sense of concern is only apparent to the outside world and/or friends with whom young men feel they cannot express their self-esteem, weight, shape, or image issues. Instead of expressing them, they neglect them. Neglecting to express their feelings towards their bodies makes it difficult for researchers to make a sound judgment (Pope et. al., 2000).

For late adolescents or college-aged men, body image distortion may become a motivating factor concerning physical appearance, popularity, and attractiveness. The

same is true for females. Males may want to have a muscular body shape but see themselves as "not so muscular." Females may wish to be a "lighter weight" but see themselves as a "heavier weight" than they really are (Cash & Pruzinsky, 2002). However, male body dissatisfaction is more inconsistent, although men frequently show concern about lacking musculature (Harvey & Robinson, 2003; Yates, Edman, & Aruguete, 2004). This concept of muscularity confirms that when male bodies' are evaluated, it is in terms of functionality more than aesthetics alone (Pope et al., 2000).

Nancy Etcoff (1999) stated that male appearance is important from an early age onward for establishing dominance. An explanation for the modern generation's obsession with fitness and appearance is the idea of a "supermale" (Pope et al., 2000). Researchers blame this media-endorsed creation for infecting millions of young men. The image of "supermales" as lean, muscular, and handsome makes these male icons increasingly harder for the average male to attain. Similarly, Miss America pageant contestants are women who have physically symbolized the ideal of the 'supposed' cultural norm. These images present increasingly impossible standards of beauty for women and men. The search for perfectionism in the male population is no surprise as women for decades have struggled with these body image issues.

Body Image and Weight-related Issues

There are many published instruments that have been used to measure attitudinal body image (Thompson, Altabe, Johnson, & Stormer, 1994), and have thereby established themselves as standards within the body image literature for dealing with weight-related issues. The first of these instruments was the Eating Attitudes Test (EAT),

which was developed by Garner and Garfinkel (1979) to identify anorexia nervosa. The original EAT was scored on a 5-point Likert scale from 1 = always to 5 = never and measured 40 items. This original EAT has since been modified, and is now identified as EAT - 26. It is widely used with both clinical and non-clinical populations as a standardized measure of symptoms and concerns characteristic of eating disorders (Garner, Olmsted, Bohr, & Garfinkel, 1982; Koslowsky, Scheinberg, Bleich, Mark, Apter, Danon, & Solomon, 1992; Mintz & O'Halloran, 2000).

Another instrument that is a mainstay in body image research is the Bulimia Test (BULIT), developed by Smith and Thelen (1984). It was constructed to aid in the assessment and diagnosis of bulimia. It is a 32-item, multiple-choice measure. Like the EAT, the BULIT has undergone some changes from the original test structure and is now the Bulimia Test-Revised (BULIT-R) with 28 items (Brelsford, Hummel, & Barrios, 1992; Thelen, Farmer, Wonderlich, & Smith, 1991).

The Eating Disorders Inventory (EDI) (Garner, Olmsted, & Polivy, 1983) is yet another measure that evaluated a component of body image with weight-related issues. The EDI initially measured the "psychopathology associated with anorexia nervosa and bulimia nervosa" (Koslowsky et al., 1992, p. 28), and has since been used with other populations as well. Of the eight EDI subscales, its Body Dissatisfaction scale is most often isolated to quantify subject satisfaction with different parts of the body (Delaney, O'Keefe, & Skene, 1997).

The EAT, BULIT, and EDI are just three examples of the multitude of first generation body image measures that deal with weight-related issues, focused mainly on eating disordered populations. However, these measures are now more widely used with

normal populations, as well. Researchers have recognized that body image behaviors, feelings, and thoughts are conceptualized on a continuum.

The discontentment with one's body image has been labeled in multiple ways, including negative body image, body image disturbance, and body image dissatisfaction. All notions are often associated with body weight and weight-sensitive body parts. The notions are, in many cases, most prevalent in women and overweight people (Cash & Pruzinsky, 2002). Discontentment with body image is a central factor in weight loss decisions, including how much weight to lose and calculating whether losing weight will significantly benefit the individual and lead to positive changes in body image (Cash & Pruzinsky, 2002). In a cross-sectional study, researchers surveyed 1,200 Radcliffe undergraduates in 1982 and 1992 (Heatherton, Nichols, Mahamedi, & Keel, 1995). Their primary goal was to compare the two cohorts on weight, dieting, and eating-disordered symptoms, but they also included an assessment of students' perceptions of their weight. Results reflected a decline in a variety of eating-disordered symptoms over the decade, and women in 1992 were less likely to consider themselves overweight than those in 1982 (31% vs. 42%, respectively). The male cohorts showed very few differences between 1982 and 1992.

Another generation of body image measures has concentrated on isolating and identifying specific components of body image weight-related issues present in multiple populations. Behavioral aspects of body image are quantified in the Body Image Avoidance Questionnaire (Rosen, Srebnik, Saltzberg, & Wendt, 1991), and the Goldfarb Fear of Fat Scale (GFFS) (Goldfarb, Dykens, & Gerrard, 1985). The Body Image Avoidance Questionnaire assessed the frequency with which 145 female undergraduates

engaged in avoidance behaviors related to body image. The GFFS investigated the behavioral patterns of females who feared weight gain.

Techniques and Technology for Assessing Body Shape/Weight Placement

Waist-to-hip Ratio (WHR)

Waist-to-hip ratio, which is an indicator of the pattern/shape of fat deposition on the body, is a body factor used in attractiveness research. In behavioral studies on the association between body fat distributions in women, female figures with low, typically feminine waist-to-hip ratios, around .70 (waist circumference that is 70% of the hip circumference), have been rated more attractive than those with typically masculine waist-to-hip ratios, around 1.0 (waist circumference that is almost 100% of the hip circumference). Ratings across male, female, cultural, and ethnic groups, have been similar (Furnham & Baguma, 1994; Furnham, Dias, & McClelland, 1998; Furnham, Tan, & McManus, 1997; Henss, 1995; Singh, 1993a, 1993b; Singh 1994a, 1994b; Singh & Luis, 1995; Singh & Young, 1995; Tassinary & Hansen, 1998).

Body Mass Index (BMI)

A common measure of a person's weight scaled according to their height is the Body Mass Index (BMI). The Belgian statistician, Adolphe Quetelet, developed BMI between 1830 and 1850. BMI is an estimation of body size for adults. It was initially developed for use as a simple means of classifying sedentary individuals with an average body composition, yet many physicians and medical experts rely on its apparent value for medical diagnosis. The American Obesity Association (2000) suggested that the use of

BMI should be a tool to assess an individual's health risk or weight status. Using BMI, the male and female body can be categorized as underweight (below 18.5), normal (18.5 – 24.9), overweight (25 – 29.9), and obese (30 and above), (CDC, 2007a). BMI is calculated using weight in kilograms divided by height in meters squared. Regular calculation of BMI can show how much an individual's body weight departs from what is normal or desirable for an individual of his/her height. The weight excess or deficiency may be accounted for by body fat although other factors such as muscularity also affect BMI significantly.

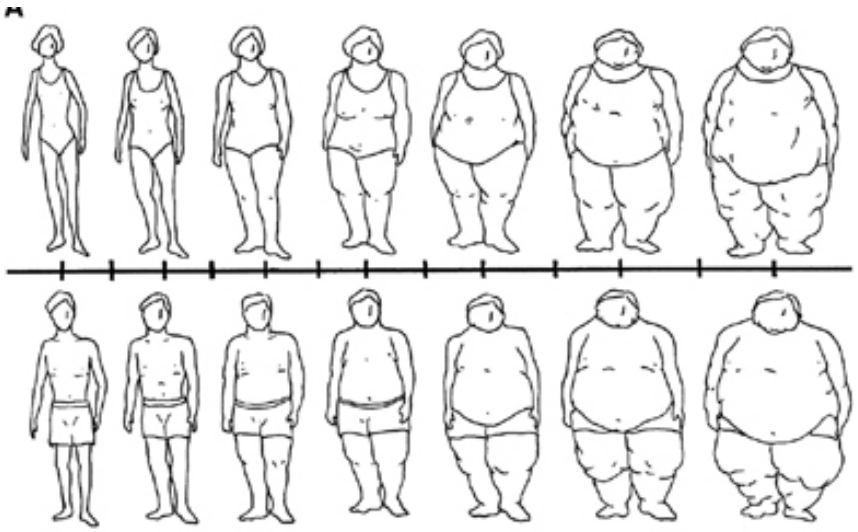
Assessment and Perceptions of Body Sizes and Shapes

In a seminal study of body perception, Traub and Orbach (1964) investigated visual perception of the physical appearance of the body. They designed an adjustable full-length mirror, which could " reflect the body of the observer on a distortion continuum ranging from extremely distorted to completely undistorted" (Traub & Orbach, 1964, p. 65). The task for the subject was to adjust his/her reflection until it appeared "undistorted" or looked just like them. The researchers were concerned with the distorting effects of the mind on perception of the body. It was assumed that the mind was able to perceive the objective body accurately or inaccurately. Failure to accurately perceive one's body (as it really is) is implicit to be the result of a perceptual or cognitive disturbance within the individual. This study introduced a framework for understanding the notion of body image as the body is viewed as an object of perception objectively separate from the mind of the person doing the perceiving.

Procedures that required subjects to estimate the actual body size or shape of their

or others' bodies have predisposed the perceptions of body image. Line drawings developed by Stunkard, Sorenson, and Schlusinger (1980) have been widely used to assess body sizes, body image, and attractiveness in men and women. Subjects are asked to identify, from nine line drawings of male or female bodies arranged from very thin to very heavy, their current and ideal body size based on these drawings (see Figure 1).

Figure 1. Male and Female Silhouette Figure Rating Scale (Stunkard et al., 1980)

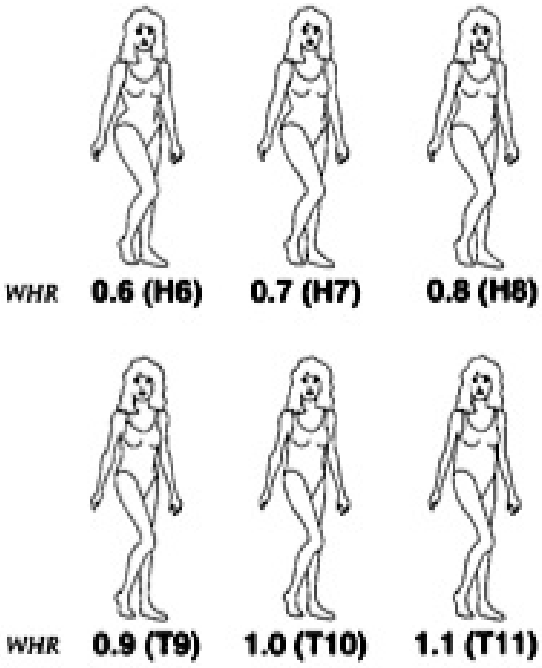


Other researchers, including Rozin and Fallon (1988), Silberstein, Striegel-Moore, Timko, and Rodin (1988), and Rand and Resnick (2000) have used these male and female line drawings for the same purpose. Yet, limitations with these line drawings have been noted by various researchers, including their lack of realism (Gardner, Friedman, & Jackson, 1998; Tovee & Cornelissen, 2001) According to Gardner et al. (1998), subjects do not have an opportunity to view the bodies from the side, or assess the actual proportional relationships of body parts.

Other line drawings have been used for research on ideal female body shape. Singh's (1994b) perceptual figure line drawings were developed using attitudinal measures to investigate female body image. See Figure 2 for Singh's (1994b, p.285) stimulus figures representing body size and waist-to-hip ratio (WHR). However, some researchers believe that the replication of Singh's research has been incongruent in its results because it does not include the exploration of sociocultural factors, which could be congruent with attitudinal components (Henss, 1995; Furnham et al., 1997; Tassinary & Hansen, 1998). Moreover, it is merely a means of linking perceptual factors of weight and the Waist-to-hip Ratio (WHR) to Singh's figure line drawings, with attitudinal measures of female body image. In Singh's study (1994b), 211 subjects (147 women, 64 men) participated. Female subjects were asked to observe target figures and respond to items such as ideal body shape and how similar their body shape is compared to an ideal figure selected. Male subjects were asked to rank the target female figures for perceived attractiveness and other attributes (see Figure 2).

Figure 2. Singh's Line Drawing (1994b)

The letter in parentheses shows whether the figure is heavy (H) or thin (T) whereas the number shows the size of the WHR.



Scores on this measure that were above the median placed female subjects in a high restraint (HR) eating category, while scores below the median placed female subjects in a low restraint (LR) eating category. HR and LR female subjects showed no significant difference in their choice of the ideal female figure, with each group overwhelmingly choosing the two normal weight figures with the (low) .60 and .70 WHRs. This study interestingly clarifies that when overall weight and WHR are pitted against each other in female figures, women and men look at WHR over weight. They both prefer a female figure with a low WHR in assessing the attractiveness of the female figure. These findings have been replicated with genders, multiple age cohorts, and various ethic groups.

Several studies have sought to replicate and extend Singh's research on the relationship between overall weight and WHR, with mixed results pertaining to sociocultural factors with differences of perceived attractiveness. In one study conducted by Henss (1995), a sample of male and female German subjects rated both male and female figure line drawings, rather than rank (like Singh's study). A total of 24 drawings were used (12 for each gender), representing 3 weight categories (underweight, normal weight, and overweight) and 4 WHRs (.70, .80, .90 and 1.0). Later, in a more recent study, Henss (2000) again focused on how attractiveness related to WHR. In this study, a sample of 180 female and 180 male subjects were used. Subjects only rated female stimuli. Instead of using the figure line drawings, color photographs of six attractive females were used and each photograph was digitally manipulated. In this approach, one set of the photographs represented lower WHR, while the other represents higher WHR. Using 6-point Likert-type scales, the subjects rated the female stimuli. Henss's (2000) study concluded that WHR was not the only important trait of female attractiveness, that features independent from WHR, like face and weight were also concerns.

Tassinary and Hansen (1998) have provided another extension of Singh's research with weight and shape. They developed a different set of figure line drawings from Singh's in response to two criticisms: "confounded weight with hip size, as well as WHR with relative waist size" and they assert that "no studies have systematically examined WHRs of less than .70" (Tassinary & Hansen, p. 150). It is true that Singh has not explored the combination of underweight figures with .60 or low WHRs, yet it is somewhat misleading, as two of Singh's studies have looked at .60 WHRs, either through figure line drawings that are pitted against each other (Singh, 1994b) or through

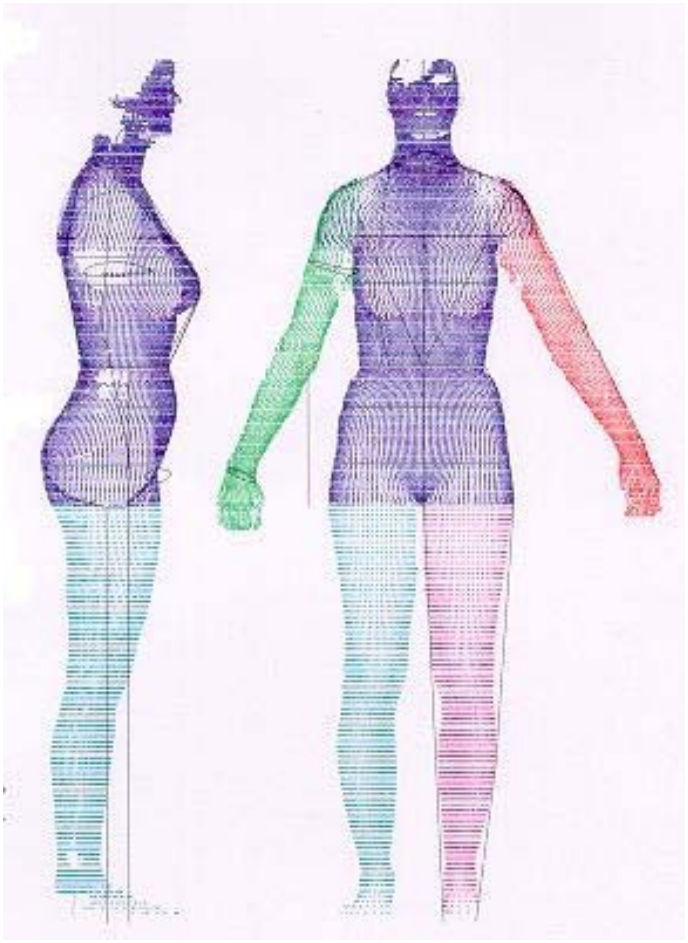
photographs (Singh, 1994c). Tassinary and Hansen's (1998) drawings do represent both .50 and .60 WHRs in 3 weight categories, but the manipulations of both the hips and the thighs of these subnormal WHRs do not appear to look proportionate.

The Young Women's Experiences with Body Weight and Shape instrument (Delaney et al., 1997) is another measure dealing with body weight and shape change that takes a multidimensional approach. It was constructed out of qualitative research and emphasizes sociocultural factors. The researchers used a sample size of 16 women between the ages of 15 and 29 (high school and university women), 101 items and 7 subscales; from this they formed semi-structured interviews. Following the initial exploratory research, they administered this version to 287 female college students. A resulting measure was created that now has 49 items and 5 subscales. These 5 dimensional subscales consist of: (1) Weight dissatisfaction, (2) Slimness as quality of life, (3) Interpersonal messages regarding slimness, (4) Societal value of thinness, and (5) Valuing exercise.

Body Scanning

"The three-dimensional body scanner is a tool that captures information about the surface of the body using multiple laser or white lights and CCD (Charge-Coupled Device) cameras. Electronic circuitry and a microprocessor unload the data which are processed, saved as a file, and visualized as a three-dimensional image on a computer monitor" (Explore Cornell, 2003, ¶ 4). This image is a three-dimensionally accurate copy of the subject and can be manipulated and viewed on a computer screen (see Figure 3).

Figure 3. Measurement Extraction from 3D Body Scan.



With today's technology, researchers can now use scan data to understand possible changes in weight in relation to body image and investment in appearance. The addition of body scanning technology brings a new way to see where weight change may occur in the gender specific areas, and how this might relate to the longitudinal body image constructs. This adds a visual component to weight change and body fat data that are calculated by standard weight measurements and Body Mass Index (BMI), a calculation in which weight is divided by height (CDC, Body Mass Index Home, 2007a).

Three-dimensional body scanning is becoming a standard practice for research that involves body shape change, as well as body measurement change (Bougourd, Dekker, Ross, & Ward, 2000; McKinnon & Istook, 2002; Simmons & Istook, 2003; $[TC]^2$, 2008a; Wells, Treleaven, & Cole, 2007). "With the use of 3D body scanners, body measurement techniques can be non-contact, instant, and accurate" (Simmons & Istook, 2003, p. 306). Three-dimensional body scanning provides many more aspects in capturing measurements by using an electronically derived image-based method as compared with the traditional manual approach that are particularly problematic or unreliable (Bougourd et al., 2000). Measurements of body scans are extracted in seconds and are consistent when measuring a large number of locations or landmarks on the human body. Additionally, it is a more desirable method of measuring the human body, with the privacy of individuals in that no physical contact has to be made, unlike traditional measures (Simmons & Istook, 2003). Yet, traditional anthropometric measuring of the body has given way to this new, advanced technology of abstracting dimensions of the human body (Jones & Rioux, 1997).

Quelet first used classical anthropometry in 1870. He had the aspiration to obtain measurements of the average man. He began by taking chest measurements of troops for better-fitting uniforms (CUErgo, 2005). Several different usages for anthropometry included automobile design, work site ergonomics, equipment design, airplane cockpit design, and clothing fit (CAD Modelling, 1992; Czaja, 1984; Herzberg, 1955; Roe, 1993; Roebuck et al., 1975; Sanders & Shaw, 1985), as cited in Simmons and Istook (2003). Furthermore, classical anthropometric data has been used for years in national sizing surveys as an indicator of health status and concerns over the increasing level of obesity

(Marks, Habicht, & Mueller, 1989; $[TC]^2$, Size USA, 2008b; Size UK, 2008; Simmons & Istook, 2003; Wells et al., 2007).

In recent years, a successful sizing survey in the United Kingdom has advanced from the classical anthropometric measuring system to using the 3D body scanners by automatically extracting 130 body measurements from each 11,000 subjects (Size UK, 2008). This highly accurate and comprehensive size and shape data has greatly influenced Size USA and other sizing surveys that can serve as a valuable tool for many industries. Following Size UK, Textile/Clothing Technology Corporation ($[TC]^2$), a not-for-profit U.S. sewn products industry organization, lead the effort to conduct the U.S. national sizing survey ($[TC]^2$, Size USA, 2008b). Since Size UK and Size USA made advancements to incorporate body scan data, other national sizing surveys are ongoing to take such steps as well, such as Size Mexico and Size Thailand (Size UK, 2008).

A government-sponsored group conducted the first published U.S. body scanning study of a national sizing survey in the late 1990s. "This study was conceived by the U.S. Air Force and was an international survey of body sizes and shapes of people between the ages 18-65" ($[TC]^2$, Size USA, 2008b, p.7). This study was called the Civilian American and European Surface Anthropometry Resource (CAESAR). The CAESAR study results were used by the American defense and commercial industries, which preceded $[TC]^2$'s Size USA study, which this study in turn modeled the national size study conducted by the UK in 2001 ($[TC]^2$, Size USA, 2008b).

Due to lack of research in the U.S. clothing industry, $[TC]^2$ originally provided the Size USA survey data to improve or further assess research in the area of garment fitting ($[TC]^2$, Size USA, 2008b). The Size USA survey data released more body

measurement data than has previously been available and provides a comprehensive analysis of body shapes and sizes that has not been conducted for decades within the U.S. ([TC]^2, Size USA, 2008b). Their body measurement system using the three-dimensional body scanner consists of four sensors of white light that project onto the subject to register more than 200,000 data points on the body. The points then become a point cloud of the subject's body and reduced to 40,000 providing a three-dimensional image. For this study, 10,000 subjects were scanned. Gender, age groups, and ethnicities grouped all subjects. Some important findings from the Size USA survey data show that the subjects get larger as they increase in age, the Black women are larger than the White and Hispanic women of similar ages, the waist measurements increase the most with age, the women's hips are larger than their bust, so they are more pear shaped, and the men's chests are larger than their hips ([TC]^2, 2004). With the abstracted data, [TC]^2 has attracted interest and considerable value to sectors within the clothing industry, as several manufacturers were intrigued to notice that the bust, waist, and hip measurements of women of a particular size range seemed to be much larger than their specification measurements for their company's fit standards ([TC]^2, 2004). Over 50 clothing companies have since implemented the Size USA data into their size specification profiles, including Victoria's Secret, Jockey, Chico's, and JCPenney. Following Size USA and Size UK, other national sizing surveys, such as Size Thailand and Size Mexico, are now underway using the three-dimensional body scanning technology and data ([TC]^2, Size USA, 2008b).

Other areas of research have incorporated 3D body scanning technology, which has involved subjects' body sizes and shapes. A two-part study conducted by researchers,

Simmons, Istook, and Devarajan (2004a & 2004b), provided insight to sorting and identifying female figure types using body scan data. Essentially, the body scan data can help improve sizing standards for clothing manufacturers in order to meet the needs of all consumers' diverse body shapes and proportions. Because of the rise of obesity rates and increased weight gain, the American population has changed greatly over the past few decades when it comes to body shapes and sizes. As body shapes evolve, so do the clothing manufacturers' sizing systems, in which many fit problems arise (Cotton Inc., 2006, 2002, 1998). Basic human proportional truths will provide significant improvements to the values of fit, as body scan data will help open opportunity to greater satisfaction with consumers (Simmons et al., 2004b). The purpose of Simmons and colleagues (2004b) research was to develop software that would use body scan data to define the body shape of women. The Female Figure Identification Technique (FFIT) for Apparel software was created to facilitate the development of new and effective sizing systems and strategies (Simmons et al., 2004a, 2004b). Body shape categories were established including 5 original categories: "hourglass," "oval," "triangle," "inverted triangle," and "rectangle;" and 4 additional categories: "spoon," "diamond," "bottom hourglass," and "top hourglass." Such additional categories were added after the 222 subjects' measurements were tested using the FFIT software in the initial testing. The categories were used to incorporate accurate body measurements that would reflect the most visually accepted body shape category for each female subject (Simmons et al., 2004b). The body scan measurements used to correspond to the body shape categories were that of the "bust," "waist," "hip," "stomach," and "abdomen." The individual shape category information concluded that over 40% of the 222 subjects were sorted to the

"bottom hourglass" category, 21.6% of subjects sorted to the "hourglass" category, 17.1% to the "spoon" category, 15.8% to the "rectangle" category, 3.6% to the "oval" category, and 1.8% to the "triangle" category. None of the subjects were sorted to the "inverted triangle," "diamond," or "top hourglass" categories (Simmons et al. 2004b). With the addition of body scan data, body shape and sizing techniques can provide more accurate and reliable standards for the clothing industry, as well as consumers.

In a research study by Ashdown, Loker, Schoenfelder, and Lyman-Clarke (2004), body scan data was used for fit analyses for 155 Misses size participants in the best fitting size of a test pant style. Expert judges rated 13 fit locations, deeming categories for the fit locations as Acceptable, Marginal, or Unacceptable for each area and then comparing the ratings using frequencies, means, and percentages to identify problem fit areas (Ashdown et al., 2004). With the addition of the body scan data, supplementary benefits to the clothing industry include: (1) the advantages of recording fit of garments that can be rotated and enlarged to view specific areas of analysis; (2) databases with a variety of body shapes and sizes of created scans; (3) scanning garments on fit models to evaluate garment/body relationships (Ashdown et al., 2004). Ashdown's and colleagues' research (2004) makes it apparent that the human body undergoes changes over time, such as weight gain/loss, changes in body posture/positions, etc., all of which researchers and manufacturers of the clothing industry must be aware in that the variation of shapes and sizes across a population must be accommodated for and understood with advancements in technology. They emphasize the gains of the body scan data, that of which for their research it captured a precise 3D representation of a garment's (pants) relationship to the body. By scanning study participants wearing a pant style and viewing the 3D scans, the

researchers were able to visually analyze fit to identify the problem areas in pattern design (Ashdown et al., 2004).

CHAPTER III. METHODOLOGY

The methodology described in this section includes sample recruitment, data collection, questionnaire development, and implementation of research questions that were developed to conduct this area of research. This study was conducted as a part of a larger study, which also included weight changes of the body in relation to nutritional aspects.

Sample Recruitment

Subjects sought out for this study were first year, male and female freshman undergraduates. Subjects were recruited at the beginning of fall semester 2006 by written announcements (Appendix A), in Auburn University's College of Human Sciences large introductory courses, and in Auburn Freshman Experience courses. Students were informed about the purpose of the study, and they signed a written consent form at the beginning of the study (Appendix B). Subjects received $25 each time they completed the study's requirements. The Institutional Review Board approved this study for the Use of Human Subjects in Research at Auburn University.

Data Collection

Data collection occurred at the beginning of fall semester 2006, at the end of fall semester 2006, and at the end of spring semester 2007. Each data collection session followed the same set of procedures:

(1) Subjects were measured for height and weight using standard techniques. Weight was measured to the nearest 0.1 lb using a digital scale (Health-O-Meter, Sunbeam Products, Model # HDL543DQ-95, Boca Raton, FL) on a level floor. To verify the digital scale for accuracy, external weights were used. For each weighing, subjects wore their street clothes and were asked to remove all outerwear and shoes. They were also asked to empty their pockets of any heavy items such as keys or cell phones. Height was measured to the nearest one-quarter inch using a fixed measuring tape placed on the wall and a headboard using standard techniques. In order to measure the height of the subjects, each subject stood flat foot without their shoes, with his or her heels, buttocks, upper back, and head (looking straight forward) against a wall with a fixed measuring tape.

(2) Body composition was taken using bioelectrical impedance (BodyStat 1500, BioVant Systems, Detroit, MI). Bioelectrical impedance analysis (BIA) measures the impedance of an electrical current (50kHz) through the human body tissues. This instrument generates an electrical current, which is then passed through the body by means of four electrodes placed at specific locations on the right hand and wrist,

and right foot and ankle. Each subject was asked to rest in a supine position on a covered floor space for five minutes in order to reach a desired state of rest, along with removing their sock and shoe on the right foot and ankle. Their limbs were positioned at a 30-45 degree angle from the trunk of the body. By measuring the resistance to impedance between the electrodes, an estimate of body water was made. This information in concurrence with the subject's sex, age, height, and weight are entered into the instrument to enable the calculation of body fat and fat free mass. Since hydration status affects the accuracy of BIA, subjects were instructed not to consume liquids, especially those containing caffeine or alcohol, or eat for 2-4 hours prior to testing. They were also instructed not to engage in strenuous exercise 12 hours prior to testing. Due to these restrictions, subjects were purposely measured in the morning hours during all three testing periods in order to ensure accuracy.

(3) Body shape and size analyses were made using 3-D body scans ($[TC]^2$ 3-D body scanner, NX-12). Each subject was asked to choose an appropriate size from the scan-wear provided, and privately change from their street wear clothing. For females, the body scan measurements identified and measured were biceps, bust, natural waist, hips, and thighs. For the males, the body scan measurements identified and measured were neck, biceps, chest, natural waist, hips,

and thighs. These measurements were determined based on the differences of body shape in men versus women.

(4) Subjects were asked to complete questionnaires during each of the three testing periods. These questionnaires consisted of measures of lifestyle, diet, body image investment and evaluation (body satisfaction/dissatisfaction), and cognitive investment in appearance. Demographic information was collected at the beginning of fall semester 2006 and included information such as: email address, telephone number, date of birth, race, parents' highest education level attained, parents' occupations, household income, weight status of parents, state of permanent residence, academic year in school, total credit hours, health-related college courses taken, place of residence during the academic year (residence hall, apartment, at home), number of roommates, available food storage and cooking facilities, place of dining facilities on and off campus, and other related information (Appendix C). The same versions of questionnaires were distributed during the three collection periods throughout the academic year. However, only one demographic data sheet was distributed at the beginning of fall semester 2006.

Questionnaire Development

Lifestyle and dietary questionnaires were developed based on the Behavior Risk Factor Surveillance System (BRFSS) reports from the CDC. The BRFSS has been used to track health conditions and risk behaviors in the United States since 1984 (CDC, 2006).

Two instruments were used in this study to assess body image investment and evaluation, and the cognitive investment in appearance: The Body Areas Satisfaction Scale (BASS) and the Appearance Schemas Inventory-Revised (ASI-R). These two instruments were selected for this study because they are well established, and address multiple aspects of the body image construct from an individual perspective.

The construct of body image measured the degree to which each subject could view his/her physical attributes as consistent or inconsistent with his/her personal ideals. There are strong beliefs and/or myths of the "Freshman 15" weight gain and body image distortion that by awareness or not, might have influenced the perception of physical appearance in their lives. Also, a goal was to evaluate behavioral patterns (female versus male) that might reveal a subject's attempt to control and/or not control his/her physical appearance, thoughts, feelings, and actions about how they conveyed their looks, as well as their overall feelings of body image.

The BASS is a subscale of the Multidimensional Body-Self Relations Questionnaire (MBSRQ) that "approaches body-image evaluation as dissatisfaction-satisfaction with body areas and attributes" (Cash, 2000, p.1). Of the MBSRQ subscales, BASS is similar to the Appearance Evaluation subscale, "except that the BASS taps satisfaction with discrete aspects of one's appearance" (Cash, 2000, p.3). The BASS is

comprised of 9-items, which indicate how satisfied or dissatisfied the subject is with each of eight areas of his/her body, with the final item asking for the subject's assessment of his/her overall appearance. This comprehensive appearance item is included in the mean score for this subscale. The BASS uses a 5-point Likert-type scale: 1 = very dissatisfied, 2 = mostly dissatisfied, 3 = neither satisfied nor dissatisfied, 4 = mostly satisfied, and 5 = very satisfied. Total scores may range from 9 to 45.

Reliability of the BASS was established through Cronbach's alpha and a 1-month test-retest derived from several combined college student samples with Ns = 804 women and 335 men (Cash, 2000). Internal consistencies of the BASS ranged from .73 to .74 for women and .77 to .86 for men.

The original ASI "was a 14-item instrument developed by Cash and Labarge (1996) to assess body-image investment vis-à-vis certain beliefs or assumptions about the importance, meaning, and influence of appearance in one's life" (Cash, 2003, p.1). According to Cash's ASI-R Brief Manual (2003, p.4), "the ASI-R is an improved, psychometrically sound replacement for the original ASI. The empirical results suggest an important distinction between the two ASI-R subscales of Self-Evaluative Salience and Motivational Salience." The Self-Evaluative Salience subscale assesses individuals' beliefs about how their looks influence their personal or social worth and sense of self. The Motivational Salience assesses the importance placed on maintaining appearance through grooming behaviors. These two subscales both aid in discovering the differences in genders. The ASI-R is comprised of 20-items, which provide statements about the beliefs people may or may not have about their physical appearance and its influence on life (Cash, 2003). The decision is based upon a 5-point Likert scale: 1 = strongly

disagree, 2 = mostly disagree, 3 = neither agree nor disagree, 4 = mostly agree, and 5 = strongly agree. Six of the 20 items are reverse scored. The Self-Evaluative subscale is based on the mean score of 12-items, and the Motivational Salience subscale is based on the mean score of 8-items.

Reliability of the ASI-R was established through Cronbach's alpha and was quite satisfactory (Cash, 2003). Internal consistencies of the ASI-R and its subscales ranged from .84 to .91 for men and .82 to .90 for women. A sample of 468 college women and 135 college men was used.

Implementation of Research Questions

Research Question 1: Is there a change in weight over the longitudinal observations?

To answer this research question, male and female weight changes were calculated in pounds over the three observation periods. A table in Microsoft Excel were created presenting the +/- weight variations between each period for each subject, with the male and female subjects divided by sex; within each sex, weight loss, no change in weight, and weight gain were included (see Example 1). Columns present the actual weight measured for each observation period and the difference between observation periods 1 (fall semester – beginning of fall semester to the end of fall semester), 2 (spring semester – end of fall semester to the end of spring semester), and 3 (academic year – beginning of fall semester to the end of spring semester).

Example 1.

Weight changes of female and male subjects from the beginning of fall, end of fall, end of spring, and total from beginning of fall to end of spring semester (observation periods: 1, 2, and 3)

	Beginning of Fall (1)	+/-	End of Fall (2)	+/-	End of Spring (3)	Total +/-
Female						
1	120	+2	122	+1	123	+3
2	155	+1	156	0	156	+1
3	136	+4	140	-2	138	+2
Male						
1	144	-1	143	+7	150	+6
2	163	+6	169	-6	163	0
3	196	+2	198	+2	200	+4

Note. Data are presented as weight in pounds (lbs)

Weight change was categorized as weight gain, weight loss, and no change in weight over the longitudinal observation periods. T-tests for dependent samples (within-group variation) were conducted to look for significant differences within each observation period. For example, in observation period 1, means at the beginning of fall semester were compared to means at the end of fall semester for each weight change group and sex. Comparisons were also made between each of the observation periods.

Research Question 2: If there is weight change, do body measurements change at the bicep, neck, bust/chest, natural waist, hips, or thighs?

To answer this research question, a table in Microsoft Excel was created presenting the body measurements (for males – bicep, neck, chest, natural waist, hips, and thighs and for females – bicep, neck, bust, natural waist, hips, and thighs) calculated in inches for each of the three observation periods and providing the +/- numeric variations between each period for each subject, with male and female subjects divided by sex (see Example 2). Columns presented the actual body measurements for each observation period and the difference between observation periods 1 (fall semester – beginning of fall semester to the end of fall semester), 2 (spring semester – end of fall semester to the end of spring semester), and 3 (academic year – beginning of fall semester to the end of spring semester). The table was divided by sex and by grouping each body measurement for each subject together (to better assess differences or similarities related to each body measurement).

Example 2.

Bicep measurements of female and male subjects from the beginning of fall, end of fall, end of spring, and total from beginning of fall to end of spring semester (observation periods: 1, 2, and 3)

	BF[a] (1)	+/-	EF[b] (2)	+/-	ES[c] (3)	Total +/-
Female (n=25)						
1	10.72	+0.32	11.04	-0.21	10.83	+0.11
2	9.1	+0.58	9.68	+0.14	9.82	+0.72
3	10.12	+0.16	10.28	-0.17	10.11	-0.01
Male (n=10)						
1	11.18	+0.16	11.34	+0.22	11.56	+0.4
2	11.37	+0.47	11.84	+0.44	12.28	+0.91
3	13.07	-0.13	12.94	-0.22	12.72	-0.35

Note. Data are presented as bicep measurements in inches (in.)

[a]Beginning of fall semester is represented as (BF)

[b]End of fall semester is represented as (EF)

[c]End of spring semester is represented as (ES)

Qualitative analysis approach was used on the data collected to investigate a difference or commonality between male and female subjects. Examples of possible patterns were an increase in thigh measurements in female subjects who experienced continuous weight gain or a decrease in the natural waist measurement for male subjects

that experienced weight loss. Body measurement changes were further examined based on weight gain, weight loss, and no change in weight over the longitudinal observation periods. Comparisons were made between each of the observation periods.

Research Question 3: Does the perception of body satisfaction related to weight gain or weight loss, change over the three observations?

To answer this research question, body image was measured using the BASS subscale of the Multidimensional Body-Self Relations Questionnaire (MBSRQ). The BASS is unique in that it approaches the evaluation of body image as "dissatisfaction-satisfaction with body areas and attributes" (Cash, 2000, p.1). Therefore, body image was observed through the perception of body satisfaction/dissatisfaction for each male and female subject using a 5-point Likert-type scale. A table in Microsoft Excel (see Example 3) was created to present the score for each subject based on nine questions of the BASS scale (see body satisfaction section in Appendix C). Adding nine ratings and dividing by nine, the total BASS mean scores were calculated. Each column provided the total mean score for the BASS questionnaire for each subject for the three observation periods. "High composite scorers are generally content with most areas of their body. Low scorers are unhappy with the size or appearance of several areas" (Cash, 2000, p.3).

Example 3.

BASS questionnaire data of female and male subjects from the beginning of fall, end of fall, and end of spring semester (observations: 1, 2, and 3)

Subject (n=36)	1	2	3	4	5	6	7	8	9	Total Composite Score	Mean
Subject-1 (BF)[a]	4	5	4	1	4	2	3	5	4	32	3.56
Subject-1 (EF)[b]	5	5	5	2	4	3	4	5	4	37	4.11
Subject-1 (ES)[c]	4	5	2	4	5	4	5	5	5	39	4.33

Note. Data are presented using a 5-point Likert-type scale (1 to 5)

[a]Beginning of fall semester is represented as (BF)

[b]End of fall semester is represented as (EF)

[c]End of spring semester is represented as (ES)

Qualitative analysis of the data collected was used to investigate a difference or commonality between male and female subjects based on their body satisfaction. Body satisfaction was further examined based on weight gain, weight loss, and no change in weight over the longitudinal observation periods. Weight change was categorized as weight gain, weight loss, and no change in weight over the longitudinal observation periods. T-tests for dependent samples (within-group variation) were conducted to look for significant differences in body satisfaction within each observation period. For example, in observation period 1, means at the beginning of fall semester were compared to means at the end of fall semester for each weight change group and sex. Comparisons were also made between each of the observation periods.

Research Question 4: Is there a change in cognitive appearance investment, and if so, is it related to weight gain or weight loss over the three observations?

To answer this research question, cognitive appearance investment was observed by using the ASI-R scale. Two subscales divide the ASI-R scale: Self-Evaluative Salience and Motivational Salience (see body image section in Appendix C). The Self-Evaluative Salience subscale is based on the mean score of 12-items (2, 5, 7, 8, 9, 11, 13, 14, 15, 16, 19, and 20), and the Motivational Salience subscale is based on the mean score of 8-items (1, 3, 4, 6, 10, 12, 17, and 18). Six of the total 20 items are reverse scored: 1, 4, 5, 9, 11, and 12 (i.e., 1 = 5, 2 = 4, 4 = 2, 5 = 1). The composite ASI-R score is based on the mean of the 20 items. A table in Microsoft Excel was created presenting the overall means and standard deviations of the ASI-R and its two subscales as a function of male and female subjects (see Example 4). The greater the means, the higher levels of self-evaluative and motivational investment the subjects have.

Example 4.

ASI-R questionnaire data of female and male subjects from the beginning of fall, end of fall, and end of spring semester (observations: 1, 2, and 3)

Subject (n=36)	1	2	3	4	5	6	7	…	Self-Evaluative Mean	Motivational Mean	Overall Mean
Subject-1 (BF)[a]	4	2	5	5	1	4	2	--	1.83	3.75	2.6
Subject-1 (EF)[b]	3	1	5	5	2	4	3	--	2.42	4	3.05
Subject-1 (ES)[c]	3	2	4	5	3	4	3	--	2.42	4	3.05

Note. Data are presented using a 5-point Likert-type scale (1 to 5)

Not all data is shown for example subject-1

ASI-R questionnaire data consists of 20 items, hence (--)

[a]Beginning of fall semester is represented as (BF)

[b]End of fall semester is represented as (EF)

[c]End of spring semester is represented as (ES)

Qualitative analysis of the data collected was used to investigate a difference or commonality between male and female subjects based on cognitive investment in appearance. Cognitive investment in appearance was further examined based on weight gain, weight loss, and no change in weight over the longitudinal observation periods. Weight change was categorized as weight gain, weight loss, and no change in weight over the longitudinal observation periods. T-tests for dependent samples (within-group variation) were conducted to look for significant differences in cognitive investment in appearance within each observation period. For example, in observation period 1, means

at the beginning of fall semester were compared to means at the end of fall semester for each weight change group and sex. Comparisons were also made between each of the observation periods.

The Self-Evaluative Salience subscale assesses an individual's beliefs about how his/her looks influence his/her personal or social worth and sense of self (Cash, 2003). The Motivational Salience assesses the importance placed on maintaining appearance through grooming behaviors. These two subscales both aid in discovering the differences and/or similarities in young men and women.

CHAPTER IV. PRESENTATION AND DATA ANALYSIS

The purpose of this study was to longitudinally assess the "Freshman 15" construct by investigating young men's and women's size and shape changes based on their three-dimensional body scan measurements and their body image constructs (body satisfaction/dissatisfaction and cognitive investments in appearance). Male and female subjects were analyzed together and separately. Data collection occurred at three points in time: (1) the beginning of fall semester 2006; (2) the end of fall semester 2006; and (3) the end of spring semester 2007.

Subjects

A total of 36 subjects (26 females, 10 males) volunteered for the study at the beginning of fall semester. At the end of fall semester, all 36 subjects returned for the follow-up assessments. However, data from one female subject was not included in the data analysis due to an eating disorder diagnosis. At the end of spring semester, 30 subjects (22 females, 8 males) returned for the follow-up assessments. As previously, data from the one female subject with the suspected eating disorder was not included in the data analysis for spring semester. Thus, 29 subjects (21 females, 8 males) were used in the spring semester data collection.

Demographic Profiles of Subjects

Demographic variables were coded individually for each data collection period. Demographic variables included the following: sex (see Table 1), age, race (see Table 2), family income (see Table 3), permanent residence (see Table 4), school residence (see Table 5), smoking habit (see Table 6), and alcohol consumption (see Table 6).

Table 1.

Sex

	Beginning of Fall n = 36	End of Fall n = 35	End of Spring n = 29
Gender			
Female	26(72%)	25(71%)	21(72%)
Male	10(28%)	10(29%)	8(28%)

Note. Data are presented as n (%)

Table 2.

Race

	Caucasian	African American	Hispanic
Beginning of Fall n=36	33(92%)	1(3%)	2(5%)

Note. Data are presented as n (%)

Of the sample at the beginning of the fall (n=36), the majority of the sample was between the ages 17 and 19. The mean age at the beginning of the fall was 18.08. From the percentages shown in Table 2, it may be noted that 92% of the sample (n = 36) consisted of Caucasian Americans; hence, the results obtained from this study would be applicable to Caucasian American college students.

Table 3.

Family Income

	Beginning of Fall n=36
30,000-50,000	1(2.8%)
50,000-70,000	2(5.6%)
70,000-90,000	3(8.3%)
90,000-110,000	2(5.6%)
110,000-130,000	2(5.6%)
130,000-150,000	2(5.6%)
>150,000	7(19.4%)
Unknown	17(47.2%)

Note. Data are presented as n (%)

Of the respondents, 47.2%, (n=17) did not know about the status of their family income (see Table 3). A family income of 150,000 and above was shown to have the second highest percentage of 19.4% (n=7) of the respondents.

Table 4.

Permanent Residence

	Beginning of Fall n=36
Alabama	19(53%)
Georgia	6(17%)
Florida	2(6%)
South Carolina	2(6%)
Texas	2(6%)
Delaware	1(3%)
North Carolina	1(3%)
Tennessee	1(3%)
Virginia	1(3%)
Wyoming	1(3%)

Note. Data are presented as n (%)

Table 5.

School Residence

	Beginning of Fall n=36	End of Fall n=35	End of Spring n=29
Apartment/House			
Female	3(33%)	3(33%)	3(43%)
Male	6(67%)	6(67%)	4(57%)
On- or Off- Campus Dorm			
Female	23(85%)	22(85%)	18(82%)
Male	4(15%)	4(15%)	4(18%)

Note. Data are presented as n (%)

Of the respondents, 53% (n=36) were permanent residents of Alabama, 17% of Georgia, and 6% for each state of Florida, South Carolina, and Texas (see Table 4). Most of the males lived in apartments or houses (see Table 5). The majority of the females lived in on- or off- campus dorms.

Table 6.

Smoking and Alcohol Consumption

	Beginning of Fall n=36	End of Fall n=35	End of Spring n=29
Smoke			
No	31(86%)	27(77%)	26(90%)
Yes	5(14%)	8(23%)	3(10%)
Alcohol Consumption			
No	17(47%)	10(29%)	6(21%)
Yes	19(53%)	25(71%)	23(79%)

Note. Data are presented as n (%)

The majority of the subjects did not smoke, although there were some subjects who began to smoke once attending college (see Table 6). At the end of spring semester, 90% of the respondents did not smoke. Slightly more than half of the subjects consumed alcohol at the beginning of freshman year. This increased from the beginning to end of fall semester, and from then to the end of spring semester.

Data Analyses

Quantitative analyses were performed using the software Instat Version 3.0 (GraphPad Software, San Diego, CA) and Microsoft Office Excel 2004 (Microsoft Corporation, Redmond, WA). Repeated measures analysis of variance (ANOVA) was used to compare BMI, body composition, and body weight among the three observation

periods: (1) beginning of fall semester and the end of fall semester; (2) end of fall semester and the end of spring semester; and (3) beginning of fall semester and the end of spring semester. Statistically significant findings using ANOVA were followed by Tukey's multiple comparisons test. Statistical significance was set at p-value of < 0.05. Means and standard deviations were calculated for each variable studied. Differences in sex characteristics and differences in observation period 1, observation period 2, and observation period 3 were analyzed using general linear models for repeated measures, with sex and weight change groups (weight gain and weight loss/no change) as covariates. For weight change groups, a subject was categorized as having gained weight if she/he gained ≥ 0.1 pounds, and a subject was categorized as having lost weight or no change in weight (maintained exact weight from first observation) if she/he had no weight change or lost ≥ 0.1 pounds. T-tests for dependent samples (within-group variation) were conducted to look for significant differences in weight change, body satisfaction, and cognitive investment in appearance within each observation period. For example, in observation period 1, means at the beginning of fall semester were compared to means at the end of fall semester for each weight change group and sex. Statistical significance was set at p-value of < 0.05. Comparisons were also made between each of the observation periods.

Descriptive analyses were used to examine subjects' differences and/or similarities in body scan measurements and body image (body satisfaction and investment in appearance) in relation to the three observation periods and weight change groups. Data presented include group means and standard deviations as well as data split by sex and/or weight change groups.

Linking Body Mass Index and Body Composition

For the purposes of this longitudinal study and as a part of a larger longitudinal study dealing with the dietary and nutritional aspects, body mass index (BMI) and body fat percentage warrant discussion. The metric formula for calculating the BMI is [Weight in Kilograms/Height in meters square]. The BMI categories for adults followed by the Centers for Disease Control were used (see Table 7).

Table 7.

BMI Chart

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and above	Obese

Note. Source: CDC Web page (http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-adult.htm)

BMI Distribution

All female and male subjects were measured for height and weight using standard techniques. Weight was measured to the nearest 0.1 lb using a digital scale (Health-O-Meter, Sunbeam Products, Model # HDL543DQ-95, Boca Raton, FL) on a level floor. To verify the digital scale for accuracy, external weights were used. For each weighing, subjects wore their street clothes and were asked to remove all outerwear and shoes. They were also asked to empty their pockets of any heavy items such as keys or cell phones.

Height was measured to the nearest one-quarter inch using a fixed measuring tape placed on the wall and a headboard using standard techniques. In order to measure the height of the subjects, each subject stood flat foot without their shoes, with his or her heels, buttocks, upper back, and head (looking straight forward) against a wall with a fixed measuring tape. These values (weight and height) were then converted to the metric equivalent so that BMI could be calculated.

Table 8.

BMI distribution for female and male subjects at the beginning of fall and end of fall semester (observation period 1)

Sex/Time	BMI[a] (kg/m^2)
Female (n=25)	
Beginning of Fall	21.0 ± 2.2
End of Fall	21.4 ± 2.2*
Male (n=10)	
Beginning of Fall	25.9 ± 4.1
End of Fall	26.1 ± 4.1
All Subjects (n=35)	
Beginning of Fall	22.4 ± 3.6
End of Fall	22.7 ± 3.6*

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than beginning of fall values

For observation period 1 (see Table 8), of the 25 females, two were initially underweight (BMI < 18.5 kg/m^2); 22 were normal weight (BMI 18.5 – 24.9 kg/m^2), and one was overweight (BMI 25.0 – 29.9 kg/m^2). Mean BMI significantly increased from 21.0 ± 2.2 kg/m^2 to 21.4 ± 2.2 kg/m^2. By the end of fall semester, two of the females classified by BMI as normal weight for the beginning of fall semester moved to the

overweight classification for BMI. Of the 10 males, five were initially normal weight, four were overweight, and one was obese (BMI $\geq$ 30.0 kg/m^2). By the end of fall semester, one of the males classified by BMI as normal weight at the beginning of the fall moved to the overweight classification for BMI. For all of the subjects combined (n=35), mean BMI significantly increased from 22.4 $\pm$ 3.6 kg/m^2 to 22.7 $\pm$ 3.6 kg/m^2. The average number of days between the measurements was 87 $\pm$ 14 days.

Table 9.

BMI distribution for female and male subjects at the end of fall and end of spring semester (observation period 2)

Sex/Time	BMI[a] (kg/m^2)
Female (n=21)	
End of Fall	21.4 $\pm$ 2.2
End of Spring	21.6 $\pm$ 2.2
Male (n=8)	
End of Fall	25.7 $\pm$ 4.3
End of Spring	26.2 $\pm$ 4.9
All Subjects (n=29)	
End of Fall	22.6 $\pm$ 3.5
End of Spring	22.9 $\pm$ 3.7

Note. Mean $\pm$ SD 141 $\pm$ 6 days between measurements

[a]Data are presented as mean $\pm$ SD

For observation period 2 (see Table 9), of the 21 females, one was classified by BMI as underweight, 17 were classified as normal weight, and three were classified as overweight. No significant changes were found in mean BMI for the females and none of the female subjects changed BMI classifications from the end of fall to the end of spring semester. Of the 8 males, four were classified by BMI as normal weight, three were classified as overweight, and one was classified as obese. No significant changes were found in mean BMI for the male subjects and no changes in their BMI classifications were found from the end of fall to the end of spring semester. For all subjects combined (n=29), mean BMI significantly increased from 22.6 $\pm$ 3.5 kg/m^2 to 22.9 $\pm$ 3.7 kg/m^2. The average number of days between the measurements taken at the end of fall semester and the end of spring semester was 141 $\pm$ 6 days.

Table 10.

BMI distribution for female and male subjects at the beginning of fall and end of spring semester (observation period 3)

Sex/Time	BMI[a] (kg/m^2)
Female (n=21)	
Beginning of Fall	21.1 ± 2.2
End of Spring	21.6 ± 2.2*
Male (n=8)	
Beginning of Fall	25.4 ± 4.3
End of Spring	26.2 ± 4.9*
All Subjects (n=29)	
Beginning of Fall	22.2 ± 3.4
End of Spring	22.9 ± 3.7*

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than beginning values

In observation period 3 (see Table 10), for both female subjects (n=21) and male subjects (n=8), mean BMI significantly increased for each group, from the beginning of fall to the end of spring semester. For all subjects combined (n=29) for the academic year, from the beginning of fall to the end of spring semester, mean BMI significantly increased from 22.2 ± 3.4 kg/m^2 to 22.9 ± 3.7 kg/m^2. By the end of the academic year, one subject was classified by BMI as underweight, 21 subjects were classified as normal

weight, six subjects were classified as overweight, and one subject was classified as obese. Three subjects that were classified by BMI as normal weight at the beginning of the fall were classified as overweight at the end of spring semester.

Body Composition

Body composition was taken using bioelectrical impedance (BodyStat 1500, BioVant Systems, Detroit, MI). Bioelectrical impedance analysis (BIA) measures the impedance of an electrical current (50kHz) through the human body issues. This instrument generates an electrical current, which is then passed through the body by means of four electrodes placed at specific locations on the right hand and wrist, and right foot and ankle. Each subject was asked to rest in a supine position on a covered floor space for five minutes in order to reach a desired state of rest, along with removing their sock and shoe on the right foot and ankle. Their limbs were positioned at a 30-45 degree angle from the trunk of the body. By measuring the resistance to impedance between the electrodes, an estimate of body water was made present. This information in concurrence with the subject's gender, age, height, and weight are entered into the instrument to enable the calculation of body fat and fat free mass. Since hydration status affects the accuracy of BIA, subjects were instructed not to consume liquids, especially those containing caffeine or alcohol, or eat for 2-4 hours prior to testing,. They were also instructed not to engage in strenuous exercise 12 hours prior to testing. Due to these restrictions, subjects were purposely measured in the morning hours during all three testing periods in order to ensure accuracy.

Table 11.

Body composition for female and male subjects at the beginning of fall and end of fall semester (observation period 1)

Sex/Time	Body Fat[a] (%)
Female (n=25)	
Beginning of Fall	22.2 ± 4.1
End of Fall	23.2 ± 3.9*
Male (n=10)	
Beginning of Fall	14.2 ± 5.4
End of Fall	15.1 ± 4.8*
All Subjects (n=35)	
Beginning of Fall	19.9 ± 5.7
End of Fall	20.9 ± 5.5*

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than beginning of fall values

In observation period 1 (see Table 11), the females' (n=25) mean percent body fat significantly increased from 22.2 ± 4.1% to 23.2 ± 3.9% by the end of fall semester (see Table 11). Of the males (n=10), mean percent body fat significantly increased from 14.2 ± 5.4% to 15.1 ± 4.8% by the end of fall semester. For all subjects combined (n=35), mean percent body fat significantly increased from 19.9 ± 5.7% to 20.9 ± 5.5%.

Table 12.

Body composition for female and male subjects at the end of fall and end of spring semester (observation period 2)

Sex/Time	Body Fat[a] (%)
Female (n=21)	
End of Fall	23.7 ± 3.6
End of Spring	23.6 ± 3.3
Male (n=8)	
End of Fall	14.2 ± 4.8
End of Spring	14.8 ± 5.8
All Subjects (n=29)	
End of Fall	21.1 ± 5.8
End of Spring	21.2 ± 5.7

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

For observation period 2 (see Table 12), of the females (n=21), no significant change was found in mean percent body fat. Of the males (n=8), no significant change was found in mean percent body fat.

Table 13.

Body composition for female and male subjects at the beginning of fall and end of spring semester (observation period 3)

Sex/Time	Body Fat[a] (%)
Female (n=21)	
Beginning of Fall	22.7 ± 3.8
End of Spring	23.6 ± 3.3*
Male (n=8)	
Beginning of Fall	13.1 ± 5.3
End of Spring	14.8 ± 5.8*
All Subjects (n=29)	
Beginning of Fall	20.1 ± 6.0
End of Spring	21.2 ± 5.7*

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than beginning values

In observation period 3 (see Table 13), for both female subjects (n=21) and male subjects (n=8), mean percent body fat significantly increased for each group, from the beginning of fall to the end of spring semester. For all subjects combined (n=29), for the academic year, from the beginning of fall to the end of spring semester, mean percent body fat increased significantly from 20.1 ± 6.0% to 21.2 ± 5.7%.

Results

Research Question 1: Is there a change in weight over the longitudinal observations?

To answer this research question, male and female weight changes were calculated in pounds over the three observation periods. Weight was measured to the nearest 0.1 lb using a digital scale (Health-O-Meter, Sunbeam Products, Model # HDL543DQ-95, Boca Raton, FL) on a level floor. To verify the digital scale for accuracy, external weights were used.

A table in Microsoft Excel was created presenting the +/- weight variations for each period for each subject, with the male and female subjects divided by sex; within each sex, weight loss, no change in weight, and weight gain was listed. Columns presented the actual weight measured for each observation period and the difference between observations 1 and 2; 2 and 3; 1 and 3. Subject's t-test was used to compare differences in weight change of females and males, as well as used to examine the differences in weight change in relation to two categories: (1) weight gain and (2) weight loss/no change in weight. Due to an exceptionally small number of students maintaining their weight over the observation periods, the no change in weight group was combined with the weight loss group. This combined weight loss/no change in weight group was the most logical approach to evaluate the data for a relatively small sample size. A subject was categorized as having gained weight if she/he gained $\geq$ 0.1 pounds, and a subject was categorized as having lost weight or no change in weight (maintained exact weight from first observation) if she/he had no weight change or lost $\geq$ 0.1 pounds. Statistical significance was set at p-value of < 0.05.

Table 14.

Body weight for female and male subjects at the beginning of fall and end of fall semester (observation period 1)

Sex/Time	Body Weight[a] (lb)
Female (n=25)	
Beginning of Fall	124.9 ± 16.6
End of Fall	126.9 ± 16.4*
Male (n=10)	
Beginning of Fall	174.4 ± 24.6
End of Fall	176.1 ± 25.5
All Subjects (n=35)	
Beginning of Fall	139.0 ± 29.5
End of Fall	140.91 ± 3.78*

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than beginning of fall values

For observation period 1 (see Table 14), of the 25 females, mean initial weight was 124.9 ± 16.6 pounds. By the end of fall semester, the females' mean weight significantly increased to 126.9 ± 16.4 pounds. Of the 10 males, mean initial weight was 174.4 ± 24.6 pounds. By the end of fall semester, the males' mean weight had not significantly changed. For all subjects combined (n=35), mean weight significantly increased from the beginning of the fall with 139.0 ± 29.5 pounds to the end of the fall

semester with 140.9 ± 3.78. Mean weight gain was 1.9 ± 3.8 pounds. Weight change ranged from a loss of 5 pounds to a gain of 10 pounds. About 70% of the subjects gained weight during fall semester.

Table 15.

Body weight for female and male subjects at the end of fall and end of spring semester (observation period 2)

Sex/Time	Body Weight[a] (lb)
Female (n=21)	
End of Fall	126.5 ± 16.3
End of Spring	127.9 ± 17.3**
Male (n=8)	
End of Fall	172.8 ± 27.6
End of Spring	176.0 ± 29.7
All Subjects (n=29)	
End of Fall	139.3 ± 28.7
End of Spring	141.2 ± 30.2*

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than end of fall values

For observation period 2 (see Table 15), of the 21 females, mean weight at the end of fall semester to the end of spring semester showed no significant changes. Like the

females, no significant changes were found in mean weight for the 8 males. For all subjects combined (n=29), mean weight significantly increased from 139.3 ± 28.7 pounds to 141.2 ± 30.2 lbs. Mean weight gain was 1.9 ± 4.1 pounds. Weight change from the end of the fall semester to the end of spring semester ranged from a loss of 5 pounds to a gain of 11.4 pounds. About 59% of the subjects gained weight.

Table 16.

Body weight for female and male subjects at the beginning of fall and end of spring semester (observation period 3)

Sex/Time	Body Weight[a] (lb)
Female (n=21)	
Beginning of Fall	124.7 ± 16.5
End of Spring	127.9 ± 17.3*
Male (n=8)	
Beginning of Fall	170.6 ± 26.2
End of Spring	176.0 ± 29.7*
All Subjects (n=29)	
Beginning of Fall	137.3 ± 28.4
End of Spring	141.2 ± 30.2*

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than beginning values

In observation period 3 (see Table 16), for all subjects combined (n=29) for the academic year, from the beginning of fall semester to the end of spring semester, mean weight increased significantly from 137.3 ± 28.4 pounds to 141.2 ± 30.2 pounds at the end of spring semester. Mean weight gain was 3.8 ± 5.0 pounds. A total of 76% of female and male subjects gained weight during their first, academic year of college as freshman students.

Weight change for the females (n=21) averaged a 3.2 ± 5.1 pounds gain, and for the males (n=8), a 5.4 ± 4.5 pounds gain. Weight change over the academic year ranged from a loss of 5.8 pounds to a gain of 13 pounds. Of the 21 females, 38% gained weight both fall and spring semesters, 33% gained weight fall semester and either lost weight or did not change weight spring semester, 14% lost weight both fall and spring semesters, and 14% lost weight or did not change weight fall semester and gained weight spring semester.

Of the 8 males, 50% gained weight both fall and spring semesters, 25% gained weight fall semester and either lost weight or did not change weight spring semester, and 25% lost weight or did not change weight fall semester and gained weight spring semester.

Summary

In observation period 1 (fall semester), out of the 21 females, the mean weight gain of the females who gained weight (n=15) was 3.82 pounds. Out of the 8 males, the mean weight gain of the males who gained weight (n=6) was 3.37 pounds. The mean weight loss of the females who lost weight (n=6) was -3.07 pounds, and the mean weight loss of the males who lost weight (n=2) was -1.3 pounds. No subjects in observation period 1 maintained their body weight or had no change in their body weight, from the beginning of fall semester to the end of fall semester.

In observation period 2 (spring semester), out of the 21 females, the mean weight gain of the females who gained weight (n=11) was 4.06 pounds. Of the 8 males, the mean weight gain of the males who gained weight (n=6) was 5.33 pounds. The mean weight loss of the females who lost weight (n=8) was -1.95 pounds. The mean weight loss of the males who lost weight (n=2) was -3.4 pounds. The remaining female subjects (n=2) of the sample maintained their body weight or had no change in their body weight over observation period 2. No male subjects maintained their body weight over observation period 2.

In observation period 3 (academic year), out of the 21 females, the mean weight gain of the females who gained weight (n=15) was 5.6 pounds. Out of the 8 males, the mean weight gain of the males who gained weight (n=7) was 6.23 pounds. The mean weight loss of the females who lost weight (n=5) was -3.2 pounds. The mean weight loss of the males who lost weight (n=1) was -0.8 pounds. Only one female subject of the sample (n=21) maintained their body weight or had no change in weight over observation

period 3. No male subjects of the sample (n=8) maintained their body weight over observation period 3.

The female and male subjects who gained weight each semester had higher mean weight gains in the second semester. The female subjects who lost weight in observation period 2 actually lost less body weight on average than the female subjects who lost weight in observation period 1. The male subjects who lost weight in observation period 2 lost more body weight on average than the male subjects who lost body weight in observation period 1.

Due to an exceptionally small number of students maintaining their weight or having no change in weight over the observation periods (two females in observation period 2 and one female in observation period 3), the no change in weight group was combined with the weight loss group. This combined weight loss/no change in weight group was the most logical approach to evaluate the data for a relatively small sample size. An assumption was made that subjects' responses on the body image questionnaires who had no change in weight would be somewhat consistent with the subjects' responses who lost weight. Some of the subjects who lost weight over the observation periods had a relatively small amount of weight loss of less than 1 pound, so this justified those subjects who had no change in weight to be grouped with the weight loss group.

Research Question 2: If there is weight change, do body measurements change at the bicep, neck, bust/chest, natural waist, hips, or thighs?

To answer this research question, a table in Microsoft Excel was created presenting the body measurements (for males – bicep, neck, chest, natural waist, hips,

and thighs and for females – bicep, neck, bust, natural waist, hips, and thighs) calculated in inches for each of the three observation periods and providing the +/- numeric variations between each period for each subject, with male and female subjects divided by sex. Columns presented the actual body measurements for each observation period and the difference between observations 1 and 2; 2 and 3; 1 and 3. Each body measurement was grouped for each subject (to better assess differences or similarities related to each body measurement).

The 3D body scanner used in this study was developed by the Textile/Clothing Technology Corporation ($[TC]^2$). The margin of error of the $[TC]^2$ NX12 is relatively minimal. The point accuracy is within 1 millimeter and the circumferential measurement is within 3 millimeters. The body measurement extractions collected by this specific body scanner are defined as followed ($[TC]^2$, 1999):

Bicep – the circumference of the arm taken about 2 inches below the armpit.

Neck – the circumference measured right at the base of the neck following the contours.

Chest – measured horizontally at the armpit level just above the bustline.

Bust – the horizontal circumference taken across the bust points at the fullest part of the chest.

Natural waist – the smallest circumference between the bust and hips determined by locating the small of the back and then going up and down a predetermined amount for a starting-point to find the waist.

Hips – the largest circumference between the waist and the crotch.

Thighs – the circumference 2 inches below the crotch.

Table 17.

Body scan measurement changes and 'weight gain' group for female subjects (n=15) between the beginning of fall and end of fall semester (observation period 1)

Body Scan Measurement	
Bicep[a]	0.34 ± 0.44
Neck[a]	0.57 ± 0.37
Bust[a]	0.01 ± 1.26
Waist[a]	0.29 ± 0.80
Hips[a]	0.41 ± 0.56
Thighs[a]	0.26 ± 0.70

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 1 (see Table 17), of the females' weight gain group (n=15), the neck increased the most (more than one-half of an inch) out of all measurement changes shown for fall semester. Following the neck measurement increase, the hips increased (about two-fifths of an inch), the bicep increased (about one-third of an inch), the waist increased (about one-third of an inch), and the thighs increased (about one-fourth of an inch) for fall semester. The bust measurement had a negligible increase. Measurements between -0.13 and 0.13 are of relatively no importance to this study (that is only about (+/-) one-eighth of an inch).

Table 18.

Body scan measurement changes and 'weight loss/no change' group for female subjects (n=6) between the beginning of fall and end of fall semester (observation period 1)

Body Scan Measurement	
Bicep[a]	-0.14 ± 0.36
Neck[a]	0.13 ± 0.86
Bust[a]	-0.07 ± 1.52
Waist[a]	-0.88 ± 0.66
Hips[a]	-0.75 ± 0.49
Thighs[a]	-0.53 ± 0.89

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 1 (see Table 18), of the females' weight loss/no change group (n=6), the neck had a negligible increase for fall semester. The body scan measurement changes of the waist (about seven-eighths of an inch) decreased the most out of all measurement changes shown for fall semester. Following the waist measurement decrease, the hips decreased (about three-fourths of an inch), and the thighs decreased (about one-half of an inch). The bicep and bust measurements had negligible decreases.

Table 19.

Body scan measurement changes and 'weight gain' group for male subjects (n=6) between the beginning of fall and end of fall semester (observation period 1)

Body Scan Measurement	
Bicep[a]	0.37 ± 0.32
Neck[a]	0.005 ± 0.78
Chest[a]	-0.06 ± 0.66
Waist[a]	0.50 ± 0.49
Hips[a]	0.11 ± 0.46
Thighs[a]	0.90 ± 0.90

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 1 (see Table 19), of the males' weight gain group (n=6), the thighs increased the most (nearly one inch) out of all measurement changes shown for fall semester. Following the thigh measurement increase, the waist increased (one-half of an inch), and the bicep increased (about three-eighths of an inch). The hips and neck measurements had negligible increases. The body scan measurement changes of the chest were the only measurement to show a negligible decrease for fall semester.

Table 20.

Body scan measurement changes and 'weight loss/no change' group for male subjects (n=2) between the beginning of fall and end of fall semester (observation period 1)

Body Scan Measurement	
Bicep[a]	0.28 ± 0.16
Neck[a]	0.02 ± 0.44
Chest[a]	0.47 ± 0.79
Waist[a]	-0.16 ± 0.69
Hips[a]	0.20 ± 0.29
Thighs[a]	-0.74 ± 0.65

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 1 (see Table 20), of the males' weight loss/no change group (n=2), it appears that the body scan measurement changes of the thighs (about three-fourths of an inch) and waist (about one-sixth of an inch) were the only measurements to show a decrease for fall semester. The body scan measurement changes of the thighs decreased the most out of all measurement changes shown for fall semester. All other body scan measurements had increases, which included the hips (about one-fifth of an inch), the bicep (about one-fourth of an inch), and the chest (about one-half of

an inch). The chest measurement provided the most amount of increase for fall semester. The neck measurement had a negligible increase.

Table 21.

Body scan measurement changes and 'weight gain' group for female subjects (n=11) between the end of fall and end of spring semester (observation period 2)

Body Scan Measurement	
Bicep[a]	0.08 ± 0.39
Neck[a]	-0.18 ± 0.60
Bust[a]	0.64 ± 1.40
Waist[a]	0.85 ± 1.21
Hips[a]	0.46 ± 0.58
Thighs[a]	0.46 ± 0.72

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 2 (see Table 21), of the females' weight gain group (n=11), the waist increased the most (nearly seven-eighths of an inch) out of all measurement changes shown for spring semester. Following the waist measurement increase, the bust increased (about five-eighths of an inch), the hips increased (nearly one-half of an inch), and the thighs increased (nearly one-half of an inch). The bicep

measurement had a negligible increase. The neck measurement, which was relatively small (nearly one-fifth of an inch), was the only measurement to decrease for spring semester.

Table 22.

Body scan measurement changes and 'weight loss/no change' group for female subjects (n=10) between the end of fall and end of spring semester (observation period 2)

Body Scan Measurement	
Bicep[a]	-0.17 ± 0.15
Neck[a]	-0.50 ± 0.62
Bust[a]	-0.58 ± 0.65
Waist[a]	-0.20 ± 0.94
Hips[a]	-0.29 ± 0.21
Thighs[a]	-0.22 ± 0.27

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 2 (see Table 22), of the females' weight loss/no change group (n=10), the bust decreased the most (nearly five-eighths of an inch) out of all measurement changes for spring semester. Following the bust measurement decrease, the neck decreased (one-half of an inch), and the hips decreased (nearly one-third of an inch).

The thigh, waist, and bicep measurements all decreased about one-fifth of an inch, which were relatively small decreases.

Table 23.

Body scan measurement changes and 'weight gain' group for male subjects (n=6) between the end of fall and end of spring semester (observation period 2)

Body Scan Measurement	
Bicep[a]	0.13 ± 0.26
Neck[a]	0.15 ± 0.91
Chest[a]	0.99 ± 0.83
Waist[a]	0.24 ± 0.42
Hips[a]	0.28 ± 0.42
Thighs[a]	-0.18 ± 0.58

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 2 (see Table 23), of the males' weight gain group (n=6), the chest increased the most (about one inch) out of all measurement changes for spring semester. Following the chest measurement increase, the hips and the waist increased (each about one-fourth of an inch). The neck had a relatively small increase and the bicep

had a negligible increase. The thigh measurement had a negligible decrease for spring semester.

Table 24.

Body scan measurements and 'weight loss/no change' group for male subjects (n=2) between the end of fall and end of spring semester (observation period 2)

Body Scan Measurement	
Bicep[a]	0.17 ± 0.11
Neck[a]	-0.13 ± 0.52
Chest[a]	0.06 ± 0.37
Waist[a]	-0.07 ± 0.35
Hips[a]	-0.03 ± 0.04
Thighs[a]	-0.40 ± 0.45

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 2 (see Table 24), of the males' weight loss/no change group (n=2), body scan measurement changes of the thighs decreased the most (about two-fifths of an inch) out of all measurement changes shown for spring semester. The neck, waist, and hips had negligible decreases. The bicep increased a relatively small amount. The chest measurement had a negligible increase.

Table 25.

Body scan measurement changes and 'weight gain' group for female subjects (n=15) between the beginning of fall and end of spring semester (observation period 3)

Body Scan Measurement	
Bicep[a]	0.26 ± 0.33
Neck[a]	0.34 ± 0.42
Bust[a]	0.40 ± 0.89
Waist[a]	0.57 ± 1.49
Hips[a]	0.57 ± 0.74
Thighs[a]	0.44 ± 0.49

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 3 (see Table 25), of the females' weight gain group (n=15), the hips (over one-half of an inch) and waist (over one-half of an inch) increased the most out of all measurement changes for the academic year. Following the hip and waist measurement increase, the thighs increased (nearly one-half of an inch), the bust increased (two-fifths of an inch), the neck increased (about one-third of an inch), and the bicep increased (about one-fourth of an inch).

Table 26.

Body scan measurement changes and 'weight loss/no change' group for female subjects (n=6) between the beginning of fall and end of spring semester (observation period 3)

Body Scan Measurement	
Bicep[a]	-0.07 ± 0.49
Neck[a]	-0.46 ± 0.79
Bust[a]	-0.84 ± 1.19
Waist[a]	-0.33 ± 1.11
Hips[a]	-0.68 ± 0.84
Thighs[a]	-0.48 ± 0.72

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 3 (see Table 26), of the females' weight loss/no change group (n=6), the bust decreased the most (nearly seven-eighths of an inch) out of all measurement changes shown for the academic year. Following the bust measurement decrease, the hips decreased (about two-thirds of an inch), the thighs decreased (nearly one-half of an inch), the neck decreased (nearly one-half of an inch), and the waist decreased (one-third of an inch). The bicep measurement had a negligible decrease.

Table 27.

Body scan measurement changes and 'weight gain' group for male subjects (n=7) between the beginning of fall and end of spring semester (observation period 3)

Body Scan Measurement	
Bicep[a]	0.51 ± 0.25
Neck[a]	0.13 ± 0.65
Chest[a]	0.84 ± 0.74
Waist[a]	0.64 ± 0.58
Hips[a]	0.40 ± 0.40
Thighs[a]	0.37 ± 0.95

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 3 (see Table 27), of the males' weight gain group (n=7), the chest increased the most (nearly seven-eighths of an inch) out of all measurement changes for the academic year. Following the chest measurement increase, the waist increased (nearly two-thirds of an inch), the bicep increased (about one-half of an inch), the hips increased (two-fifths of an inch), and the thighs increased (nearly two-fifths of an inch). The neck measurement had a negligible increase.

Table 28.

Body scan measurement changes and 'weight loss/no change' group for male subjects (n=1) between the beginning of fall and end of spring semester (observation period 3)

Body Scan Measurement	Male (n=1)
Bicep[a]	-0.11 ± 0.00
Neck[a]	-0.24 ± 0.00
Chest[a]	0.80 ± 0.00
Waist[a]	-0.52 ± 0.00
Hips[a]	-0.09 ± 0.00
Thighs[a]	-0.53 ± 0.00

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

Means of body scan measurements are shown in inches

Measurements between -0.13 and 0.13 are within the margin of error for accuracy

For observation period 3 (see Table 28), of the males' weight loss/no change group (n=1), the thighs and waist both decreased the most (about one-half of an inch), out of all measurement changes for the academic year. Following the thigh and waist measurement decreases, the neck decreased (about one-fourth of an inch). The bicep and hip measurements had negligible decreases. The chest was the only measurement to increase (four-fifths of an inch) for the academic year.

Summary

When comparing the females' weight gain groups across the three observation periods, some patterns were found. In the females' weight gain group for observation period 1 (fall semester), the neck measurement increased the most with more than one-half of an inch increase. In the females' weight gain group for observation period 2 (spring semester), the measurements to increase the most were the waist (nearly seven-eighths of an inch) and the bust (about five-eighths of an inch). In the females' weight gain group for observation period 3 (academic year), the measurements to increase the most were the hips (over one-half of an inch) and the waist (over one-half of an inch). There appeared to be common "measurement-area" increases for the waist measurement in observation period 2 and 3.

When comparing the females' weight loss/no change groups across the three observation periods, some patterns were found. In the females' weight loss/no change group for observation period 1 (fall semester), the measurements that decreased the most were the waist (about seven-eighths of an inch), the hips (about three-fourths of an inch), and the thighs (about one-half of an inch). In the females' weight loss/no change group for observation period 2 (spring semester), the measurements with the most decrease were the bust (nearly five-eighths of an inch), the neck (one-half of an inch), and the hips (nearly one-third of an inch). In the females' weight loss/no change group for observation period 3 (academic year), the measurements with the most decrease were the bust (nearly seven-eighths of an inch), the hips (about two-thirds of an inch), the thighs (about one-half of an inch), and the neck (nearly one-half of an inch). There appeared to be common "measurement-area" decreases for the hip measurement in observation periods 1, 2, and

3. There appeared to be common “measurement-area” decreases for the thigh and hip measurement in observation periods 1 and 3. There appeared to be common “measurement-area” decreases for the bust, neck, and hip measurement in observation periods 2 and 3.

When comparing the males’ weight gain groups across the three observation periods, patterns were found. In the males’ weight gain group for observation period 1 (fall semester), the measurements with the most increase were the thighs (nearly one inch), the waist (one-half of an inch), and the bicep (about three-eighths of an inch). In the males’ weight gain group for observation period 2 (spring semester), the measurements with the most increase were the chest (about one inch), the hips (nearly one-third of an inch), and the waist (about one-fourth of an inch). In the males’ weight gain group for observation period 3 (academic year), the measurements with the most increase were the chest (nearly seven-eighths of an inch), the waist (nearly two-thirds of an inch), the bicep (about one-half of an inch), the hips (two-fifths of an inch), and the thighs (nearly two-fifths of an inch). There appeared to be common “measurement-area” increases for the waist in observation periods 1, 2, and 3. There appeared to be common “measurement-area” increases for the chest, hips, and waist in observation periods 2 and 3. There appeared to be common “measurement-area” increases for the thighs and waist in observation periods 1 and 3.

When comparing the males’ weight loss/no change groups across the three observation periods, patterns were found. In the males’ weight loss/no change group for observation period 1 (fall semester), the measurements with the most decrease were the thigh (about three-fourths of an inch) and the waist (about one-sixth of an inch). In the

males' weight loss/no change group for observation period 2 (spring semester), the measurement with the most amount of decrease was the thigh (about two-fifths of an inch). In the weight loss/no change group for observation period 3 (academic year), the measurements with the most amount of decrease were the thigh (about one-half of an inch) and the waist (about one-half of an inch). There appeared to be common "measurement-area" decreases for the thighs in observation periods 1, 2, and 3. There appeared to be common "measurement-area" decreases for the waist and thighs in observation periods 1 and 3.

There seemed to be some patterns of measurement increase in the males' weight loss/no change groups. In the males' weight loss/no change group for observation period 1 (fall semester), the measurements with increased amounts were the chest (about one-half of an inch), the bicep (about one-fourth of an inch), and the hips (about one-fifth of an inch). In the males' weight loss/no change group for observation period 2 (spring semester), the measurement with an increase was the bicep. In the males' weight loss/no change group for observation period 3 (academic year), the measurement with an increase was the chest (four-fifths of an inch). The common "measurement-area" increases for the bicep measurement were found in observation periods 1 and 2. The common "measurement-area" increases for the chest measurement were found in observation periods 1 and 3. These increases in measurements for the males' weight loss/no change groups could indicate that these males participate in physical activity that includes some combination of weight and strength training.

Research Question 3: Does the perception of body satisfaction related to weight gain or weight loss, change over the three observations?

To answer this research question, body image was measured using the BASS subscale of the Multidimensional Body-Self Relations Questionnaire (MBSRQ). The BASS is unique in that it approaches the evaluation of body image as "dissatisfaction-satisfaction with body areas and attributes" (Cash, 2000, p.1). Therefore, body image was observed through the perception of body satisfaction/dissatisfaction for each male and female subject using a 5-point Likert-type scale. A table in Microsoft Excel was created to present the score for each subject based on the nine questions of the BASS scale (see body satisfaction section in Appendix C). Adding the nine ratings and dividing by nine produced composite mean scores. The mean BASS score for each subject for the three observation periods allowed examination of female and male subjects' body satisfaction/dissatisfaction. "High composite scorers are generally content with most areas of their body. Low scorers are unhappy with the size or appearance of several areas" (Cash, 2000, p.3). Body satisfaction/dissatisfaction factors were examined for female and male subjects to determine if there were differences between those that gained weight, lost weight, or had no change in weight.

Due to a variation in the returning subjects for spring semester, only the 29 subjects were used in the data collection for the BASS scale and their weight change analysis for all observation periods. Thus, 21 females and 8 males were used in the data collection for more reliable results. The three observation periods are best observed with the same subjects analyzed throughout the entire academic year.

Table 29.

BASS and 'weight gain' group for female and male subjects at the beginning of fall and end of fall semester (observation period 1)

Sex/Time	BASS[a]
Female (n=15)	
Beginning of Fall	3.42 ± 0.48*
End of Fall	3.29 ± 0.43
Fall Average	3.36 ± 0.45
Male (n=6)	
Beginning of Fall	3.35 ± 0.39*
End of Fall	3.30 ± 0.42
Fall Average	3.32 ± 0.40
All Subjects (n=21)	
Beginning of Fall	3.40 ± 0.45*
End of Fall	3.29 ± 0.41
Fall Average	3.35 ± 0.43

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than end of fall values

For observation period 1 (see Table 29) of the females' weight gain group (n=15), body areas satisfaction significantly decreased from the beginning of fall semester to the end of fall semester. The males' weight gain group (n=6) showed a significant decrease

in body areas satisfaction from the beginning of fall semester to the end of fall semester as well. It was less of a decrease than the females' weight gain group. Overall, the females' weight gain group was slightly more content with their body areas satisfaction than the males' weight gain group. On the 5-point scale, they each averaged between 3 and 4 (3 = neither satisfied nor dissatisfied and 4 = mostly satisfied).

Table 30.

BASS and 'weight loss/no change' group for female and male subjects at the beginning of fall and end of fall semester (observation period 1)

Sex/Time	BASS[a]
Female (n=6)	
Beginning of Fall	3.61 ± 0.53*
End of Fall	3.81 ± 0.53
Fall Average	3.71 ± 0.52
Male (n=2)	
Beginning of Fall	4.33 ± 0.63
End of Fall	4.33 ± 0.47
Fall Average	4.33 ± 0.45
All Subjects (n=8)	
Beginning of Fall	3.79 ± 0.61*
End of Fall	3.94 ± 0.54
Fall Average	3.87 ± 0.56

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) less than end of fall values

For observation period 1 (see Table 30) of the females' weight loss/no change group (n=6), body areas satisfaction increased from the beginning of fall semester to the end of fall semester. The males' weight loss/no change group (n=2) had no change

between the two observations, yet when compared to the females' weight loss/no change group, they were more satisfied or happy with their body areas. On the 5-point scale, the weight loss/no change subjects for observation period 1 each averaged between 3 and 5 (3 = neither satisfied nor dissatisfied, 4 = mostly satisfied, and 5 = strongly satisfied).

When comparing the weight gain group to the weight loss/no change group, the females' weight loss/no change group in total (beginning of fall mean scores and end of fall mean scores combined average) was more satisfied with their body areas than the females' weight gain group (see Table 29 and Table 30). When comparing the males' weight loss/no change group in total for the fall semester to the males' weight gain group in total for fall semester, the weight loss/no change group was more satisfied with their body areas than the weight gain group. For all subjects in total (beginning of fall means and end of fall means combined average) for fall semester, the weight gain group (n=21) was less satisfied with their body areas than the weight loss/no change group (n=8).

Table 31.

BASS and 'weight gain' group for female and male subjects at the end of fall and end of spring semester (observation period 2)

Sex/Time	BASS[a]
Female (n=11)	
End of Fall	3.34 ± 0.54
End of Spring	3.38 ± 0.55
Spring Average	3.36 ± 0.54
Male (n=6)	
End of Fall	3.61 ± 0.73
End of Spring	3.76 ± 0.53*
Spring Average	3.69 ± 0.61
All Subjects (n=17)	
End of Fall	3.44 ± 0.61
End of Spring	3.52 ± 0.56*
Spring Average	3.48 ± 0.58

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than end of fall values

For observation period 2 (see Table 31) of the females' weight gain group (n=11), body areas satisfaction negligibly increased from the end of fall semester to the end of spring semester. The males' weight gain group (n=6) significantly increased from the end

of fall semester to the end of spring semester. Overall, the females' weight gain group was less satisfied with their body areas satisfaction than the males' weight gain group. On the 5-point scale, they each averaged between 3 and 4 (3 = neither satisfied nor dissatisfied and 4 = mostly satisfied).

Table 32.

BASS and 'weight loss/no change' group for female and male subjects at the end of fall and end of spring semester (observation period 2)

Sex/Time	BASS[a]
Female (n=10)	
End of Fall	3.54 ± 0.47
End of Spring	3.74 ± 0.72*
Spring Average	3.64 ± 0.60
Male (n=2)	
End of Fall	3.39 ± 0.08
End of Spring	3.33 ± 0.47
Spring Average	3.36 ± 0.28
All Subjects (n=12)	
End of Fall	3.52 ± 0.43
End of Spring	3.68 ± 0.68*
Spring Average	3.60 ± 0.56

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than end of fall values

For observation period 2 (see Table 32) of the females' weight loss/no change group (n=10), body areas satisfaction significantly increased from the end of fall semester to the end of spring semester. The males' weight loss/no change group (n=2) was

negligibly less satisfied with their body areas by the end of spring semester. Overall, the females' weight loss/no change group was more satisfied with their body areas than the males' weight loss/no change group for the total spring semester. On the 5-point scale, the weight loss/no change subjects for observation period 2 each averaged between 3 and 4 (3 = neither satisfied nor dissatisfied and 4 = mostly satisfied).

When comparing the females' weight gain group (n=11) to the females' weight loss/no change group (n=10) for the total spring semester (end of fall means and end of spring means combined average), the females' weight loss/no change group was overall more content or happy with their body areas than the females' weight gain group (see Table 31 and Table 32). When comparing the males' weight gain group (n=6) to the males' weight loss/no change group (n=2) for the total spring semester, the males' weight gain group was more content or happy with their body areas than the males' weight loss/no change group. For all subjects in total for spring semester, the weight gain group (n=17) was less satisfied with their body areas than the weight loss/no change group (n=12).

Table 33.

BASS and 'weight gain' group for female and male subjects at the beginning of fall and end of spring semester (observation period 3)

Sex/Time	BASS[a]
Female (n=15)	
Beginning of Fall	3.41 ± 0.52
End of Spring	3.39 ± 0.52
Academic Year Average	3.40 ± 0.51
Male (n=7)	
Beginning of Fall	3.43 ± 0.41
End of Spring	3.52 ± 0.40*
Academic Year Average	3.48 ± 0.40
All Subjects (n=22)	
Beginning of Fall	3.41 ± 0.48
End of Spring	3.43 ± 0.48
Academic Year Average	3.42 ± 0.47

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than beginning of fall values

For observation period 3 (see Table 33) of the females' weight gain group (n=15), body areas satisfaction negligibly decreased from the beginning of fall to the end of spring semester. Of the males' weight gain group (n=7), body areas satisfaction

significantly increased from the beginning of fall to the end of spring semester. Overall, the females' weight gain group was less satisfied with their body areas satisfaction than the males' weight gain group. On the 5-point scale, they each averaged between 3 and 4 (3 = neither satisfied nor dissatisfied and 4 = mostly satisfied).

Table 34.

BASS and 'weight loss/no change' group for female and male subjects at the beginning of fall and end of spring semester (observation period 3)

Sex/Time	BASS[a]
Female (n=6)	
Beginning of Fall	3.65 ± 0.40
End of Spring	3.96 ± 0.81*
Academic Year Average	3.81 ± 0.63
Male (n=1)	
Beginning of Fall	4.78 ± 0.00
End of Spring	4.56 ± 0.00
Academic Year Average	4.67 ± 0.16
All Subjects (n=7)	
Beginning of Fall	3.81 ± 0.56
End of Spring	4.05 ± 0.77*
Academic Year Average	3.93 ± 0.66

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) greater than beginning of fall values

For observation period 3 (see Table 34) of the females' weight loss/no change group (n=6), body areas satisfaction significantly increased from the beginning of fall to the end of spring semester. Of the males' weight loss/no change group (n=1), body areas

satisfaction decreased from the beginning of fall to the end of spring semester. Overall, the females' weight loss/no change group was less satisfied with their body areas satisfaction than the males' weight loss/no change group. The higher mean scores of the males' weight loss/no change group could be due to only one male subject for the group compared to the six female subjects and their mean scores. A greater sample size or equal sample size for the males' weight loss/no change group could produce a better comparison. On the 5-point scale, the weight loss/no change subjects for observation period 3 each averaged between 3 and 5 (3 = neither satisfied nor dissatisfied, 4 = mostly satisfied, and 5 = strongly satisfied).

When comparing the weight gain group to the weight loss/no change group, the females' weight loss/no change group in total (beginning of fall means and end of spring means combined average) was more satisfied with their body areas than the females' weight gain group (see Table 33 and Table 34). When comparing the males' weight loss/no change group in total for observation period 3, the weight loss/no change group was more satisfied with their body areas than the weight gain group. For all subjects in total (beginning of fall means and end of spring means combined average) for observation period 3, the weight gain group (n=22) was less satisfied with their body areas than the weight loss/no change group (n=7).

Table 35.

Mean Averages of the BASS and 'weight gain' group for female and male subjects for the entire academic year (observation period 1, 2, and 3 combined average)

Sex/Time	BASS[a]
Female (n=15) Average	3.37 ± 0.48
Male (n=7) Average	3.45 ± 0.41
All Subjects (n=22) Average	3.39 ± 0.46

Note. [a]Data are presented as mean ± SD

Table 36.

Mean Averages of the BASS and 'weight loss/no change' group for female and male subjects for the entire academic year (observation period 1, 2, and 3 combined average)

Sex/Time	BASS[a]
Female (n=6) Average	3.80 ± 0.58
Male (n=1) Average	4.67 ± 0.11
All Subjects (n=7) Average	3.92 ± 0.62

Note. [a]Data are presented as mean ± SD

The females' weight gain group's combined average (n=15) was less satisfied with their body areas than the males' weight gain group's (n=7) for the entire academic year (see Table 35). The one male with weight loss/no change was more strongly satisfied with his body areas when compared to the females' weight loss/no change group (n=6) (see Table 36). When comparing the females' weight gain group's combined average (n=15) for the entire academic year to the females' weight loss/no change group's (n=6), the females' weight loss/no change group was more content with their body areas than the females' weight gain group (see Table 35 and 36). When comparing the males' weight gain group's combined average (n=7) for the entire academic year to the one male with weight loss/no change, the latter was more satisfied with his body areas. For all subjects (observation period 1, 2, and 3 combined means) for the entire academic year, the weight loss/no change group (n=7) was overall more satisfied with their body areas than the weight gain group (n=22).

Table 37.

Mean Averages of the BASS and 'all weight' groups combined for female and male subjects for the entire academic year (observation period 1, 2, and 3 combined average)

Sex/Time	BASS[a]
Female (n=21) Average	3.49 ± 0.55
Male (n=8) Average	3.60 ± 0.56
All Subjects (n=29) Average	3.52 ± 0.55

Note. [a]Data are presented as mean ± SD

When combining both the weight gain and weight loss/no change groups in total (observation period 1, 2, and 3 combined means) for the entire academic year, the females (n=21) were overall less satisfied with their body areas than the males (n=8). All subjects combined (n=29) were fairly satisfied with their body areas (see Table 37). On the 5-point scale, they each averaged between 3 and 4 (3 = neither satisfied nor dissatisfied and 4 = mostly satisfied).

Summary

Table 38.

Means of the BASS and all 'weight gain' groups for female and male subjects (observation periods: 1, 2, and 3)

Sex/Time	BASS[a]	Sex/Time	BASS[a]	Sex/Time	BASS[a]
Female (n=15)		Female (n=11)		Female (n=15)	
Beginning Fall	3.42	End Fall	3.34	Beginning Fall	3.41
End Fall	3.29*	End Spring	3.38	End Spring	3.39
Fall Average	3.36	Spring Average	3.36	Academic Year Average	3.40
Male (n=6)		Male (n=6)		Male (n=7)	
Beginning Fall	3.35	End Fall	3.61	Beginning Fall	3.43
End Fall	3.30*	End Spring	3.76	End Spring	3.52
Fall Average	3.32	Spring Average	3.69	Academic Year Average	3.48
All Subjects (n=21)		All Subjects (n=17)		All Subjects (n=22)	
Beginning Fall	3.40	End Fall	3.44	Beginning Fall	3.41
End Fall	3.29*	End Spring	3.52	End Spring	3.43
Fall Average	3.35	Spring Average	3.48	Academic Year Average	3.42

Note. [a]Data are presented as mean

*Statistically significantly ($p < 0.05$) less than beginning values

On the 5-point scale, all weight gain subjects averaged between 3 and 4 (3 = neither satisfied nor dissatisfied and 4 = mostly satisfied) (see Table 38). In the females' weight gain group for observation period 1, the females' body satisfaction significantly decreased by the end of fall semester. In the females' weight gain group for observation period 2 (spring semester), the females' body satisfaction had no significant changes, but they were somewhat satisfied with their bodies. In the females' weight gain group for observation period 3 (academic year), the females' body satisfaction had no significant changes, but they were somewhat satisfied with their bodies. In the males' weight gain group for observation period 1 (fall semester), the males' body satisfaction significantly decreased. In the males' weight gain group for observation period 2 (spring semester), the males' body satisfaction significantly increased. In the males' weight gain group for observation period 3 (academic year), the males' body satisfaction significantly increased. All male weight gain subjects were somewhat satisfied with their bodies. The males from observation period 2 seemed to be more satisfied than those in observation period 1 and 3. For all weight gain subjects in observation period 1 (fall semester), body satisfaction significantly decreased. For all weight gain subjects in observation period 2 (spring semester), body satisfaction significantly increased. For all weight gain subjects in observation period 3, no significant change occurred, but all weight gain subjects were somewhat satisfied with their bodies.

Table 39.

Means of the BASS and all 'weight loss/no change' groups for female and male subjects (observation periods: 1, 2, and 3)

Sex/Time	BASS[a]	Sex/Time	BASS[a]	Sex/Time	BASS[a]
Female (n=6)		Female (n=10)		Female (n=6)	
Beginning Fall	3.61	End Fall	3.54	Beginning Fall	3.65
End Fall	3.81*	End Spring	3.74*	End Spring	3.96*
Fall Average	3.71	Spring Average	3.64	Academic Year Average	3.81
Male (n=2)		Male (n=2)		Male (n=1)	
Beginning Fall	4.33	End Fall	3.39	Beginning Fall	4.78
End Fall	4.33	End Spring	3.33	End Spring	4.56
Fall Average	4.33	Spring Average	3.36	Academic Year Average	4.67
All Subjects (n=8)		All Subjects (n=12)		All Subjects (n=7)	
Beginning Fall	3.79	End Fall	3.52	Beginning Fall	3.81
End Fall	3.94*	End Spring	3.68*	End Spring	4.05*
Fall Average	3.87	Spring Average	3.60	Academic Year Average	3.93

Note. [a]Data are presented as mean

*Statistically significantly ($p < 0.05$) greater than beginning of fall values

On the 5-point scale, all weight loss/no change subjects averaged between 3 and 5 (3 = neither satisfied nor dissatisfied, 4 = mostly satisfied, and 5 = strongly satisfied) (see Table 39). In the females' weight loss/no change group for observation period 1 (fall

semester), body satisfaction significantly increased. In the females' weight loss/no change group for observation period 2 (spring semester), body satisfaction significantly increased. In the females' weight loss/no change group for observation period 3 (academic year), body satisfaction significantly increased. It appeared that body satisfaction of observation period 3 was higher than body satisfaction of observation periods 1 and 2 for the females' weight loss/no change groups. In the males' weight loss/no change group for observation period 1 (fall semester), body satisfaction had no significant change, but the two subjects were mostly satisfied with their bodies for fall semester. In the males' weight loss/no change group for observation period 2 (spring semester), body satisfaction significantly decreased. The subjects were somewhat satisfied with their bodies for spring semester. In the males' weight loss/no change group for observation period 3 (academic year), body satisfaction significantly decreased. Subjects were mostly satisfied with their bodies for the academic year. It appeared that body satisfaction of observation period 3 was higher than body satisfaction of observation periods 1 and 2. For all weight loss/no change subjects in observation period 1, body satisfaction significantly increased. The subjects were somewhat satisfied with their bodies. For all weight loss/no change subjects in observation period 2, body satisfaction significantly increased. The subjects were somewhat satisfied with their bodies. For all weight loss/no change subjects in observation period 3, body satisfaction significantly increased. The subjects were mostly satisfied with their bodies.

Research Question 4: Is there a change in cognitive appearance investment, and if so, is it related to weight gain or weight loss over the three observations?

To answer this research question, cognitive appearance investment was observed by using the ASI-R scale. Two subscales divide the ASI-R scale: Self-Evaluative Salience and Motivational Salience (see body image section in Appendix C). The Self-Evaluative Salience subscale is based on the mean score of 12-items (2, 5, 7, 8, 9, 11, 13, 14, 15, 16, 19, and 20), and the Motivational Salience subscale is based on the mean score of 8-items (1, 3, 4, 6, 10, 12, 17, and 18). Six of the total 20 items are reverse scored: 1, 4, 5, 9, 11, and 12 (i.e., 1 = 5, 2 = 4, 4 = 2, 5 = 1). The composite ASI-R score is based on the mean of the 20 items. A table in Microsoft Excel was created presenting the overall means and standard deviations of the ASI-R and its two subscales as a function of male and female subjects. The greater the mean, the more 'self-evaluatively' and 'motivationally' invested the subjects are.

Table 40.

ASI-R and 'weight gain' group for female and male subjects at the beginning of fall and end of fall semester (observation period 1)

Sex/Time	ASI-R[a] Composite	ASI-R[a] Self-Evaluative	ASI-R[a] Motivational
Female (n=15)			
Beginning of Fall	3.67 ± 0.53	3.50 ± 0.54	3.92 ± 0.60
End of Fall	3.59 ± 0.49*	3.36 ± 0.52*	3.93 ± 0.52
Fall Average	3.63 ± 0.51	3.43 ± 0.53	3.93 ± 0.56
Male (n=6)			
Beginning of Fall	3.13 ± 0.83	3.03 ± 0.78	3.27 ± 0.92
End of Fall	3.19 ± 0.84	2.99 ± 0.88	3.50 ± 0.84
Fall Average	3.16 ± 0.80	3.01 ± 0.79	3.39 ± 0.85
All Subjects (n=21)			
Beginning of Fall	3.51 ± 0.66	3.37 ± 0.64	3.73 ± 0.75
End of Fall	3.47 ± 0.61	3.25 ± 0.64*	3.81 ± 0.64
Fall Average	3.49 ± 0.63	3.31 ± 0.63	3.77 ± 0.69

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) less than beginning of fall values

In observation period 1 (see Table 40), the females' weight gain group (n=15) was significantly less invested in their overall (composite ASI-R) appearance by the end of

fall semester than at the beginning of fall semester. Their self-evaluative scores fell significantly. Their motivational scores stayed nearly the same. The males' weight gain group (n=6) was significantly more invested in their overall appearance by the end of fall semester than at the beginning of fall semester. Their self-evaluative scores stayed nearly the same, and their motivational scores increased significantly by the end of fall semester. On the 5-point scale, they each averaged between 3 and 4 (3 = neither agree or disagree and 4 = mostly agree). Higher scores indicate stronger associations with evaluating and attending to one's looks and appearance-maintaining behaviors.

When comparing the females' and males' weight gain groups for fall semester, the females were more invested in their overall appearance than the males. The females also had higher self-evaluative and motivational scores than the males. Overall, all weight gain subjects combined (n=21) were negligibly less invested in their overall appearance by the end of fall semester than at the beginning of fall semester. Their self-evaluative scores fell significantly. Their motivational scores increased significantly.

Table 41.

ASI-R and 'weight loss/no change' group for female and male subjects at the beginning of fall and end of fall semester (observation period 1)

Sex/Time	ASI-R[a] Composite	ASI-R[a] Self-Evaluative	ASI-R[a] Motivational
Female (n=6)			
Beginning of Fall	3.08 ± 0.43	2.75 ± 0.59	3.56 ± 0.65
End of Fall	2.97 ± 0.58*	2.56 ± 0.63*	3.58 ± 0.62
Fall Average	3.02 ± 0.49	2.65 ± 0.59	3.57 ± 0.60
Male (n=2)			
Beginning of Fall	3.05 ± 0.14	2.46 ± 0.06	3.94 ± 0.27
End of Fall	3.30 ± 0.49	2.75 ± 0.24	4.13 ± 0.88
Fall Average	3.18 ± 0.33	2.60 ± 0.22	4.03 ± 0.54
All Subjects (n=8)			
Beginning of Fall	3.07 ± 0.37	2.68 ± 0.52	3.66 ± 0.58
End of Fall	3.05 ± 0.55	2.60 ± 0.55*	3.72 ± 0.67
Fall Average	3.06 ± 0.45	2.64 ± 0.52	3.69 ± 0.61

Note. Mean ± SD 87 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) less than beginning of fall values

In observation period 1 (see Table 41), the females' weight loss/no change group (n=6) was significantly less invested in their overall appearance by the end of fall

semester than at the beginning of fall semester. Their self-evaluative scores fell significantly. Their motivational scores negligibly increased by the end of fall semester. The two males were more invested, but not significantly. Their self-evaluative and motivational scores significantly increased. On a 5-point scale, they each averaged between 2 and 5 (2 = mostly disagree, 3 = neither agree or disagree, 4 = mostly agree, and 5 = strongly agree). Higher scores indicate stronger associations with evaluating and attending to one's looks and appearance-maintaining behaviors.

When comparing the females' and males' weight loss/no change groups for fall semester, the females' weight loss/no change group (n=6) was less invested in their overall appearance than the males' weight loss/no change group (n=2). The females' self-evaluative scores were higher and their motivational scores were lower than the males' scores. Overall, all weight loss/no change subjects combined (n=8) were negligibly less invested in their overall appearance by the end of fall semester than at the beginning of fall semester. Their self-evaluative scores significantly fell. Their motivational scores significantly increased.

When comparing the females' weight gain group (n=15) for fall semester to the females' weight loss/no change group (n=6) for fall semester, the females' weight gain group was much more invested in their overall appearance than the females' weight loss/no change group. Also, the females' self-evaluative and motivational scores were higher in the weight gain group (see Table 40 and Table 41). When comparing the males' weight gain group (n=6) for fall semester to the males' weight loss/no change group (n=2) for fall semester, the males' weight gain and weight loss/no change groups had nearly the same investment in their overall appearance with 3.16 and 3.18 respectively.

The males' self-evaluative scores were higher in the weight gain group. Their motivational scores were lower than the males' weight loss/no change group. When comparing all weight gain subjects (n=21) and all weight loss subjects (n=8) for fall semester, the weight gain group was more invested in their overall appearance than the weight loss/no change group. Their self-evaluative and motivational scores were higher than the weight loss/no change group.

Table 42.

ASI-R and 'weight gain' group for female and male subjects at the end of fall and end of spring semester (observation period 2)

Sex/Time	ASI-R[a] Composite	ASI-R[a] Self-Evaluative	ASI-R[a] Motivational
Female (n=11)			
End of Fall	3.36 ± 0.42	3.06 ± 0.51	3.81 ± 0.47
End of Spring	3.32 ± 0.51	3.08 ± 0.73	3.69 ± 0.42*
Spring Average	3.34 ± 0.45	3.07 ± 0.62	3.75 ± 0.44
Male (n=6)			
End of Fall	3.32 ± 0.84	3.04 ± 0.86	3.73 ± 0.96
End of Spring	3.10 ± 0.81*	2.86 ± 0.68*	3.46 ± 1.11*
Spring Average	3.21 ± 0.79	2.95 ± 0.75	3.59 ± 1.00
All Subjects (n=17)			
End of Fall	3.34 ± 0.57	3.05 ± 0.63	3.78 ± 0.65
End of Spring	3.24 ± 0.62*	3.00 ± 0.70*	3.61 ± 0.71*
Spring Average	3.29 ± 0.59	3.03 ± 0.66	3.69 ± 0.68

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) less than end of fall values

In observation period 2 (see Table 42), the females' weight gain group (n=11) was significantly less invested in their overall (composite ASI-R) appearance by the end of

spring semester than at the end of fall semester. Their self-evaluative scores were nearly the same. Their motivational scores significantly decreased by the end of spring semester. The males' weight gain group (n=6) was significantly less invested in their overall appearance by the end of spring semester. Their self-evaluative and motivational scores significantly fell. On a 5-point scale, they each averaged between 2 and 4 (2 = mostly disagree, 3 = neither agree or disagree, and 4 = mostly agree). Higher scores indicate stronger associations with evaluating and attending to one's looks and appearance-maintaining behaviors.

When comparing the females' and males' weight gain groups for spring semester, the females' weight gain group (n=11) was more invested in their overall appearance than the males' weight gain group (n=6). The females' self-evaluative and motivational scores were higher than the males' scores. Overall, all weight gain subjects combined (n=17) were significantly less invested in their overall appearance by the end of spring semester than at the end of fall semester. Their self-evaluative and motivational scores significantly decreased by the end of spring semester.

Table 43.

ASI-R and 'weight loss/no change' group for female and male subjects at the end of fall and end of spring semester (observation 2)

Sex/Time	ASI-R[a] Composite	ASI-R[a] Self-Evaluative	ASI-R[a] Motivational
Female (n=10)			
End of Fall	3.47 ± 0.74	3.20 ± 0.81	3.86 ± 0.68
End of Spring	3.27 ± 0.71*	3.03 ± 0.72*	3.63 ± 0.73*
Spring Average	3.37 ± 0.71	3.11 ± 0.75	3.74 ± 0.69
Male (n=2)			
End of Fall	2.93 ± 0.18	2.58 ± 0.00	3.44 ± 0.44
End of Spring	2.90 ± 0.07	2.63 ± 0.06	3.31 ± 0.09*
Spring Average	2.91 ± 0.11	2.60 ± 0.04	3.38 ± 0.27
All Subjects (n=12)			
End of Fall	3.38 ± 0.70	3.10 ± 0.77	3.79 ± 0.65
End of Spring	3.20 ± 0.65*	2.96 ± 0.67*	3.57 ± 0.67*
Spring Average	3.29 ± 0.67	3.03 ± 0.71	3.68 ± 0.65

Note. Mean ± SD 141 ± 6 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) less than end of fall values

In observation period 2 (see Table 43), the females' weight loss/no change group (n=10) was significantly less invested in their overall appearance by the end of spring

semester than at the end of fall semester. Their self-evaluative and motivational scores fell significantly. The males' weight loss/no change group (n=2) had nearly the same amount of investment in their overall appearance by the end of spring semester than at the end of fall semester. Their self-evaluative scores significantly increased and their motivational scores significantly decreased by the end of spring semester. On a 5-point scale, they each averaged between 2 and 4 (2 = mostly disagree, 3 = neither agree or disagree, and 4 = mostly agree). Higher scores indicate stronger associations with evaluating and attending to one's looks and appearance-maintaining behaviors.

When comparing the females' and males' weight loss/no change groups for spring semester, the females' weight loss/no change group (n=10) was more invested in their overall appearance than the males' weight loss/no change group (n=2). The females had higher self-evaluative and motivational scores than the males. Overall, all weight loss/no change subjects combined (n=12) were significantly less invested in their overall appearance by the end of spring semester that at the end of fall semester. Also, their self-evaluative and motivational scores were significantly lower by the end of spring semester.

When comparing the females' weight gain group (n=11) for spring semester to the females' weight loss/no change group (n=10) for spring semester, the females' weight gain and weight loss/no change groups had nearly the same amount of investment in their overall appearance by the end of spring semester (see Table 42 and Table 43). The females' self-evaluative and motivational scores were nearly the same in both weight groups by the end of spring semester. Both weight groups had higher motivational scores than composite scores and self-evaluative scores. When comparing the males' weight

gain group (n=6) for spring semester to the males' weight loss/no change group (n=2) for spring semester, the males' weight gain group was more invested in their overall appearance. Also, the males' self-evaluative and motivational scores were higher in the weight gain group. When comparing all weight gain subjects (n=17) and all weight loss/no change subjects (n=12) for the spring semester, the weight gain and weight loss/no change groups had nearly the same amount of investment in their overall (composite) appearance by the end of spring semester. Their self-evaluative and motivational scores were nearly the same as well. Both weight groups had higher motivational scores than composite scores and self-evaluative scores.

Table 44.

ASI-R and 'weight gain' group for female and male subjects at the beginning of fall and end of spring semester (observation period 3)

Sex/Time	ASI-R[a] Composite	ASI-R[a] Self-Evaluative	ASI-R[a] Motivational
Female (n=15)			
Beginning of Fall	3.63 ± 0.55	3.47 ± 0.59	3.88 ± 0.60
End of Spring	3.49 ± 0.55*	3.27 ± 0.71*	3.83 ± 0.46*
Academic Year Average	3.56 ± 0.54	3.37 ± 0.65	3.85 ± 0.53
Male (n=7)			
Beginning of Fall	3.10 ± 0.76	2.94 ± 0.75	3.34 ± 0.86
End of Spring	2.96 ± 0.70*	2.77 ± 0.63*	3.25 ± 0.87*
Academic Year Average	3.03 ± 0.71	2.86 ± 0.67	3.29 ± 0.83
All Subjects (n=22)			
Beginning of Fall	3.46 ± 0.66	3.30 ± 0.67	3.70 ± 0.72
End of Spring	3.33 ± 0.63*	3.11 ± 0.71*	3.64 ± 0.66*
Academic Year Average	3.39 ± 0.64	3.21 ± 0.69	3.67 ± 0.68

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) less than beginning of fall values

In observation period 3 (see Table 44), the females' weight gain group (n=15) was significantly less invested in their overall appearance by the end of spring semester than

at the beginning of fall semester. Their self-evaluative and motivational scores fell significantly. The males' weight gain group (n=7) was significantly less invested in their overall appearance by the end of spring semester than at the beginning of fall semester. Their self-evaluative and motivational scores fell significantly. On the 5-point scale, they each averaged between 2 and 4. Higher scores indicate stronger associations with evaluating and attending to one's looks and appearance-maintaining behaviors.

When comparing the females' and males' weight gain groups for observation period 3, the females were more invested in their overall appearance than the males. The females also had higher self-evaluative and motivational scores than the males. Overall, all weight gain subjects combined (n=22) were significantly less invested in their overall appearance by the end of spring semester than at the beginning of fall semester. Also, their self-evaluative and motivational scores significantly fell.

Table 45.

ASI-R and 'weight loss/no change' group for female and male subjects at the beginning of fall and end of spring semester (observation period 3)

Sex/Time	ASI-R[a] Composite	ASI-R[a] Self-Evaluative	ASI-R[a] Motivational
Female (n=6)			
Beginning of Fall	3.17 ± 0.49	2.83 ± 0.58	3.67 ± 0.71
End of Spring	2.80 ± 0.42*	2.50 ± 0.32*	3.25 ± 0.65*
Academic Year Average	2.98 ± 0.48	2.67 ± 0.48	3.46 ± 0.69
Male (n=1)			
Beginning of Fall	3.15 ± 0.00	2.50 ± 0.00	4.13 ± 0.00
End of Spring	3.65 ± 0.00	3.00 ± 0.00	4.63 ± 0.00
Academic Year Average	3.40 ± 0.35	2.75 ± 0.35	4.38 ± 0.35
All Subjects (n=7)			
Beginning of Fall	3.16 ± 0.45	2.79 ± 0.55	3.73 ± 0.67
End of Spring	2.92 ± 0.50*	2.57 ± 0.35*	3.45 ± 0.80*
Academic Year Average	3.04 ± 0.47	2.68 ± 0.46	3.59 ± 0.72

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

*Statistically significantly ($p < 0.05$) less than beginning of fall values

In observation period 3 (see Table 45), the females' weight loss/no change group (n=6) was significantly less invested in their overall appearance by the end of spring

semester than at the beginning of fall semester. Their self-evaluative and motivational scores fell significantly. The one male was significantly more invested in his overall appearance at the end of spring semester than at the beginning of fall semester. His self-evaluative and motivational scores significantly increased. On the 5-point scale, they each averaged between 2 and 5. Higher scores indicate stronger associations with evaluating and attending to one's looks and appearance-maintaining behaviors.

When comparing the females' and males' weight loss/no change groups for observation period 3, the females were less invested in their overall appearance than the male of the weight loss/no change group. Their self-evaluative and motivational scores were also lower than the male. Overall, all weight loss/no change subjects combined (n=7) were significantly less invested in their overall appearance by the end of spring semester than at the beginning of fall semester. Their self-evaluative and motivational scores fell significantly.

When comparing the females' weight gain group (n=15) in observation period 3 to the females' weight loss/no change group (n=6), the females' weight gain group was more invested in their overall appearance than the females' weight loss/no change group (see Table 44 and Table 45). Their self-evaluative and motivational scores were higher than the females' weight loss/no change group scores. When comparing the males' weight gain group (n=7) in observation period 3 to the male with weight loss/no change, the male with weight loss/no change was more invested in his appearance than the weight gain group. His self-evaluative score was lower than the weight gain group's scores and his motivational score was higher than the weight gain group's scores. When comparing all weight gain subjects (n=22) and all weight loss/no change subjects (n=7) for

observation period 3, the weight gain group was more invested in their overall appearance than the weight loss/no change group. Their self-evaluative and motivational scores were higher than the weight loss/no change group's scores.

Table 46.

Mean Averages of the ASI-R and 'weight gain' group for female and male subjects for the entire academic year (observation period 1, 2, and 3 combined average)

Sex/Time	ASI-R[a] Composite	ASI-R[a] Self-Evaluative	ASI-R[a] Motivational
Female (n=15) Average	3.56 ± 0.53	3.35 ± 0.62	3.88 ± 0.52
Male (n=7) Average	3.07 ± 0.71	2.88 ± 0.70	3.36 ± 0.80
All Subjects (n=22) Average	3.41 ± 0.63	3.20 ± 0.68	3.72 ± 0.66

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

Table 47.

Mean Averages of the ASI-R and 'weight loss' group for female and male subjects for the entire academic year (observation period 1, 2, and 3 combined average)

Sex/Time	ASI-R[a] Composite	ASI-R[a] Self-Evaluative	ASI-R[a] Motivational
Female (n=6) Average	2.99 ± 0.48	2.66 ± 0.50	3.49 ± 0.64
Male (n=1) Average	3.48 ± 0.29	2.81 ± 0.27	4.50 ± 0.33
All Subjects (n=7) Average	3.06 ± 0.49	2.68 ± 0.47	3.64 ± 0.70

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

The females' weight gain group's combined average (n=15) for the entire academic year had higher motivational scores than self-evaluative scores and composite scores (see Table 46). The males' weight gain group's combined average (n=7) for the entire academic year had higher motivational scores than self-evaluative scores and composite scores. When comparing the females' and males' weight gain groups for the entire academic year, the females' weight gain group's combined average (n=15) was higher than the males' weight gain group's combined average (n=7) in composite scores. Their self-evaluative and motivational scores were also higher.

The females' weight loss/no change group's combined average (n=6) for the entire academic year had higher motivational scores than self-evaluative and composite scores (see Table 47). The one male with weight loss/no change for the entire academic year had higher motivational scores than self-evaluative and composite scores. When comparing the females' and the male with weight loss/no change for the academic year, the females' weight loss/no change group's combined average (n=6) was lower in composite scores. Their self-evaluative and motivational scores were also lower. Overall, all weight loss/no change subjects' combined average (n=7) was higher in motivational scores than self-evaluative and composite scores.

When comparing the females' weight gain group's combined average (n=15) for the entire academic year to the females' weight loss/no change group's combined average (n=6) for the academic year, the females' weight gain group was more invested in their overall appearance (see Table 46 and Table 47). Their self-evaluative and motivational scores were also higher. When comparing the males' weight gain group's combined average (n=7) for the entire academic year to the male with weight loss/no change for the entire academic year, the latter was more invested in overall appearance. The male with weight loss/no change also had a higher self-evaluative and motivational score. When comparing all weight gain subjects (n=22) and all weight loss subjects (n=7) for the entire academic year, the weight gain subjects were more invested in their overall appearance. Their self-evaluative and motivational scores were also higher.

Table 48.

Mean Averages of the ASI-R and 'all weight' groups for female and male subjects for the entire academic year (observation period 1, 2, and 3 combined average)

Sex/Time	ASI-R[a] Composite	ASI-R[a] Self-Evaluative	ASI-R[a] Motivational
Female (n=21) Average	3.40 ± 0.58	3.15 ± 0.67	3.77 ± 0.58
Male (n=8) Average	3.13 ± 0.68	2.87 ± 0.66	3.51 ± 0.84
All Subjects (n=29) Average	3.32 ± 0.62	3.08 ± 0.67	3.70 ± 0.67

Note. Mean ± SD 229 ± 14 days between measurements

[a]Data are presented as mean ± SD

When comparing all female subjects in both weight groups (n=21) to all male subjects in both weight groups (n=8) for the entire academic year, the females were more invested in their overall appearance. Their self-evaluative and motivational scores were also higher (see Table 48). Overall, all subjects (n=29) had higher motivational scores than self-evaluative and composite scores.

Summary

Table 49.

Means of the ASI-R and all 'weight gain' groups for female subjects (observation periods: 1, 2, and 3)

	Observation Period 1 Female (n=15)		Observation Period 2 Female (n=11)		Observation Period 3 Female (n=15)	
Composite	Begin Fall End Fall Fall Average	3.67 3.59* 3.63	End Fall End Spring Spr Average	3.36 3.32 3.34	Begin Fall End Spring Acad Average	3.63 3.49* 3.56
Self-eval	Begin Fall End Fall Fall Average	3.50 3.36* 3.43	End Fall End Spring Spr Average	3.06 3.08 3.07	Begin Fall End Spring Acad Average	3.47 3.27* 3.37
Motivational	Begin Fall End Fall Fall Average	3.92 3.93 3.93	End Fall End Spring Spr Average	3.81 3.69* 3.75	Begin Fall End fall Acad Average	3.88 3.83* 3.85

*Statistically significantly ($p < 0.05$) less than beginning values

In the females' weight gain group for observation period 1, overall investment in appearance significantly decreased (see Table 49). Their self-evaluative scores were significantly lower than at the beginning of the fall. In the females' weight gain group for observation period 2, overall investment in appearance had no significant changes. The motivational scores significantly decreased. In the females' weight gain group for observation period 3, overall investment in appearance significantly decreased. Their

self-evaluative and motivational scores significantly decreased. Out of the three observation periods, the females' weight gain group for observation period 1 (fall semester) had the highest overall appearance-investment, self-evaluative, and motivational scores.

Table 50.

Means of the ASI-R and all 'weight gain' groups for male subjects (observation periods: 1, 2, and 3)

	Observation Period 1 Male (n=6)		Observation Period 2 Male (n=6)		Observation Period 3 Male (n=7)	
Composite	Begin Fall End Fall Fall Average	3.13 3.19 3.16	End Fall End Spring Spr Average	3.32 3.10* 3.21	Begin Fall End Spring Acad Average	3.10 2.96* 3.03
Self-eval	Begin Fall End Fall Fall Average	3.03 2.99 3.01	End Fall End Spring Spr Average	3.04 2.86* 2.95	Begin Fall End Spring Acad Average	2.94 2.77* 2.86
Motivational	Begin Fall End Fall Fall Average	3.27 3.50 3.39	End Fall End Spring Spr Average	3.73 3.46* 3.59	Begin Fall End fall Acad Average	3.34 3.25* 3.29

*Statistically significantly ($p < 0.05$) less than beginning values

In the males' weight gain group for observation period 1, overall investment in appearance had no significant changes (see Table 50). Their motivational scores

significantly increased. In the males' weight gain group for observation period 2, overall investment in appearance significantly decreased. Their self-evaluative and motivational scores significantly decreased. In the males' weight gain group for observation period 3, overall investment in appearance significantly decreased. Their self-evaluative and motivational scores significantly decreased. Out of the three observation periods, the males' weight gain group with the highest overall appearance-investment and motivational scores was observation period 2 (spring semester). The observation period with the highest self-evaluative scores was observation period 1 (fall semester).

Table 51.

Means of the ASI-R and all 'weight loss/no change' groups for female subjects (observation periods: 1, 2, and 3)

	Observation Period 1 Female (n=6)		Observation Period 2 Female (n=10)		Observation Period 3 Female (n=6)	
Composite	Begin Fall End Fall Fall Average	3.08 2.97* 3.02	End Fall End Spring Spr Average	3.47 3.27* 3.37	Begin Fall End Spring Acad Average	3.17 2.80* 2.98
Self-eval	Begin Fall End Fall Fall Average	2.75 2.56* 2.65	End Fall End Spring Spr Average	3.20 3.03* 3.11	Begin Fall End Spring Acad Average	2.83 2.50* 2.67
Motivational	Begin Fall End Fall Fall Average	3.56 3.58 3.57	End Fall End Spring Spr Average	3.86 3.63* 3.74	Begin Fall End fall Acad Average	3.67 3.25* 3.46

*Statistically significantly ($p < 0.05$) less than beginning values

In the females' weight loss/no change group for observation period 1, overall investment in appearance significantly decreased (see Table 51). Their self-evaluative scores significantly decreased. In the females' weight loss/no change group for observation period 2, overall investment in appearance significantly decreased. Their self-evaluative and motivational scores significantly decreased. In the females' weight loss/no change group for observation period 3, overall investment in appearance significantly decreased. Their self-evaluative and motivational scores decreased. Out of

the three observation periods, the females' weight loss/no change group for observation period 2 (spring semester) had the highest overall appearance-investment, self-evaluative, and motivational scores.

Table 52.

Means of the ASI-R and all 'weight loss/no change' groups for male subjects (observation periods: 1, 2, and 3)

	Observation Period 1 Male (n=2)		Observation Period 2 Male (n=2)		Observation Period 3 Male (n=1)	
Composite	Begin Fall	3.05	End Fall	2.93	Begin Fall	3.15
	End Fall	3.30	End Spring	2.90	End Spring	3.65
	Fall Average	3.18	Spr Average	2.91	Acad Average	3.40
Self-eval	Begin Fall	2.46	End Fall	2.58	Begin Fall	2.50
	End Fall	2.75	End Spring	2.63	End Spring	3.00
	Fall Average	2.60	Spr Average	2.60	Acad Average	2.75
Motivational	Begin Fall	3.94	End Fall	3.44	Begin Fall	4.13
	End Fall	4.13	End Spring	3.31*	End fall	4.63
	Fall Average	4.03	Spr Average	3.38	Acad Average	4.38

*Statistically significantly ($p < 0.05$) less than beginning values

In the males' weight loss/no change group for observation period 1 (fall semester), overall investment in appearance significantly increased (see Table 52). Their self-evaluative and motivational scores significantly increased. In the males' weight

loss/no change group for observation period 2 (spring semester), overall investment in appearance had no significant changes. Their self-evaluative scores increased and their motivational scores decreased. For the one male with weight loss/no change in observation period 3 (academic year), overall investment in appearance significantly increased. Self-evaluative and motivational scores significantly increased. Out of the three observation periods, the one male with weight loss/no change in observation period 3 had the highest overall appearance-investment, self-evaluative, and motivational scores.

CHAPTER V. SUMMARY, CONCLUSION AND RECOMMENDATION

Discussion and Conclusions

The phrase “Freshman 15” is used to describe the idea that college freshmen will gain an average of fifteen pounds of body weight in their first year of college. Although the idea pervades college campuses and inundates the minds of freshmen believers, little scientific evidence exists. The research is limited but suggests not all freshmen gain an average of 15 pounds. Weight change in female freshmen students has been documented more often than in males. Various factors associated with weight change in both cases have not been extensively documented. Previous studies were typically conducted for only one semester. Nearly all were conducted outside the southeast region of the United States where the prevalence of obesity is high.

The purpose of this study was to longitudinally assess the “Freshman 15” construct by investigating young men’s and women’s size and shape changes based on their three-dimensional body scan measurements and their body image constructs (body satisfaction/dissatisfaction and cognitive investments in appearance). Male and female subjects were analyzed together and separately. Data collection occurred at three points in time: (1) the beginning of fall semester 2006; (2) the end of fall semester 2006; and (3) the end of spring semester 2007.

A total of 36 subjects (26 females, 10 males) volunteered for the study at the beginning of fall semester. At the end of fall semester, all 36 subjects returned for the follow-up assessments. However, data from one female subject was not included in the data analysis due to an eating disorder diagnosis. At the end of spring semester, 30 subjects (22 females, 8 males) returned for the follow-up assessments. As previously noted, data from the one female subject with the suspected eating disorder was not included in the data analysis for spring semester. Thus, 29 subjects (21 females, 8 males) were used in the spring semester data collection.

Weight Change

The weight change results of the study reported here found about 76% of the female and male students gained weight their first academic year, suggesting weight gain is an issue among college freshmen. Yet, instead of the well publicized "Freshman 15," this research suggested the "Freshman 4." The weight gain of about 4 pounds was the same for females and males.

Of four studies found in the literature, only two studies examined weight change over an academic year in college freshmen (Graham & Jones, 2002; Ritter, 2006). Of the two, only one examined both females and males (Graham & Jones, 2002).

There are similarities between the present study and research from Duncan and Simpson (Ritter, 2006). They conducted an unpublished study of the "Freshman 15," at the University of Guelph (Canada), which only used female freshmen students (Ritter, 2006). Their study found that weight gain in more than 100 first-year college women was an average of about 5 pounds over the course of the year. This is comparable to the present

study's findings of about 4 pounds over the academic year.

Graham and Jones (2002) examined both females and males throughout the first academic year; differences were found between the present study and their research findings. Their subjects consisted of 49 freshmen at a small Midwestern liberal arts college observed at the beginning and end of the year. Their findings revealed no significant weight gain at the end of the year. An average of 1.5 pounds in weight loss was documented. Those researchers called the "Freshman 15" a myth (Graham & Jones, 2002).

Some studies only examined weight change during students' first semester. Levitsky et al. (2004) reported an average weight gain of 4 pounds after one semester. These findings were twice the average weight gain of 2 pounds found in the females and males after fall semester in the present study.

Hoffman et al. (2006) measured and documented weight gain during the second semester (spring) of freshmen year, providing data only for those who gained weight over those months. For the females and males in the study who gained weight, the mean increase in body weight was 6.82 pounds at the end of spring semester. Their mean weight gain for the weight gain group was slightly more than that of the present study. In the weight gain group (females and males) for spring semester, the mean weight gain was 4.5 pounds for the present study.

When comparing the total weight changes reported here to the existing literature, the present study contributes important findings. Freshman weight gain was found for female and male students. It was not the highly publicized "Freshman 15" pounds. It was a significant weight gain of about 4 pounds in both female and male subjects combined

over the academic year, while attending a large public university in the Southeastern part of the United States. Results of weight change reported in this study and results of the literature reviewed suggest that the "Freshman 15" is not well found in research. The study suggests that though there is an average weight gain across freshmen studied, the number could be reduced to 4 to 5 pounds on average. With all of the changing aspects of college life, the weight gain in the freshman year is a possibility but is not inevitable.

Change in Body Measurements

This study employed use of 3D body scanning technology, which brought visual dimension to the research allowing researchers to see where weight change might occur. Three-dimensional body scanning is becoming a standard practice for research that involves body shape change, as well as body measurement change (Bougourd, Dekker, Ross, & Ward, 2000; McKinnon & Istook, 2002; Simmons & Istook, 2003; $[TC]^2$, 2008a; Wells, Treleaven, & Cole, 2007). "With the use of 3D body scanners, body measurement techniques can be non-contact, instant, and accurate" (Simmons & Istook, 2003, p. 306). Three-dimensional body scanning provides many more aspects in capturing measurements by using an electronically derived image-based method as compared with the traditional manual measurement approach which is particularly problematic or unreliable (Bougourd et al., 2000). Measurements of body scans are extracted in seconds and are consistent when measuring a large number of locations or landmarks on the human body. Additionally, it is a more desirable method of measuring the human body, allowing privacy of individuals in that no physical contact has to be made to extract measurements, unlike traditional measures (Simmons & Istook, 2003).

Table 53.

Body scan measurement increases and all 'weight gain' groups for female subjects (observation periods: 1, 2, and 3)

Observation Period 1 (n=15)		Observation Period 2 (n=11)		Observation Period 3 (n=15)	
Neck	1/2 inch	Waist Bust	7/8 inch 5/8 inch	Waist Hips	1/2 inch 1/2 inch

For this study, body scan derived measurements were recorded for the neck, bust, biceps, waist, hips, and thighs for females; and for the neck, chest, biceps, waist, hips, and thighs for the males. When comparing the females' weight gain groups across the three observation periods, some patterns were found (see Table 53). In the females' weight gain group for observation period 1 (fall semester – beginning of fall semester to the end of fall semester), the neck measurement increased the most with more than one-half of an inch increase. The females' weight gain group in observation period 1 had a mean weight gain of 3.82 pounds. In the females' weight gain group for observation period 2 (spring semester – end of fall semester to the end of spring semester), the measurements to increase the most were the waist (nearly seven-eighths of an inch) and the bust (about five-eighths of an inch). The females' weight gain group in observation 2 had a mean weight gain of 4.06 pounds. In the females' weight gain group for observation period 3 (academic year – beginning of fall semester to the end of spring semester), the measurements to increase the most were the hips (over one-half of an inch) and the waist (over one-half of an inch). The females' weight gain group for observation

period 3 had a mean weight gain of 5.6 pounds. There appeared to be common "measurement-area" increases for the waist measurement in observation period 2 and 3. Findings are consistent with literature, that suggest that the hips have are the most typical weight gain area for females (Kalodner & Scarano, 1992; Bird, 2006). Observation period 3 had the highest mean weight gain, with the hip measurement increasing over one-half of an inch.

Table 54.

Body scan measurement increases and all 'weight gain' groups for male subjects (observation periods: 1, 2, and 3)

Observation Period 1 (n=6)		Observation Period 2 (n=6)		Observation Period 3 (n=7)	
Thighs	1 inch	Chest	1 inch	Chest	7/8 inch
Waist	1/2 inch	Waist	1/4 inch	Waist	2/3 inch
Bicep	3/8 inch	Hips	1/4 inch	Bicep	1/2 inch
				Hips	2/5 inch
				Thighs	2/5 inch

When comparing the males' weight gain groups across the three observation periods, patterns were found (see Table 54). In the males' weight gain group for observation period 1 (fall semester – beginning of fall semester to the end of fall semester), the measurements with the most increase were the thighs (nearly one inch), the waist (one-half of an inch), and the bicep (about three-eighths of an inch). The males'

weight gain group for observation period 1 had a mean weight gain of 3.37 pounds. In the males' weight gain group for observation period 2 (spring semester – end of fall semester to the end of spring semester), the measurements with the most increase were the chest (about one inch), the hips (nearly one-third of an inch), and the waist (about one-fourth of an inch). The males' weight gain group for observation period 2 had a mean weight gain of 5.33 pounds. In the males' weight gain group for observation period 3 (academic year – beginning of fall semester to the end of spring semester), the measurements with the most increase were the chest (nearly seven-eighths of an inch), the waist (nearly two-thirds of an inch), the bicep (about one-half of an inch), the hips (two-fifths of an inch), and the thighs (nearly two-fifths of an inch). The males' weight gain group for observation period 3 had a mean weight gain of 6.23 pounds. There appeared to be common "measurement-area" increases for the waist in observation periods 1, 2, and 3. There appeared to be common "measurement-area" increases for the chest, hips, and waist in observation periods 2 and 3. There appeared to be common "measurement-area" increases for the thighs and waist in observation periods 1 and 3.

Table 55.

Body scan measurement decreases and all 'weight loss/no change' groups for female subjects (observation periods: 1, 2, and 3)

Observation Period 1 (n=6)		Observation Period 2 (n=10)		Observation Period 3 (n=6)	
Waist	-7/8 inch	Bust	-5/8 inch	Bust	-7/8 inch
Hips	-3/4 inch	Hips	-1/3 inch	Hips	-2/3 inch
Thighs	-1/2 inch	Neck	-1/2 inch	Neck	-1/2 inch
				Thighs	-1/2 inch

When comparing the females' weight loss/no change groups across the three observation periods, some patterns were found (see Table 55). In the females' weight loss/no change group for observation period 1 (fall semester – beginning of fall semester to the end of fall semester), the measurements that decreased the most were the waist (about seven-eighths of an inch), the hips (about three-fourths of an inch), and the thighs (about one-half of an inch). The females' weight loss/no change group for observation period 1 had a mean weight change of -3.07 pounds. In the females' weight loss/no change group for observation period 2 (spring semester – end of fall semester to the end of spring semester), the measurements with the most decrease were the bust (nearly five-eighths of an inch), the neck (one-half of an inch), and the hips (nearly one-third of an inch). The females' weight loss/no change group for observation period 2 had a mean weight change of -1.56 pounds. In the females' weight loss/no change group for observation period 3 (academic year – beginning of fall semester to the end of spring

semester), the measurements with the most decrease were the bust (nearly seven-eighths of an inch), the hips (about two-thirds of an inch), the thighs (about one-half of an inch), and the neck (nearly one-half of an inch). The females' weight loss/no change group for observation period 3 had a mean weight change of -2.67 pounds. There appeared to be common "measurement-area" decreases for the hip measurement in observation periods 1, 2, and 3. There appeared to be common "measurement-area" decreases for the thigh and hip measurement in observation periods 1 and 3. There appeared to be common "measurement-area" decreases for the bust, neck, and hip measurement in observation periods 2 and 3.

Table 56.

Body scan measurement decreases and all 'weight loss/no change' groups for male subjects (observation periods: 1, 2, and 3)

Observation Period 1 (n=2)		Observation Period 2 (n=2)		Observation Period 3 (n=1)	
Thighs	-3/4 inch	Thighs	-2/5 inch	Thighs	-1/2 inch
Waist	-1/6 inch			Waist	-1/2 inch

Table 57.

Body scan measurement increases and all 'weight loss/no change' groups for male subjects (observation periods: 1, 2, and 3)

Observation Period 1 (n=2)		Observation Period 2 (n=2)		Observation Period 3 (n=1)	
Chest	1/2 inch	Bicep	minimal	Chest	4/5 inch
Bicep	1/4 inch				
Hips	1/5 inch				

When comparing the males' weight loss/no change groups across the three observation periods, patterns were found (see Table 56 and Table 57). In the males' weight loss/no change group for observation period 1 (fall semester – beginning of fall semester to the end of fall semester), the measurements with the most decrease were the thigh (about three-fourths of an inch) and the waist (about one-sixth of an inch). The males' weight loss/no change group for observation period 1 had a mean weight change of -1.3 pounds. In the males' weight loss/no change group for observation period 2 (spring semester – end of fall semester to the end of spring semester), the measurement with the most amount of decrease was the thigh (about two-fifths of an inch). The males' weight loss/no change group for observation period 2 had a mean weight change of -3.4 pounds. In the weight loss/no change group for observation period 3 (academic year – beginning of fall semester to the end of spring semester), the measurements with the most amount of decrease were the thigh (about one-half of an inch) and the waist (about one-half of an inch). The males' weight loss/no change group for observation period 3 had a

mean weight change of -0.8 pounds. There appeared to be common “measurement-area” decreases for the thighs in observation periods 1, 2, and 3. There appeared to be common “measurement-area” decreases for the waist and thighs in observation periods 1 and 3. There seemed to be some patterns of measurement increase in the males’ weight loss/no change groups. In the males’ weight loss/no change group for observation period 1 (fall semester – beginning of fall semester to the end of fall semester), the measurements with increased amounts were the chest (about one-half of an inch), the bicep (about one-fourth of an inch), and the hips (about one-fifth of an inch). In the males’ weight loss/no change group for observation period 2 (spring semester – end of fall semester to the end of spring semester), the measurement with an increase was the bicep. In the males’ weight loss/no change group for observation period 3 (academic year – beginning of fall semester to the end of spring semester), the measurement with an increase was the chest (four-fifths of an inch). The common “measurement-area” increases for the bicep measurement were found in observation periods 1 and 2. The common “measurement-area” increases for the chest measurement were found in observation periods 1 and 3. These increases in measurements for the males’ weight loss/no change groups could indicate that these males participated in physical activity that included some combination of weight and strength training. The bicep and chest areas in men are targeted areas for increased muscle development for those who engage in certain types of physical activity.

There appeared to be a greater trend in lower body weight changes over upper body weight changes from the results reported here for female subjects over the academic year (subjects that gained or lost weight). The same seems to be true for the male subjects who gained or lost weight throughout the academic year, with the exception of the males

who lost and/or maintained their weight and had increases in the bicep and chest measurements.

Body Satisfaction

Body image has multidimensional definitions with multiple interpretations and meanings. Definitions stem from a range of different theoretical orientations, including phenomenology, neurology, experimental psychology, psychoanalysis and feminist philosophy. According to Cash and Pruzinsky (2002, p.38), "satisfaction or dissatisfaction with one's body, including evaluative beliefs about it," refers to *body image evaluation*. Body image evaluations develop from the degrees of differences or similarities between self-perceived physical characteristics and personally valued appearance ideals (Cash & Szymanski, 1995).

The present study reported here suggested a relationship between weight gain and body dissatisfaction. As fall semester progressed, the group of subjects who gained weight became less satisfied with their bodies than at the beginning of fall semester. Female subjects who lost weight or maintained their weight by the end of fall semester showed an increase in body satisfaction; the small males' weight loss/no change group maintained their body satisfaction for fall semester. When comparing the weight gain group to the weight loss/no change group, the females' weight loss/no change group were more satisfied with their bodies than the females' weight gain group for fall semester. Like the females, the males' weight loss/no change group was more satisfied with their bodies than the males' weight gain group for fall semester.

The findings in this present research are consistent with some of the reviewed literature. A study by Heatherton et al. (1997) found that body image concerns increased with increasing body weight. Furthermore, increased body weight was found to be the strongest predictor of body dissatisfaction in women. Body dissatisfaction emerges as an individual compares her/his perception of actual body size with the internalized notion of cultural ideals, interpersonal experiences, physical characteristics, and personality attributes (Blood, 2005).

When comparing the females' weight gain group to the males' weight gain group for spring semester and the academic year, the males' were more satisfied with their bodies than the females. Other researchers have found differences between females' and males' body satisfaction as well, suggesting that men tend to be relatively satisfied with their bodies (Forbes, Adams-Curtis, & Rade, 2001; Rozin, Trachtenburg, & Cohen, 2001). Studies show that women diet more (Liebman, Cameron, & Carson, 2001; Wardle, Haase, & Steptoe, 2004) and are more frustrated with their bodies than men (Lokken, Ferraro, Kirchner, & Bowling, 2003; Rozin et al., 2001; Smith, Thompson, & Raczynski, 1999; Yates, Edman, & Aruguete, 2004).

Some research suggests that young women's body images may actually be improving. By using over 15 years of archived MBSRQ data collected at Old Dominion University, a cross-sectional investigation was conducted by Cash, Morrow, Hrabosky, and Perry (2004). The researchers observed changes in multiple facets of body image among 3,127 male and female college students from 1983 through 2001. The same standardized assessment was used in 22 studies. The four MBSRQ subscales examined were: Appearance Evaluation, Body Areas Satisfaction, Overweight Preoccupation, and

Appearance Orientation. From the 1980s to the early 1990s, young women's appearance evaluation, body satisfaction, and overweight preoccupation worsened significantly, but it progressively improved significantly in the late 1990s. Men's body images remained relatively stable over the time periods and were more positive than those of the women. They also had lower appearance investment than the women. The only significant change for men was their decline in overweight preoccupation following the 1980s.

Pope, Phillips, and Olivardia (2000) provided a foundation for heightened concerns about male preoccupation with physical appearance. The findings of the present study reported may support this issue, as the group of males with weight loss or no change had increases in body satisfaction. Increases in muscle mass may have taken place in some of the male subjects as well. There seemed to be some patterns of measurement increase in the males' weight loss/no change groups. In the males' weight loss/no change group for observation period 1 (fall semester – beginning of fall semester to the end of fall semester), the body measurements with increased amounts were the chest (about one-half of an inch), the bicep (about one-fourth of an inch), and the hips (about one-fifth of an inch). In the males' weight loss/no change group for observation period 2 (spring semester – end of fall semester to the end of spring semester), the body measurement with an increase was the bicep. In the males' weight loss/no change group for observation period 3 (academic year – beginning of fall semester to the end of spring semester), the measurement with an increase was the chest (four-fifths of an inch). The common "measurement-area" increases for the bicep measurement were found in observation periods 1 and 2. The common "measurement-area" increases for the chest measurement were found in observation periods 1 and 3. These increases in

measurements for the males' weight loss/no change groups may indicate that these males are preoccupied with physical activity that includes some combination of weight and strength training for the upper body. The males of the weight loss/no change group for observation period 1 were mostly satisfied with their bodies, and the one male of the weight loss/ no change group for observation period 3 was more than "mostly satisfied" with his body.

A meta-analysis of attractiveness and body image utilized 222 studies, which indicated that the gender differences in body dissatisfaction are increasing, with women becoming more dissatisfied than men (Feingold & Mazzella, 1998). By the end of spring semester for the females' weight loss/no change group, body satisfaction increased from the end of fall semester. For the males' weight loss/no change group, body satisfaction actually decreased by the end of spring semester from the end of fall semester. These males who lost weight or had no change in weight were physically smaller and may have wanted to be larger. When comparing females and males' weight loss/no change groups, the females were more satisfied with their bodies than the males' weight loss/no change group for spring semester. For all subjects in spring semester, the weight gain group was less satisfied with their bodies than the weight loss/no change group.

All subjects combined were fairly satisfied with their bodies for the academic year. The males' weight gain group was more satisfied with their bodies than the females' weight gain group for the academic year. Of the weight loss/no change groups for the academic year, the males' weight loss/no change group reported greater satisfaction than the females' weight loss/no change group. The females' weight loss/no change group was more satisfied with their bodies than the females' weight gain group

when compared over the academic year. Like the females' weight loss/no change group, the males' weight loss/no change group was more satisfied than the males' weight gain group for the academic year. Overall, the weight loss/no change subjects were more satisfied with their bodies than the weight gain subjects for the academic year. When combining both the weight gain and weight loss/no change groups for the academic year, the females were less satisfied with their bodies than the males.

In comparison to the studies in the reviewed literature similarities continue to arise. A study by Tiggemann and Lynch (2001) revealed that women's desires to be thinner do not diminish across age spans, nor does their preoccupation with being overweight, or their satisfaction with appearance. The ideal shape presented in the media has become thinner over the past 30 years, yet women have actually become heavier in weight. As an apparent consequence of this weight change from the supposed ideal body size and shape, many women have experienced dissatisfaction with their body size and shape. This is so common that researchers call it "a normative discontent" (Rodin et al., 1985; Tiggemann & Lynch, 2001).

Many men want to alter their body image, as do women, according to Pope, Phillips, and Olivardia (2000). Men are frequently obsessed with body shape and muscularity. Other researchers highlight the idea that lack of exercise versus compulsive exercise, and appearance obsessions are common problems of body shape concerns faced by men today (Anderson, Cohn, & Holbrook, 2000). Such body shape concerns provide a standpoint for their body image and body satisfaction/dissatisfaction awareness. These two studies found that the desire for men to meet the current appearance standards led many of them to spend excessive amounts of time attempting to change their appearance,

and in some cases to take extensive risks in doing so (such as using steroids). A form of body image anguish may emerge in young men as a vague sense of concern regarding body weight or shape. This lost sense of concern is only apparent to the outside world and/or friends with whom young men feel they cannot express their self-esteem, weight, shape, or image issues. Instead of expressing them, they neglect them. Neglecting to express their feelings towards their bodies makes it difficult for researchers to make a sound judgment (Pope et. al., 2000).

The discontentment with one's body image has been labeled in multiple ways, including negative body image, body image disturbance, and body image dissatisfaction. All notions are often associated with body weight and weight-sensitive body parts. The notions are, in many cases, most prevalent in women and overweight people (Cash & Pruzinsky, 2002). Discontentment with body image is a central factor in weight loss decisions, including how much weight to lose and calculating whether losing weight will significantly benefit the individual and lead to positive changes in body image (Cash & Pruzinsky, 2002). In a cross-sectional study, researchers surveyed 1,200 Radcliffe undergraduates in 1982 and 1992 (Heatherton, Keel, Nichols, & Mahamedi, 1995). Their primary goal was to compare the two cohorts on weight, dieting, and eating-disordered symptoms, but they also included an assessment of students' perceptions of their weight. Results reflected a decline in a variety of eating-disordered symptoms over the decade, and women in 1992 were less likely to consider themselves overweight than those in 1982 (31% vs. 42%, respectively). The male cohorts showed very few differences between 1982 and 1992.

Another generation of body image measures has concentrated on isolating and identifying specific components of body image weight-related issues present in multiple populations. Behavioral aspects of body image are quantified in the Body Image Avoidance Questionnaire (Rosen, Srebnik, Saltzberg, & Wendt, 1991), and the Goldfarb Fear of Fat Scale (GFFS) (Goldfarb, Dykens, & Gerrard, 1985). The Body Image Avoidance Questionnaire assessed the frequency with which 145 female undergraduates engaged in avoidance behaviors related to body image. The GFFS investigated the behavioral patterns of females who feared weight gain.

Replicating previous findings by Cash and Szymanski (1995), Cash and Henry (1995) found that the evaluative body-image gestalt is a weighted, additive composite of discontent with most aspects of one's appearance. In their study, almost one-half of the women reported globally negative evaluations of their appearance and concerns with being or becoming overweight. Over one-third of the women expressed body-image discontent or dissatisfaction, which averaged across eight isolated physical areas or aspects of the body (Cash & Henry, 1995).

Appearance Investment

Much of the literature on body image concentrates on the evaluative dimension and overlooks body image investment (importance or cognitive-behavioral salience of one's appearance) (Cash & Deagle, 1997; Cash & Pruzinsky, 2002). According to Cash and Pruzinsky (2002, p.38), "the cognitive, behavioral, and emotional importance of the body for self-evaluation" refers to *body image investment.* The body image construct is built around the basis of self-schemas related to one's appearance. In an early defining

study, Markus (1977) identified self-schemas as “cognitive generalizations about the self, derived from past experience, that organize and guide the processing of self-related information contained in an individual’s social experience” (p. 64). Markus offered the idea that a person who is schematic of their body and appearance will process important information differently than a person who is not schematic (1977). Cash and Labarge (1996) developed the original Appearance Schemas Inventory (ASI) to assess these body image self-schemas that reflect one’s core and the influence of one’s appearance in life.

Appearance-schematic processing and activating events based on cognitive-behavioral perspectives develop from related events that activate self-evaluations of one’s physical appearance (Cash, 1997). According to Cash’s and colleagues’ (2003, p.309) revision of the Appearance Schemas Inventory, the first ASI-R factor assesses the self-evaluative salience of appearance or beliefs about how his/her looks influence their personal or social worth and sense of self. The other ASI-R factor developed by Cash and colleagues (2003, p.309), assesses the individual’s motivational salience about being attractive and managing their appearance.

The results of the present study suggested relationships between the ASI-R body image dimensions (composite, self-evaluative, and motivational investment in appearance) and weight change groups. The scores for the motivational salience factor were higher for all subjects at each observation period than the scores for the self-evaluative salience factor. Therefore, valuing and attending to one’s appearance and engaging in grooming behaviors (appearance-management) to appear or feel attractive has seemed at least relatively important to all subjects, whether they gained or lost weight over the academic year.

Some appearance investment patterns for female and male subjects for fall and spring semester were apparent. All female subjects, whether they belonged to the weight gain group (average weight gain of 3.82 pounds) or the weight loss/no change group (average weight loss of 3.07 pounds) for fall semester, showed declines in their composite investment in appearance and self-evaluative investment in appearance scores. Both groups had higher motivational scores by the end of fall semester. The females' weight loss/no change group, with a mean weight change of -1.56 pounds for spring semester, showed significant drops in overall, self-evaluative, and motivational scores by the end of spring semester. The females' weight gain group, with a mean weight change of 4.06 pounds for spring semester, also showed a significant decline in their overall appearance investment and significantly lower motivational scores by the end of spring semester. The females' weight gain group for the academic year, with a mean weight change of 5.6 pounds, had significantly lower composite, self-evaluative, and motivational scores. The females' weight loss/no change group for the academic year, with a mean weight change of -2.67 pounds, had significantly lower composite, self-evaluative, and motivational scores.

The males' weight change groups did not have many patterns in common for fall and spring semester as the females' weight change groups. The males' weight gain group from the beginning of fall semester to the end of fall semester, with a mean weight change of 3.37 pounds, had significantly higher composite and motivational scores. The males' weight loss/no change group, with a mean weight change of -1.3 pounds, had significantly higher composite, self-evaluative, and motivational scores by the end of fall semester. The males' weight gain group by the end of spring semester, with a mean

weight change of 5.33 pounds, had significantly lower composite, self-evaluative, and motivational scores. The males' weight loss/no change group, with a mean weight change of -3.4 pounds by the end of spring semester, had significantly lower composite and motivational scores. Their self-evaluative scores were significantly higher. The males' weight gain group by the end of the academic year, with a mean weight change of 6.23 pounds, had significantly lower composite, self-evaluative, and motivational scores. The males' weight loss/no change group by the end of the academic year, with a mean weight change of -0.8 pounds, had significantly higher composite, self-evaluative, and motivational scores.

When comparing weight change groups to each other for each semester and the academic year (weight gain versus weight loss/no change), differences and commonalities are perceptible. The females' weight gain group for fall semester was more invested in appearance than the females' weight loss/no change group. Their self-evaluative and motivational scores were both higher. In sum, the females' weight gain groups were all more motivationally invested in their appearance than the females' weight loss/no change groups.

The transition into the college atmosphere from high school may have triggered changes in attitudes on managing/maintaining one's appearance or self-evaluations of their appearance. Such changes in attitudes could have been activated by the "dress down" effect. In a day-to-day college student's schedule, such as going to and from class, "dressing down" for class is a common act made by many students. A typical college student "look" for "dressing down," would be shorts and a T-shirt with flip-flops. Such "dressing down" behaviors may have adapted as a college mainstay in today's college

students' minds, rather than the professional attire someone would think students would be implementing for future transition from college to the workforce. The lack of self-evaluation and motivation to have the "proper" look is not widely implemented by the existing majority of "already-established" college students (sophomores to seniors). So, if these students do not have the motivation or desires to set a "proper" look for college students then the new, incoming freshmen have no need to keep up their looks. Many students transitioning in their first semester of college start out making the extra efforts. Extra efforts tend to diminish as their desire to "blend in" takes affect as the first year progresses. They may recognize that their extra efforts are not worth it, as studying and other activities consume their time as well. Results reported here in the study showed that students had lower self-evaluative and motivational scores as the year progressed, suggesting their lack of overall appearance investment by the end of the academic year. From a broader point of view, this could be just another societal change from the past three decades, when the vast majority of the population all began to slide to the more casual appeal, especially in the corporate world. The "Casual Friday" turned into "Casual College" for students it seems.

A study by Cash (1997) investigated distressed body image emotions. To manage or cope with distressing body image emotions, Cash (1997) identified self-regulatory actions and reactions for individuals engaging in cognitive behaviors to adjust to environmental events. Adjustive or coping reactions include avoidant and body concealment behaviors, compensatory strategies, and appearance correcting rituals (such as motivational-grooming behaviors). These maneuvers serve to maintain body image

reinforcement, as they enable the individual to temporarily escape, reduce, or regulate any negative body image discomfort.

The males' weight gain group for fall semester was slightly less invested in their overall appearance, had higher self-evaluative scores and lower motivational scores than the males' weight loss/no change group for fall semester. The males' weight gain group for spring semester was more invested in their overall appearance, had higher self-evaluative and motivational scores than the males' weight loss/no change group for spring semester. The males' weight gain group for the academic year was less invested in their overall appearance, had lower self-evaluative and motivational scores than the males' weight loss/no change group for the academic year. In sum, no common trends were shown amongst all males' weight gain groups versus all males' weight loss/no change groups across the investments in appearance. Each observation period provided differing results.

When comparing all weight gain subjects to all weight loss subjects for each semester and the academic year, differences and commonalities were apparent. The weight gain group for fall semester was more invested in their overall appearance, had higher self-evaluative and motivational scores than the weight loss/no change group for fall semester. The weight gain group for spring semester was equally invested in their overall appearance investment and their self-evaluative appearance investment, and had slightly higher motivational scores than the weight loss/no change group for spring semester. The weight gain group for the academic year was more invested in their overall appearance investment, had higher self-evaluative and motivational scores than the weight loss/no change group for the academic year. In sum, all weight gain groups for

each observation period had higher motivational scores than the weight loss/no change groups.

The ASI-R has limitations. The media's messages in the Western society make it almost impossible for any young adult to be satisfied or create an appropriate amount of investment in one's appearance without feeling as if they have continued to fail society's expectations. Therefore, a dysfunctionality of higher ASI-R scores arise in that they may reflect a negative evaluation (or make-up through extra investment in some cases) rather than emphasizing one's appearance investment in relation to self-evaluation. The distinction between the self-evaluative salience and motivational salience dimensions is observationally captivating. Valuing and managing one's physical appearance may not necessarily provide the suitable adjustment to one's body. More clearly, the dysfunctionality of high investment portrays beliefs that link one's appearance to its comparisons with others, and potential to affect one's life as integral to one's sense of worth and confidence.

Limitations

There were several limitations to the present study. First, recruitment was not entirely random; students were primarily recruited from classes within the College of Human Sciences with majors in the areas of concentration in nutrition and food science, and in apparel merchandising, design, and production management. Such majors often attract students with more concerns about their body weight and body image (body satisfaction and investment in appearance). Also, there was a reliance on the willingness of students to have their height and weight, body scan measurements, and body

composition taken at three observation periods over the academic year. Thus, self-selection bias could have introduced some degree of bias because the present study measured only those students who felt comfortable enough with their bodies to be measured those three times. Those students may have already had an interest in maintaining their bodies, or even wanted to keep their weight in-check in comparison to the "Freshman 15" or any other dimension of size, whether body composition or body measurements.

Second, subjects were not blinded to the subject matter being observed. Flyers and information regarding the study and what it entailed were sent out to all subjects who might be interested in being part of the study. Third, a small sample size for was used because of funding limitations to provide incentives. Also, some subjects did not return for all observations. They may have felt uncomfortable with their bodies and decided against the final two testing periods. Plus, a small sample size is always a limitation for any statistical analysis. Fourth, problems with reporting on the questionnaires could have led to misrepresentation of data. One example was the frequency with some of the appearance investment activity, which could have been over- or under- estimated by degrees of behaviors.

Implications and Recommendations for Future Research

These results provide some information as to the type of weight changes and where body measurement changes occur in students as they move through their first year in a college environment. The fact that some college students gained weight while others lost weight suggests that the "Freshman 15" is a myth, but it also sheds light on who gains

weight and where weight gain may possibly occur across sexes. This will allow educators to target programs to promote and educate students on the benefits of a healthy mind and body, and to steer them away from extreme weight gain or weight loss. The potential for interventions to prevent extreme weight gain among students entering college is great and important given the continued increase in the number of overweight and obese adults.

It is perhaps important for investigators to help educate students or implement programs designed to combat negative body image and weight-related issues. This would help students to recognize that seemingly minor and perhaps even harmless changes in weight may result in sizeable changes of body image over a longitudinal period of time, partially due to their changing cultural environment. These results could provide investigators with a model of physical change and physiological change (body image) that accompanies transition from teens into adulthood. Thus, it may serve, as an impetus for investigators to inform students that taking responsibility of their health and dietary choices, as well as defining them against the society's perfect-image obsessed ideals would in turn relay positive lifestyles based upon individual needs.

Furthermore, as the present study suggests, helping a freshman college student understand the course of his/her own body image experiences that are activated and unfold in everyday life may be an important means for change surrounding weight-related issues. Investigators should continue to examine the value of body image in relation to body satisfaction and cognitive investment in appearance in the prevention and treatment of significant body image disturbances (the possibility of extreme weight change). The current findings suggest the need for a second study which should include implications for research in college students during and after their freshman year of

college and on through their sophomore to senior year of college. Also, researchers should conduct additional studies to better characterize weight change and body measurement patterns in relation body image issues among freshman college students as well as college students throughout their entire college careers.

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APPENDIX A

ANNOUNCEMENT TO RECRUIT STUDENTS

Body Composition and Shape in College Freshman Research Study
Be part of an important body measurement study Exploring the "Freshman 15"

Are you an entering freshman?

Are you interested in knowing your body weight, shape and body fat?

If you answered YES to these questions, you may be eligible to participate in the body measurement study mentioned above.

The purpose of this research study is to determine the body composition and shape of college freshman during the freshman year. Benefits include interacting with state of the art technology in body measurements. Participants will also receive monetary compensation for participation.

Entering college freshman are eligible.

This study is being conducted by researchers from the College of Human Sciences Nutrition and Food Science and Consumer Affairs Departments.

Please contact Drs. Gropper or Connell with the Departments of Nutrition and Food Science and Consumer Affairs at 844-4261 or email gropps@auburn.edu or connelj@auburn.edu.

APPENDIX B

INFORMED CONSENT LETTER – PARENTAL AND STUDENT FORM

INFORMED CONSENT FOR A RESEARCH STUDY ENTITLED,
"Longitudinal Study of Changes in Body Composition and Shape in College Students"

You may be aware that as a population, the US is currently experiencing an epidemic related to weight. There is some evidence that when students move to a college setting, they gain weight although some students lose weight. Your student is being invited to participate in a study at Auburn University to help researchers understand the potential for weight gain among college students during their freshmen year. This study is being conducted by Drs. Lenda Jo Connell and Sareen Gropper of the College of Human Sciences. We explore the potential for weight gain by taking body measurements using traditional measures and a new technology involving a 3D body scanner. Your son or daughter was selected to participate because they are an entering freshman attending Auburn University.

If your son or daughter decides to participate, we will take body measurements using a standard scale and the 3D body scanner. Your son or daughter will be asked to enter a private dressing room where they will put on standard clothing for body scanning which consists of bicycle shorts for males and or a sport bra and bicycle shorts for females. The scans are done with a non-invasive white light and will be conducted in a private area with a trained technician. The software projects only a data image and subjects are not identifiable. Please see the attached example of a body scan.

Body fat and body composition will be measured using bio-electrical impedance (BIA). For BIA, students will be asked to lie down on a towel on the floor. Two self-adhesive disposable electrodes will be placed on their right hand and two on their right foot. A safe, battery generated electrical signal will pass through the electrodes enabling the calculation of body fat. They will feel no discomfort, however, freshmen who have a pace-maker or an implantable electronic device can not participate.

In addition to the body scanning, we will ask your son or daughter to fill out a questionnaire about their eating habits and about their feelings about their body image and lifestyle factors which may impact body weight. This process will take approximately 30-45 minutes. They will need to participate in three measurement and questionnaire sessions. The first session will be held during

_____ _____
Parent/Guardian's Initials Participant's Initials
(if participant is under 19 years)

HUMAN SUBJECTS
OFFICE OF RESEARCH
PROJECT #06-137 EP 0608
APPROVED8-17-06 TO 8-16-08

the first two weeks of the fall semester. The second session will be conducted during the last two weeks of the fall semester. And a third will be conducted in late April. They will receive a total of $75.00 ($25.00 after each session) as incentive to participate. Analysis of data from the three body measurement sessions and questionnaires should enable us to better understand any changes in body size and students' feelings regarding their weight during their first year in college.

Any information obtained in connection with this study will remain anonymous. Only researchers will have access to the data, which will be identified by numbers, not names. Data will be stored in a secure site and your student will only be identified by number. Information collected through their participation may be used to fulfill educational requirements, published in a professional journal, and/or presented at a professional meeting. If so, none of their identifiable information will be used.

Your son or daughter may withdraw from participation at any time, without penalty, and you may withdraw any data which has been collected about them that is confidential. Your decision to allow your son or daughter to participate or not to participate will not jeopardize your future relations with Auburn University or the Departments of Consumer Affairs and Nutrition and Food Science.

If you have any questions, you may contact us at (334) 844-3789 and we will be happy to answer them. Your son or daughter will be provided a copy of this form to keep.

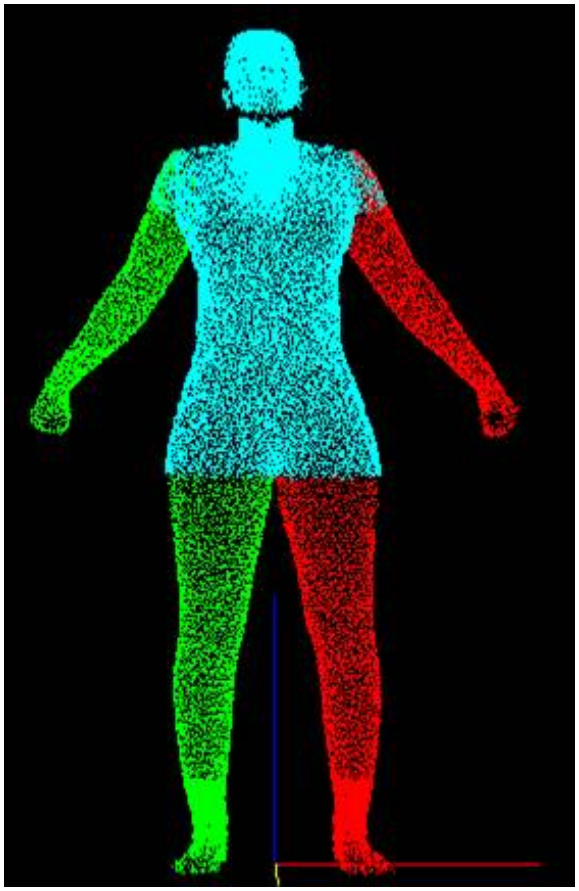
For more information regarding your son or daughter's rights as a research participant, you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334) 844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU AND YOUR SONS OR DAUGHTER MUST DECIDE WHETHER OR NOT THEY WILL PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS FOR YOUR SON OR DAUGHTER TO PARTICIPATE. THEY MUST ALSO INDICATED THEIR WILLINGNESS TO PARTICIPATE.

_____	_____
Parent/Guardian signature Date	Participant's signature Date
_____	_____
Print Name	Print Name
_____	
Investigator Obtaining Consent Date	

HUMAN SUBJECTS
OFFICE OF RESEARCH
PROJECT #06-137 EP 0608
APPROVED8-17-06 TO 8-16-08

Example of 3D Body Scan



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_____ _____
Parent/Guardian's Initials Participant's Initials
(if participant is under 19 years)

HUMAN SUBJECTS
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APPROVED8-17-06 TO 8-16-08

the first two weeks of the fall semester. The second session will be conducted during the last two weeks of the fall semester. And a third will be conducted in late April. You will receive a total of $75.00 ($25.00 after each session) as
an incentive to participate. Analysis of data will be analyzed as a group and from the three body measurement sessions and questionnaires we should better understand any changes in body size and students' feelings regarding their weight during their first year in college.

Any information obtained in connection with this study will remain anonymous. Only researchers will have access to the data, which will be identified by numbers, not names. Data will be stored in a secure site and you will only be identified by number. Information collected through your participation may be used to fulfill educational requirements, published in a professional journal, and/or presented at a professional meeting. If so, none of your identifiable information will be used.

You may withdraw from participation at any time, without penalty, and you may withdraw any data which has been collected about yourself that is confidential. Your decision to participate or not to participate will not jeopardize your future relations with Auburn University or the Departments of Consumer Affairs and Nutrition and Food Science.

If you have any questions, you may contact us at (334) 844-3789 and we will be happy to answer them. You will be provided a copy of this form to keep.

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HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WILL PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE.

_____

Participant's signature Date

_____

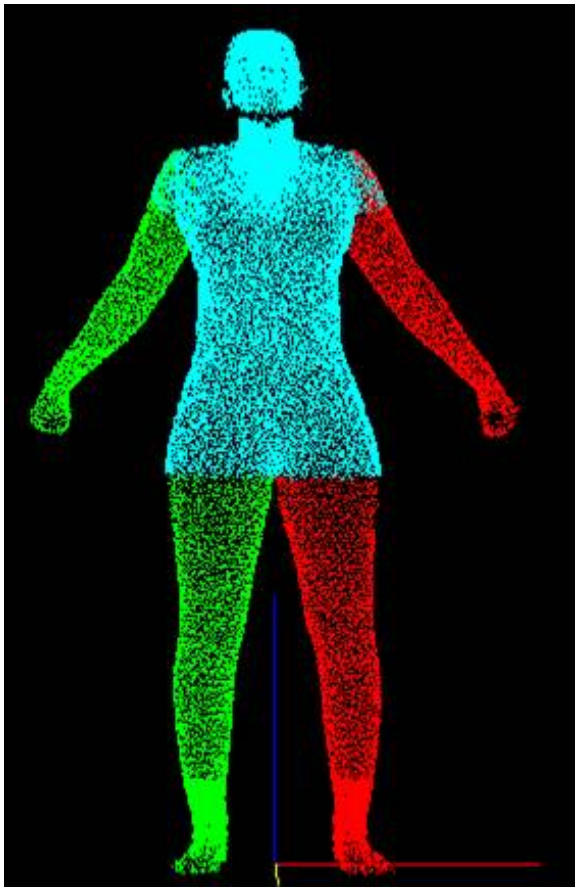
Print Name

_____

Investigator Obtaining Consent Date

HUMAN SUBJECTS
OFFICE OF RESEARCH
PROJECT #06-137 EP 0608
APPROVED8-17-06 TO 8-16-08

Example of 3D Body Scan



APPENDIX C

QUESTIONNAIRES

Study of Changes in Body Image and Shape among College Students
Beginning of first semester

Name (full) _____
First Middle Last

Address _____

_____

Email address_____

Phone (home) _____

(cell) _____

For department use only

Code_____

Study of Changes in Body Image and Shape among College Students
Demographic Information

What is your Date of Birth? (give month/day/year) _____

What is your Race?

___Caucasian___African American/Black____Asian___Hispanic___Other

What is your gender? ___Male___Female

Where is your Permanent Residence? (give city, state) _____

What is your place of residence during the academic school year?
___Apartment___On-campus Residence Hall___House or The Commons

___Fraternity house___With parents___Other

Do you smoke cigars, cigarettes or a pipe? ___yes___no

If yes, which one(s) do you smoke? _____

If yes, during the past 30 days, on how many days did you smoke? _____days

If yes, how many years have you smoked? _____years

If yes, how many cigarettes, cigars or pipes do you smoke per day? _____

During the past 30 days, on how many days did you drink one or more drinks of an alcoholic beverage? _____

On the days that you drank during the past 30 days, how many drinks did you usually have? _____

During the past 30 days, on how many days did you have 5 or more drinks on the same occasion? _____

What is your family's yearly household income?

_____ <$10,000/year _____ $70,000 to 90,000

_____ $10,000 to 30,000 _____ $90,000 to 110,000

_____$30,000 to 50,000 _____$110,000 to 130,000

_____$50,000 to 70,000 _____ $130,000 to 150,000

_____ more than $150,000 _____ don't know

Appearance Schemas Inventory-Revised (ASI-R)
Questionnaire

For ordering information and permitted use go to: www.body-images.com/assessments/asi.html

Distribution for use by others, modification of the ASI-R items, and any commercial use of the materials (other than use in research or clinical practice) is prohibited by the author, Thomas F. Cash.

Body Image

Circle the number that most describes your feelings about the question being asked.

1. I spend little time on my physical appearance.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree Or Disagree	Mostly Agree	Strongly Agree

2. When I see good-looking people, I wonder about how my own looks measure up.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree Or Disagree	Mostly Agree	Strongly Agree

3. I try to be as physically attractive as I can be.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree Or Disagree	Mostly Agree	Strongly Agree

4. I have never paid much attention to what I look like.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

5. I seldom compare my appearance to that of other people I see.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

6. I often check my appearance in a mirror just to make sure I look okay.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

7. When something makes me feel good or bad about my looks, I tend to dwell on it.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

8. If I like how I look on a given day, it's easy to feel happy about other things.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

9. If somebody had a negative reaction to what I look like, it wouldn't bother me.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

10. When it comes to my physical appearance, I have high standards.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

11. My physical appearance has had little influence on my life.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

12. Dressing well is not a priority for me.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

13. When I meet people for the first time, I wonder what they think about how I look.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

14. In my everyday life, lots of things happen that make me think about what I look like.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

15. If I dislike how I look on a given day, it's hard to feel happy about other things.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

16. I fantasize about what it would be like to be better looking than I am.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

17. Before going out, I make sure that I look as good as I possibly can.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

18. What I look like is an important part of who I am.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

19. By controlling my appearance, I can control many of the social and emotional events in my life.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

20. My appearance is responsible for much of what's happened to me in my life.

1	2	3	4	5
Strongly Disagree	Mostly Disagree	Neither Agree	Mostly Agree	Strongly Agree

Multidimensional Body-Self Relations Questionnaire
Subscale: Body Areas Satisfaction Scale (BASS)

For ordering information and permitted use go to: www.body-images.com/assessments/mbsrq.html

Distribution for use by others, modification of the BASS items, and any commercial use of the materials (other than use in research or clinical practice) is prohibited by the author, Thomas F. Cash.

Body Satisfaction

Use this 1 to 5 scale to indicate how dissatisfied or satisfied you are with each of the following areas or aspects of your body:

1. Face (facial features, complexion)

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Strongly Satisfied

2. Hair (color, thickness, texture)

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Strongly Satisfied

3. Lower torso (buttocks, hips, thighs, legs)

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Strongly Satisfied

4. Mid torso (waist, stomach)

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Strongly Satisfied

5. Upper torso (chest or breasts, shoulders, arms)

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Strongly Satisfied

6. Muscle tone

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Strongly Satisfied

7. Weight

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Strongly Satisfied

8. Height

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Strongly Satisfied

9. Overall appearance

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied Nor Dissatisfied	Mostly Satisfied	Strongly Satisfied