

PERCEPTIONS OF THE SIZE, SHAPE AND ATTRACTIVENESS OF FEMALE  
BODY SCANS RELATIVE TO BODY MASS INDEX

Except where reference is made to the work of others, the work described in this thesis is my own or was done in collaboration with my advisory committee.

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PERCEPTIONS OF THE SIZE, SHAPE AND ATTRACTIVENESS OF FEMALE  
BODY SCANS RELATIVE TO BODY MASS INDEX

Shiara Farinah

A Thesis

Submitted to

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PERCEPTIONS OF THE SIZE, SHAPE AND ATTRACTIVENESS OF FEMALE  
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Shiara Farinah

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## VITA

Shiara Farinah, the eldest daughter of Anton Wijaya and Mutia Fahrina, was born December 28, 1976, in Jakarta, Indonesia. She graduated from Michigan Technological University in Houghton, Michigan with a Bachelor of Science degree in the College of Business and Accounting in May 2001. She has an adopted American family, Robert J. Wenc and Carol Wenc from Houghton, Michigan who have provided her with love, comfort, a place to go home to, and encouragement throughout her time living in the United States of America. She married Wu Tsung-Hsueh in August 2001, and together they have a son, Brandon Michael Wu.

## THESIS ABSTRACT

### PERCEPTIONS OF THE SIZE, SHAPE AND ATTRACTIVENESS OF FEMALE BODY SCANS RELATIVE TO BODY MASS INDEX

Shiara Farinah

Master of Science, August 8, 2005  
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123 Typed Pages

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The purpose of this study was to investigate male and female college students' perceptions of female body size using 3-D body scan images. A convenience sample of 146 men and 155 women viewed 10 women's scanned images projected (in PowerPoint slides) in (1) front views, (2) side views, and (3) combined front and side views. The stimuli scans were selected to represent BMI categories as follows: two underweight (BMI of 16-17), three normal (BMI of 21-22), three overweight (BMI of 26-27), and two obese (BMI of 34-35). The images were selected from a group of 100 scans of 5'4"-5'7" women. Within front, side, and front/side view sets, the unlabeled scans were randomly mixed in the presentation. For each image in each of the three sets, subjects were asked to identify (in multiple choice format) the image as underweight, normal, overweight, or obese. The research questions asked how accurately all subjects could perceive the four

body sizes from the front, side, and combined front/side views; and whether or not there were differences between the male and female subjects' perceptions. Participants also filled a scale rating of females' body attractiveness.

Majority of students classified normal, overweight, and obese images correctly; however, most students misclassified underweight images. Women's body sizes were perceived more accurately from the side view compare to the front view. Women perceived normal and overweight body sizes better, while men perceived the underweight and the obese body sizes more precisely. Women's body sizes were perceived to be more attractive from the side as compared to the front view. Females' attractiveness ratings were always higher than males did. Body shapes did influence the perception of female body sizes, in this case, for normal and overweight images. There was an inverse linear relationship between perceptions of attractiveness and body size of the female body; as the body size increased the attractiveness rating decreased. Overweight and obese female subjects rated underweight images slightly smaller than did the underweight and normal subjects. Thus, the overweight and obese females' assessment was more accurate.

## ACKNOWLEDGMENTS

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## I. INTRODUCTION

Cooke (1996) asked, "What size should I be?" This is a common personal question. Where does a person's self-image originate? The person's self-image is often derived from what others say about him or her. Many studies have shown that people, especially women, are dissatisfied with their bodies; weight accounts for sixty percent of overall appearance satisfaction (Garner, 1997). When women perceive themselves to be overweight, it causes negative body images. "Self-perception of overweight was common in women compared with men," (Paeratakul, White, Williamson, Ryan, & Bray, 2002, p. 345), and Mahoney and Finch (1976) noted, "a person's weight affected both self-esteem and self-perceived physical attractiveness," (p. 38). When women think that their body images do not match the ideal standard, they consider themselves to be unattractive. "The fact that the norms of ideal body weight in Western societies are often unrealistic to achieve and at times even unhealthy," (Paeratakul, White, Williamson, Ryan, & Bray, 2002, p. 348). The development of women's body attitudes and perceptions is influenced by social factors (Monteath & McCabe, 1997).

American culture seems to embrace thinness for women, yet national surveys show that Americans are becoming heavier with each passing year. According to Schoenborn, Adams, and Bernes (2002), over half (54.7%) of the U.S. population was overweight, and one in five (19.5%) was obese. Women have higher rates of obesity than

men; and health practitioners often attribute women's health issues to obesity (The Boston Women's Health Book, 1998). Many Americans struggle with their weight problems and some even misperceive themselves and think that they are a healthy weight when they are actually overweight or underweight. A study by Rand and Resnick (2000) found that 48% of obese subjects thought that their body sizes were socially acceptable, even though they weren't their ideal body sizes. Their results also showed that the majority of underweight (79%), normal (92%), and overweight (84%) adolescent subject groups also believed that their body sizes were socially acceptable, although it may not have been their ideal body sizes.

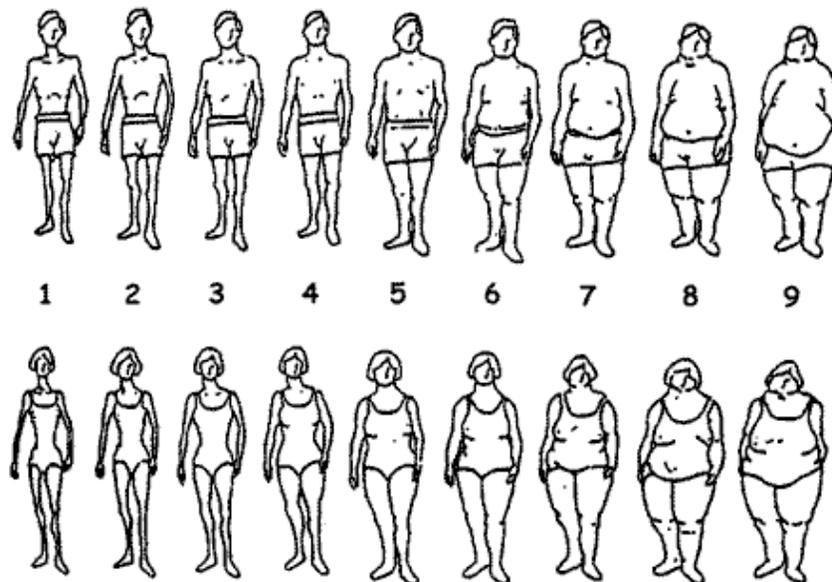
How a person feels about his or her body at any given moment in time refers to body image (Kaiser, 1997). "Body image is defined as personal perceptions, thoughts and feelings about his or her own body" (Grogan, 1999, p. 1) and is the result of every experience with parents, role models, and peers. According to Hutchinson (2003) body image is the way we ourselves have perceived our bodies to fit or not fit the cultural image and is also influenced by the positive and negative feedback of people. Social and cultural values affect how people interpreted and perceived bodies (Chen & Swalm, 1998). Rucker and Cash (1992, p. 291) defined one component of body image as a perceptual component that is focused on "estimation of one's body size, including perceptual distortion and discrepancy from an idealized standard" because body size may affect perceptions of attractiveness and the many ways of looking at attractiveness in women.

Many researchers are eager to explore the phenomena of beauty in women. For example, Frazoi, and Herzog (1987) found that while men had a tendency to relate

females' attractiveness to sexuality, women related female attractiveness with physical stamina and condition; Singh's (1993a) study implied that "waist-to-hip ratio (WHR) represented an important body feature associated with physical attractiveness" (293); Tovee and Cornelissen (2001) discovered that body mass index (BMI) and body shape were the main perceptual indicator for females' attractiveness.

Stunkard, Sorenson, and Schlusinger (1980) developed nine line drawings of male or female bodies arranged from very thin to very heavy figures to be used as stimuli to study perception assessing current and ideal body size, and these line drawings have been widely used for assessing body sizes, body image and attractiveness in men and women (see Figure 1).

Figure 1: Stunkard, et al. Male and Female Silhouette Figure Rating Scale



Other researchers, including Fallon and Rozin (1985), Rozin and Fallon (1988), Silberstein, Moore, Timko, and Rodin (1988), and Rand and Resnick (2000) have used these drawings for the same purpose. Some researchers (Gardner, Friedman, & Jackson,

1998; Tovee & Cornelissen, 2001) have noted limitations with these line drawings. Line drawings are sketches with limited realism. According to Gardner et al. (1998) Stunkard et al. (1980) silhouette figures are not identical in height and the figures face the front; respondents do not have a chance to view the bodies from the side.

3D body scanning technology has been more recently used to automatically capture and measure a person's overall body dimensions using 3D measurement. Body scanning technology has been used to improve sizing and fit of apparel (Bentley, 2003; [TC]<sup>2</sup>, 2004) but not to study perception of body size and attractiveness. Body scans show a more realistic three-dimensional image of a person's body than do line drawings. "Line drawing did not give a good representation of a human body" (Tovee & Cornelissen, 2001, p. 399). Scans do show body curves (e.g., a person's abdominal fat will appear in the body scan images).

The common instrument to estimate body proportion for adults is the Body Mass Index (BMI). Using BMI, the female body can be categorized as underweight (below 18.5), normal (18.5 - 24.9), overweight (25 - 29.9), and obese (30 and above), (Center for Disease Control, April 20, 2004). BMI is calculated using weight in kilograms divided by height in meters squared. BMI is widely used because it is easy and accurate as a basic measurement of the body size in a broad range of populations (Malina & Katzmarzyk, 1999). The American Obesity Association (2000) has suggested that medical experts and professionals use BMI as a tool to assess an individual's health risk or weight status.

## Statement of Purpose

Although BMI is used by the medical community, average individuals probably do not know their own BMI or what a figure in each of the BMI categories might look like. The purpose of this study is to investigate men's and women's perceptions of women's body size and attractiveness. Line drawings that were developed by Stunkard et al. (1980) have been frequently used to study body perceptions by many researchers but there are limitations to the line drawings, including lack of realism. According to a perception study by Tovee and Cornelissen (2001), using photographs as stimuli could determine BMI more accurately when compared to line drawings. However, body scan images display the contours of real people, and these will be used in this study.

This research will develop a basis for increased understanding of how people perceive women's body sizes and attractiveness. Along with providing information, it will give insight into a methodology using body scan technology.

## Research Questions

1. How accurately can individuals perceive the four different body sizes as categorized by BMI?
2. Are there differences in perceptions of body sizes based on front and side views?
3. Are there differences between men's and women's perceptions of women's body sizes?
4. Are there differences in perceptions of attractiveness based on front views and side views of women's body images?
5. Are there differences between men's and women's perceptions of attractiveness of women's bodies?
6. Does body shape influence the perception of two body sizes, normal and overweight?
7. Is there a relationship between perceptions of attractiveness and the body sizes as categorized by BMI?
8. Is there a relationship between an individual's personal BMI score and the perception of body size?

## II. REVIEW OF LITERATURE

One of the results of abundant research about women and obesity is that people's perceptions about women's body sizes in the college population have emerged as an

important area of research in and of itself. This section includes literature that will direct the research. This literature review is separated into five sections:

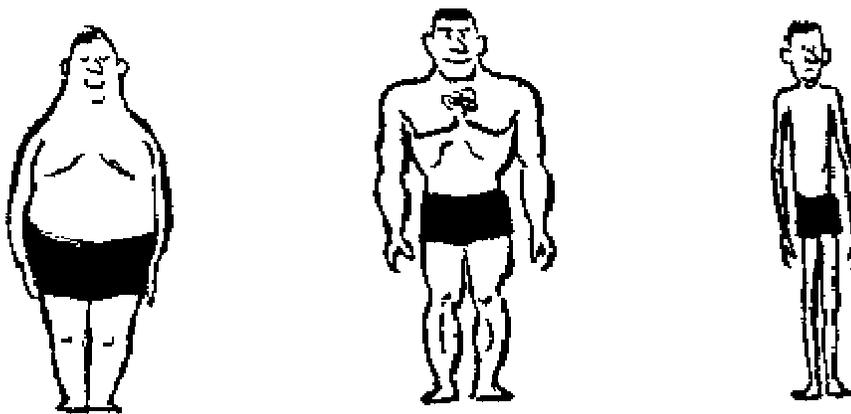
(a) assessment and perception of body size, (b) Body Mass Index, (c) gender/sex and perception, (d) influence of body shape on perception of size, (e) body image, and (f) attractiveness. Each section explains the importance of the literature to the research described in this thesis. The literature will also explore research studies that have been done in the past and relate them to the current studies.

### Assessment and Perception of Body Size

The origins of current body size research endeavors can be traced to the mid-20<sup>th</sup> century. From this research, several systems developed for classifying body types. The best known is the classification of body builds into three basic categories: (see Figure 2)

1. ectomorph: slender to very thin
2. endomorph: a rounder, plumper person
3. mesomorph: a thicker, more muscular person

Figure 2: Varieties of Human Physique



Endomorph

Mesomorph

Ectomorph

Dr. William Sheldon, in his book, The Varieties of Human Physique (1940), used 4000 photographs of college-age men to somatotype basic components of men's body types for medical purposes. Men were photographed nude from three angles, the front, side, and back views. He then applied anthropometric measurements to the photographs, using a scale from 1 to 7 to assess or describe each of the components in the photos (Croney, 1971, p. 50). Thus, Sheldon (1940) combined photography and anthropometry in his methodology. In another book, The Atlas of Men, Sheldon, Dupertuis, and McDermott's (1954) interest was in establishing and categorizing a range of human variations, however, most of Sheldon's photographs were no longer being used in his research; many of the photographs were destroyed because they were the nude photographs of college students. This became an issue of privacy as some subjects were very uncomfortable having their nude photographs used publicly (Science, Nude & Faces, April 26, 2004).

Douty (1963) introduced a somatographic technique to measure and study the human body, and used graphic somatometry to develop body build and posture scales for women (Douty, Moore, & Hartford, 1974). In 1963, she used backlit photography to project images of subjects, wearing undergarments or a leotard, on a grid in order to study body shape and posture. Silhouette photographs were enlarged to life size on a screen for examination. This method was referred to as silhouette photography, graphic somatometry, or graphic anthropometry (Alexander, 2003). Douty's (1968) Posture Scale and Body Build Scale allowed researchers to classify postural patterns and to identify body characteristics as well as body build. One limitation of her method is that the scales used applied only to one body shape, the hourglass shape.

Terry (1968) used Douty's silhouette photographs as a method of identifying figural and postural variations for garment fit. In addition to the hourglass shape limitation, one drawback about Douty's methodology was a lack of a clear, specific standard for recognizing the ideal figure or posture. Therefore, subjects in Terry's (1968) study had difficulty validating the figures used as a stimulus or comparing them with subjects' actual figure or posture.

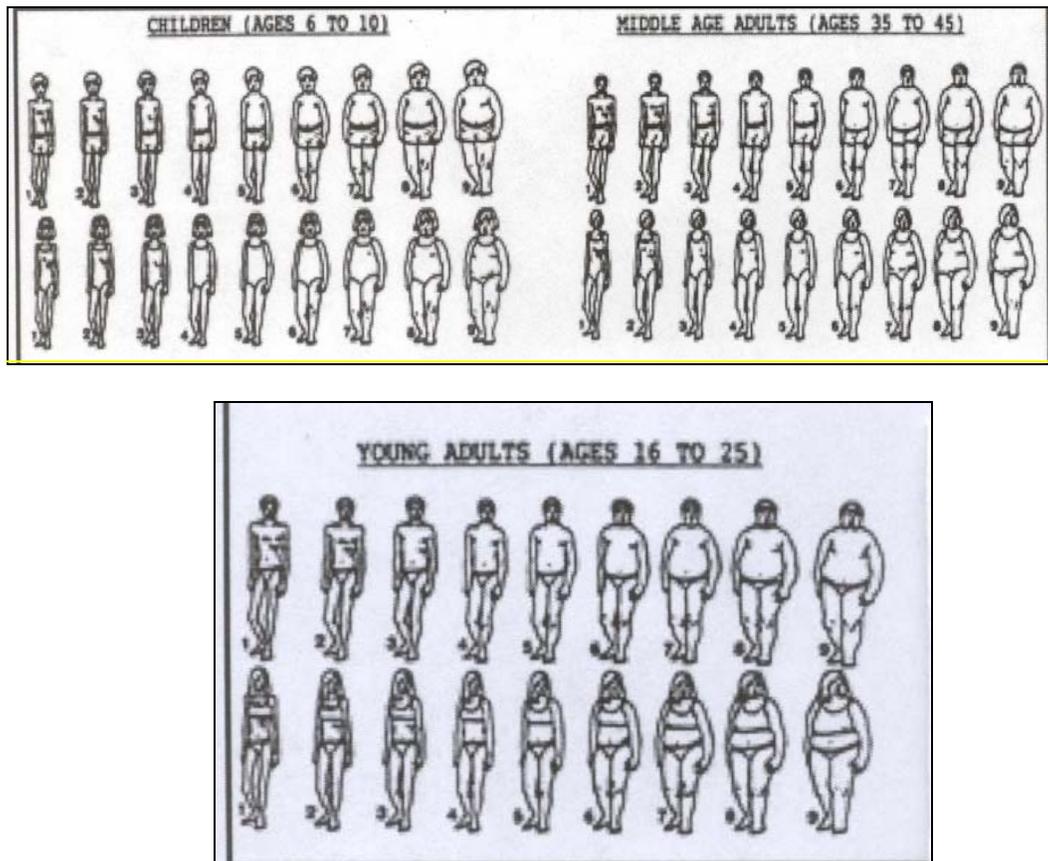
Another method for studying body size is the use of figure line drawings. This was first introduced by Stunkard et al. (1980). Unlike Sheldon's and Douty's research objectives, Stunkard's silhouette figures were primarily used to study perception of body size in terms of attractiveness. Fallon and Rozin (1985) asked women subjects to indicate their 'ideal figure,' their 'current figure', and the figure which men would find attractive using Stunkard et al.(1980) line drawings. The results showed that women

chose a heavier figure as their 'current figure' than the figure men most find attractive, and even a thinner figure for their 'ideal figure.'

On the other hand, Fallon and Rozin (1985) also asked men subjects to indicate the figures that approximated their current figures that they would like to have, and figures that women find most attractive. Their results concluded that men were satisfied with their figures, and there was no significant discrepancy between men's ideals, women's ideals and their current shapes.

Line drawings are a common instrument used to assess body sizes for current, desired and ideal body sizes (Rand & Resnick, 2000). Rand and Resnick used line drawings of children, young adults, and middle-age adults (see Figure 3), and Stunkard's figural stimuli (see Figure 1). They chose their subjects from four different age groups (children, adolescent, young adults and middle-age adults) in both genders, and determined what were socially acceptable body sizes from the array of nine body sizes.

Figure 3: Line Drawings of Children, Young Adults, and Middle-Age Adults (Rand & Resnick, 2000)



Rand and Resnick's study (2000) concluded that most participants in both genders (87%) considered their body size to be within the range of social acceptability.

Additionally, of "the obese subjects who participated in the research, 48% considered their body size acceptable" (Rand & Resnick, 2000, p. 309). They concluded that "line drawings were reliable and valid for assessing current, desired and ideal body size" (Rand & Resnick, 2000, p. 311).

Figural stimuli were also easy to use to measure a person's body size (Bulik, Wade, Heath, Ng, Stunkard, & Eaves, 2001). Bulik et al. study used Stunkard's line

drawings to check the effectiveness of line drawings in identifying obesity and thinness among the Caucasian population. Their results showed that the line drawings helped sort thin and obese individuals (Bulik et al., 2001). The advantage of line drawings over nude and silhouette photographs is the drawings depict a range of body size from extremely thin to obese.

Since drawings obscure facial features and vary exclusively by body size, they are well suited for the study of body perception such as attractiveness and social acceptability. Stunkard et al. (1980) and other researchers (e.g., Fallon & Rozin, 1985; Rozin & Fallon, 1988; Silberstein et al., 1988) used the same line drawings to study women's body size and perception. The limitation to the line drawing is that there is no physical measurement such as weight and height associated with the drawings.

### Body Mass Index (BMI)

Body sizes can be categorized based on visual photographs or drawings, but they also can be categorized based on Body Mass Index (BMI). BMI is a tool for indicating weight status in adults and is considered one of the best methods to assess weight categories (CDC, April 20, 2004). "Body weight and height are two simple anthropometric measurements fundamental to a physical description of an individual" (Norgan, 1994, p. S10). BMI measurement reveals a relationship between an individual's height and weight, and can be determined mathematically by dividing the weight (in kilograms) by the square of the height (in meters) (Whitney & Rolves, 1999). According to BMI, the size of male and female bodies is classified in the following four basic categories (Web MD, June 2, 2004):

1. **Underweight:** the condition of weighing less than is normal or desirable for one's height and build.
2. **Normal:** an ideal or healthy weight
3. **Overweight:** a condition in which a person's weight is 10%-20% higher than "normal," as defined by a standard height/weight chart.
4. **Obesity:** a condition in which a person's weight is 20% or more above normal weight.

Table 1: BMI Chart (CDC, April 20, 2004).

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

Health professionals use BMI because it is an accurate tool to evaluate health risk in individuals (American Obesity Association, 2000). Medical experts note that a healthy individual should have a BMI between 18.5 to 24.9.

Since fat in the body contributes to the shape and size of the body, BMI has a direct relationship with body size and shape (Norgan, 1994). The most common areas of body fat in women are the buttocks, the abdomen, the front and side surfaces of the upper thigh, the breasts, the back of the neck, and the posterior of the upper arm (Croney, 1971). For women, body fat in the lower body is most commonly located on hips, buttocks and thighs (Singh, 1994; Croney, 1971). Two people may have the same BMI but, their body fat percentage can be different (Center for Disease Control and Prevention, April 20, 2004). For example, a body builder and an overweight person may

have the same height, the same weight and the same BMI. However, the body builder will have more muscles and less body fat than the overweight person. Therefore, two people may have the same height, weight and BMI, but their body types can be different.

“Besides diet, metabolism is another factor contributing to body fat accumulation. Researchers find that each person has his or her own unique metabolism” (Lutter & Jaffee, 1996, p. 42). An athlete who has a muscular body build can have different patterns of fat located in different parts of his or her body. A non-athletic person can have another body type that has fat located in some other part of his or her body (i.e. stomach, buttock or bust).

Tovee, Reinhardt, Emery, and Cornelissen (1998) suggested that BMI was associated with health, fertility and sexual attractiveness, and was also an important factor in evaluating female attractiveness. In 1999, Tovee, Maisey, Emery, and Cornelissen found that BMI appeared to be a more important indicator of attractiveness than waist-to-hip-ratio (WHR) which, was supported by Singh (1993a,1993b).

#### Gender/sex and Perception

Kaschak (1992) stated in her book, Engendered Lives, that women are represented, seen and judged all the time, not only through the media with fashion or trends, but also in the eyes of society. This could mean that the perceptions of women's bodies were influenced by how their bodies fit civilization standards (Cash & Pruzinsky, 2002). The media and society idealized the female figure and suggested certain benefits such as happiness, desirability and status were achieved when the ideal was reached (Cash & Pruzinsky, 2002). “Not only do media influence behavior indirectly, they also

offer explicit instruction on how to attain the beauty ideal” (Cash & Pruzinsky, 2002, p. 92).

Though Tovee and Cornelissen’s (2001) study results showed that there weren’t any key differences in rating the attractiveness of women by males or females, other researchers differed, noticing that differences did exist between male and female perceptions of the female body. “Men and women appear to emphasize different body functions when assessing one another. Men tend to place more importance on body functions directly related to sexuality, whereas women tend to emphasize physical stamina and condition” (Franzoi & Herzog, 1987, p. 29).

Generally, males and females perceived their body sizes differently (Mable, Balance, & Galgan, 1986). According to Mable et al. (1986) study, college girls perceived themselves to be slightly overweight although their weight was considered low for their height and build. Singh and Young (1995) noted that women with larger breasts, small hips and slender bodies were perceived as being more attractive to men. “Breasts play an important role in contemporary American men’s assessments of women’s attractiveness” (Weitz, 2003, p. 133). Two researchers (Fallon & Rozin, 1985; Rozin & Fallon, 1988) showed gender differences in perceiving the ideal female body. In general, males and females focused on similar body items (Franzoi & Herzog, 1987).

Their findings showed:

“First, regarding female attractiveness, although women do not consider sex drive, sex organs, and sex activities as important components in judging women’s attractiveness, men disagree, and place more importance on these sexually related body parts and functions. Men and women appear to emphasize different body

functions when assessing one another. The present data cannot determine why these differences exist, it is possible that the present data that they may be shaped by the culture's sex role stereotypes. That is as, a group, men may be socialized to perceive women as sexual providers while women are more attentive to nonsexual factor" (Franzoi & Herzog, 1987, p. 29).

Gender may play an important role in perceiving a person's body size or shape and the ideal body standard may vary across cultures (Fallon & Rozin, 1985; Rosen and Gross, 1987). If ethnicity and culture are taken into account, in some cultures men like slim women, but in others men prefer the more voluptuous builds. Poran (2002) stated, "Recognition of the power of gender expectations to influence body cognition has been a great contribution to the literature on physical attractiveness" (p. 66).

#### Influence of Body Shape on Perception of Size

"Body shape as a marker for female beauty has evolved in the West throughout the twentieth century" (Becker, 1995, p. 29). Perception of shape in a woman is formed visually by looking at weight, waists and hips (Tovee, Hancock, Mahmoodi, Singleton, & Cornelissen, 2002). Genes play an important role in determining a person's body size and shape. This means there are features in a person's body that cannot be changed due to the influence of heredity. According to Singh (1994), the female body shape is based on both amounts of fat as well as its distribution. Besides genes, Monteath and McCabe (1997) noted that age affected a person's body size and shape.

Fat contributes to the shape of the body. As the size of the human body increases the fat placed at different places in the body could alter the shape and lead people to perceive the body size negatively.

Singh (1994) noted that healthy premenopausal women deposited fat on lower body parts, especially on buttocks and thighs, producing characteristically feminine or gynoid fat distribution. Areas such as stomach, buttock, hips, legs, waist, and thigh were usually associated with weight gain in women (Monteath & McCabe, 1997).

Rosen and Gross (1987) noted that the cultural ideal for women's body shapes favored slender forms and the cultural ideal for men's bodies favored an athletic, V-shaped muscular look. The ideal female shape was not only slim but full-breasted in Western culture (Grogan, 1999). Pingitore, Spring, and Garfield's (1997) study looked at how male and female college students judged their body satisfaction by looking at their body shapes and weights. Their results showed that, for both genders, satisfaction with bodyweight and shape decreased as Body Mass Index (BMI) increased. Although women, in this study, were more dissatisfied with their body and weight than men, both genders agreed that body shape satisfaction was higher at the very lowest BMI. Body shape and body weight represent an important factor for college-age females.

A newer method of identifying body shape is to use body scan images of real women to assess shape. Three dimensional body scanners, first introduced to the market in the early 90's (Alexander, 2003), capture a person's body in 2-D or 3-D image. Body scanners have even been used to create personalized virtual models of subjects so that the subjects are able to use online programs to find clothes that fit them best (Ashdown & Loker, 2001). To capture the shape of human bodies using a body scanner, the subject

wears form-fitting briefs or running shorts. The 3D body scanner is capable of examining a person's body by measuring the circumference of the body, viewing cross sections in different areas of the body, and illustrating body shape, surface and volume (Cornell University, February 15, 2005).

The Body Shape Assessment Scale (BSAS©) was developed from 3D print outs of body scans data of frontal and side views during a pilot study by Drs. Connell, Ulrich, Brannon and Presley. The Body Shape Analysis Scale (BSAS©) was used to study body shape variations. Alexander (2003) used BSAS © to examine possible relationships among female body shape characteristics, fit problems and body cathexis. Alexander (2003) used BSAS © to analyzed body shapes from scans of 500 women between the age of 19-55. BSAS © consists of nine parts. The front view of body shape is assessed based on body build, body shape, hip shape and shoulder slope, while the side view of the body scans is assessed based on torso, bust prominence, buttock prominence, back curvature and posture. Alexander used women from different geographic areas who responded to questionnaires probing fit-related issues. Her results concluded that there appears to be a relationship among some components of body shape, body build and posture. Hip was found to be the best predictor of body shape.

### Body Image

“Body image satisfaction can be obtained in a variety of ways. Satisfaction itself must be further defined to reflect such components as weight satisfaction, shape satisfaction, and satisfaction with specific body sites and features” (Cash & Pruzinsky, 2002, p. 143). Body image is defined as the mental representation of a person's body at

any given point in time (Kaiser, 1997). It involves a person's perception, emotion, imagination and self-esteem about his or her own physical appearance. According to Garner (1997), physical appearance, attractiveness and beauty are aspects that relate to body image. "In the general population, a person's positive or negative feelings toward his or her body were found to affect his or her well-being" (Breakey, 1997, p. 107).

O' Connor (1995) suggested that women were more aware of their physical attractiveness and their body image (i.e. pay more attention to their weight and physical condition) than men.

A woman's physical appearance, size, and shape are part of her body image (Hutchinson, 1985), or the representation of the mental state about body size, imposed by several external impacts such as physical appearance, size and shape. "Body image is a very important aspect of psychological and interpersonal development of the person," (Cash & Pruzinsky, 2002, p. 74). "As women, we are raised to see our bodies as the means to achieving control of our lives" (Hutchinson, 1985, p. 21). "A woman's body is so intimately linked with her sense of self that her body attitude readily spills over into self-attitude" (Hutchinson, 1985, p.20). Cash, Cash and Butters (1983) reported that physical attractiveness was a crucial element of body image satisfaction. Rucker and Cash (1992) found that body image perceptions were very specific to a cultural context. According to Cash and Pruzinsky (2002), although body ideals vary across cultural groups and time dimensions, the construction of body image was highly influenced by social context, or how women were perceived by society. Many women believe the more attractive they are the more society will accept them.

Monteath and McCabe (1997) found that most women perceived themselves to be larger than the societal ideal. But a study conducted by Rand found that 48% of obese subjects accepted their body size as normal despite the fact that the society still highlights the thin image as beautiful and attractive. “It is remarkable that so many considered their actual size within the range of socially acceptable sizes despite the prejudice against obesity ”(Rand & Resnick, 2000, p. 314).

In studying women with eating disorders, psychologists and sociologists have used a variety of different measures to assess body satisfaction (Grogan, 1999). Body image dissatisfaction in females could start as early as adolescence. Although body size dissatisfaction is usually associated with those who are overweight, and is especially widespread among women, it is not limited to these groups. All overweight people did not have poor body images (Ikeda, November 27, 2003). People with eating disorders usually had poor body images. The result of a study using eating disorder subjects by Tovee and Cornelissen (2001) showed that people with eating disorders tend to overestimate their BMI.

### Attractiveness

The physical attractiveness of a woman is a persistent characteristic that strongly influences all aspects of her life. Throughout history, women have experienced pressure to maintain acceptable appearances (Weitz, 2003). “In a male-dominated society, women’s appearances dramatically affect women’s lives” (Weitz, 2003, p. 133). “Attractiveness in general has a more powerful effect on the lives of women than men” (Pingitore, Spring, & Garfield, 1997). “Attractiveness also served as an indirect form of

power for women” (Weitz 2003, p. 133). Concern for physical attractiveness is not something new to women in modern Western culture; beauty standards in society can be traced even in the earliest centuries. A woman’s body is often viewed as an object of attention and evaluation by society (Wiederman & Hurst, 1998) and based upon the facts and the importance of the woman’s appearance, research efforts have focused on understanding physical attractiveness and beauty standards of women.

Being attractive, according to Dion, Berscheid, and Walster’s (1972) study, brings many advantages to women. Since attractive women receive more attention, they have a higher tendency to succeed in both social and personal life and to be accepted in the society. In personal relationships, attractive women can more effectively attract the opposite sex (Fallon & Rozin, 1985). Simmons Market Research Bureau showed that the majority of people of all sizes (71 percent of underweight, 78 percent of normal, 75% of overweight, and 69% of obese) agreed that it is important to look attractive to others (Gardyn, 2003).

Douty, Moore, and Hartford (1974) suggested that the perception of body attractiveness was related to the outlook toward the body. Their study covered the broad perspective and multiple aspects (i.e. personality, physical) applied in self-perception. Douty et al. found that “perception of body attractiveness” was closely related to attitude toward the body, yet the validity of personal attractiveness ratings is questionable. However, because the *perceived* self is the operative real self, triggering the responses, attitudes and behavior, a better understanding might be stimulated if people could be aided in becoming more attuned to reality. “Simple information on ranges of physical characteristics and common variations can, with the aid of somatographs, drastically

affect perceptions as was found for posture ratings after only a minimum of instructions” (Douty et al., 1974, p. 519/520).

Society often plays a major role in shaping what is considered attractive. Race and ethnicity have a part in impacting the perception of what is considered attractive in women. For example, Powell and Kahn’s (1995) study showed that Caucasian women felt more pressure to be thin than African-American women. Some minority men prefer large or obese women (Goode & Preissler, 1983). Thus, different ethnic groups can have different beauty standards.

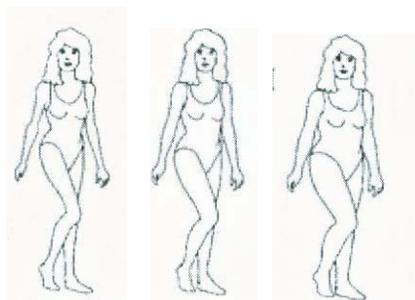
Douty and Brannon (1984) investigated the figural characteristics that impact the perception of attractiveness. Their study concluded that weight was a dominating factor for rating attractiveness. Male and female subjects were asked to give ratings based on different parts of the body called “body features”. While men judged attractiveness based on the contour of the body, which includes the bust size and shape, women judged it based on the waist size. All figures with smooth and even contour were perceived as more attractive than ones with uneven or lumpy contour. A slim, thin waistline was perceived more attractive than big waistline. Other body features that influenced perceived attractiveness of the figure assessment in the same study were abdomen size, body proportionality, and hip size.

Franzoi and Herzog’s (1987) study examined how people judge physical attractiveness in men and women. They used a 5-point Likert-type scale to evaluate the attractiveness of an individual from the same sex and opposite sex. The scale was used to measure individual attractiveness judging from thirty-two specific body parts (i.e. lips, sex organs, buttock, breast, and etc). Their objective was to analyze whether certain body

parts and their functions influenced the judgment of physical attractiveness from the viewpoint of the same sex or the opposite sex. The study concluded that men looked more at sexuality while women looked at physical stamina and condition. Other researchers such as Tovee and Cornelissen (2001), Singh (1993a, 1993b), and Wiggins, Wiggins, and Conger (1968) examined many different features related to female attractiveness. While Wiggins et al. (1968) concluded that the breasts, buttocks, and legs were seen as most attractive by male undergraduates, Tovee and Cornelissen (2001) concluded that women with lower BMI were perceived to be more attractive by both male and female. To sum up, males and females looked at certain characteristics when examining female attractiveness.

Singh's (1993a) study, on the other hand, examined how waist-to-hip ratio (WHR) influenced attractiveness in females. He introduced the first set of figure line drawings that varied along a continuum of body fat distribution (rather than just overall weight) (see Figure 4).

Figure 4: Singh's Line Drawing (1993)



Singh (1993a) used WHR in determining how males select and judge attractiveness in females' figures. His line drawings with three levels of body weight (normal, underweight, and overweight) were used to test his hypothesis that WHR was an

indicator of a female's body attractiveness. All the facial and bodily features were held constant except for the WHR and overall body size. His subjects, undergraduate college students between eighteen to twenty two years, were asked to rate twelve line drawings from 1 (most attractive) to 12 (least attractive). Each drawing represented a 5'5" female proportion, which was underweight (90 lb.), normal (120 lb.) or overweight (150lb.) (Singh, 1993a). His results clearly showed that women with low WHR were more attractive and more appealing for males and females. Singh's stimuli were frontal views in which WHR could be different if viewed from the side view. Singh (1993b, 1994) also found that besides WHR, weight played an important role in determining attractiveness.

Similar to Singh, Henss's (2000) study focused on how attractiveness related to WHR. Instead of the line drawings, Henss used color photographs of six attractive female and digitally manipulated each picture (see Figure 5).

Figure 5: Henss's (2000) Color Photographs



In his approach, one set of the photographs represented lower WHR, while the other represents higher WHR; in one of the pictures the waist was tightened; in the other, it was widened. Using six Likert-type scales, 180 female and 180 male subjects rated the stimuli. The study concluded that although WHR was an important trait of female attractiveness, it was not the only important trait. There may be other features independent from WHR, such as face and weight (Henss, 2000).

Keisling (1992) studied male perceptions of female attractiveness. He used 122 undergraduate college students to rate attractiveness of twenty-two high school female photographs from 1(Extremely unattractive) to 7(Extremely attractive) on a Likert-type scale. Keisling found that self-perception was important in rating others. Men who believed themselves to be masculine perceived women of average size to be less attractive. On the other hand, men who believed that they had an average or less masculine body rated women with average body size as being attractive. The study also showed that feminine women were perceived as more attractive than masculine females (Keisling, 1992).

Tovee, Hancock, Mahmoodi, Singleton, and Cornelissen (2002) used waveform analysis to study attractiveness with a front-view photographic image of sixty women's bodies varying in BMI (See Figure 6). Their first experiment was to find if shape, in the form of waist-to-hip ratio, could determine attractiveness. The second was to test if there was a relationship between BMI and WHR in determining attractiveness.

Figure 6: Photographic Images (Tovee, Emery, and Cohen-Tovee, 2000)



In the final experiment, body shape was separated into parts, torso and legs, and analyzed using waveform analysis to identify attractiveness. Subjects, male and female undergraduate college students, were asked to rate the attractiveness of sixty color images

of women from the front view. The images were presented in a randomized order; nine point Likert-type scales from 0 (least attractive) to 9 (most attractive) were used.

Subjects analyzed body shape by evaluating female torsos and legs to determine whether body shape was cued to women's physical attractiveness. Results showed that BMI and shape were two cues used to determine female physical attractiveness. However, body shape alone was a weak predictor to determine physical attractiveness. Since subjects' judgments toward images were influenced more by BMI than by WHR, BMI was considered a stronger predictor of attractiveness than WHR.

Supporting their study, previous studies by Tovee, Reinhardt, Emery, and Cornelissen (1998), Tovee, Maisey, Emery, and Cornelissen (1999), and Tovee, Tasker, and Benson (2000) found that BMI was a key in determining female attractiveness. However, Tovee, Emery, and Cohen-Tovee's (2000) results brought up a concern about how a person's BMI could affect his or her judgment of looking at another person's attractiveness. Tovee et al. stated, "an overestimation of another person's BMI would systematically shift an observer's perception of that person's body attractiveness just as an overestimation of the observer's own BMI would shift her perception of her own attractiveness" (2000, p. 1988). In that study, Tovee et al. asked 204 female subjects who had eating disorders to rate their own BMI and twenty-five photographic images of women with different BMI. The result showed that an overestimation of BMI toward other women's bodies did occur, but the majority of the subjects estimated their own BMI close to accurate.

Tovee and Cornelissen (2001) used photographic image of women from front and side view. In most of Tovee et al. studies, the women in the stimuli faced the front

(Tovee et al., 1998; Tovee et al. 1999; Tovee, Emery, & Cohen-Tovee, 2000; Tovee, Tasker, & Benson, 2000). The front-view stimulus showed that BMI was a stronger predictor of female attractiveness than shape. Next, they used stimulus from the side view to test if shape would still be a stronger cue of attractiveness than BMI. Another addition in the Tovee et al. (1999) research was the use of male subjects. Tovee and Cornelissen wanted to know if “gender differences existed in the perceptions of attractiveness” (2001, p. 393). Tovee and Cornelissen concluded that men and women appeared to have the same preferences for what represented female physical attractiveness. Whether a woman was viewed from the front or the side, specific cues were used in judging her attractiveness; they were body mass index (BMI) and shape (Tovee & Cornelissen, 2001).

### III. METHODOLOGY

#### Sample

A convenience sample of male and female undergraduate students who attended Auburn University was sought. Student volunteers were recruited from Auburn University students in Department of Health and Human Performance classes, Physical Education classes and the marching band. Students were recruited through announcements (Appendix A) from the researcher. The recruitment of students began in early Fall semester 2004. The goal was to involve a minimum of 250 students.

## Procedure

Data were derived from: (1) stimulus Power Point slides of female body scan images associated with an attractiveness rating scale and a body size scale; (2) demographic information; and (3) self-reports of weight and height, personal attractiveness, and personal body size.

## Body Scan Images

Sets of three-dimensional female body scan images (Appendix D) used as stimuli in the study included front and side views. Ten body scan images were selected from a larger group of 100 images from [TC]<sup>2</sup>. The ten selected body scans represented a range of heights between 5'4' and 5'7'. The selected body scan images represented a BMI that was placed approximately in the middle of each category. Most research methodologies in the past have shown women from a frontal view to evaluate size and attractiveness. For example, Stunkard et al. (1980), Singh (1993a, 1993b), Fallon and Rozin (1985), Tovee et al. (1998), Tovee et al. (1999), Tovee, Emery, & Cohen-Tovee (2000), Tovee, Tasker, & Benson (2000), Rand and Resnick (2000), and Henss (2000) all used frontal views. However, women's bodies are three dimensional and are often judged from many angles. People might perceive and evaluate side and front views of bodies differently. A person standing sideways reveals part of her body that is not so obvious from the front. Researchers Tovee and Cornelissen (2001) observed women's images not only from the front, but also a side profile.

In this study, the selected images had a BMI that fell in the middle of each BMI category as follows: underweight (16-17); normal (21-22); overweight (26-27); and obese (34-35). Thus, the images were similar in size within each BMI category group. The ten selected women's body scan images contained two images from underweight, two images from the obese category, three images with three different body shapes (hourglass, rectangle and pear body shape) from normal, and three images with three different body shapes (hourglass, rectangle and pear body shape) from the overweight category. The slide evaluation contained: 10 front, 10 side and 10 with front and side views of women's body scan images together.

#### Written Instrument

An instrument was developed and used to record college students' perceptions of four different body sizes, as categorized by BMI (underweight, normal, overweight, and obese), and to explore college students' perceptions of attractiveness using the projected images of women's body scans. The instrument divided into eight sections.

#### Attractiveness Rating: Sections I, II, and V

The attractiveness rating was based on a 5-point Likert scale where 1 is very unattractive, 2 is unattractive, 3 is average, 4 is attractive and 5 is very attractive. The first section asked each respondent to rate the attractiveness of projected women's body scan images from a front view. The second section asked each respondent to rate the attractiveness of projected women's body scan images from a side view. The fifth section asked each respondent to rate the attractiveness of projected women's body scan images from simultaneous front and side views.

### Body size Perception: Sections III, IV, and VI

Subjects were asked to identify four different body sizes, as categorized by BMI (underweight, normal, overweight, and obese) in multiple choice type questions.

Subjects were not told that images were categorized according to BMI. The third section asked each respondent to categorize body size of projected women's body scan images from the front view. The fourth section asked each respondent to categorize the body size of projected women's body scan images from the side view. The sixth section asked each respondent to categorize the body size of projected women's body scan images from simultaneous front and side views.

### Personal Profile: Sections VII and VIII

The seventh section asked each respondent to self-report age, race, academic major, weight, height, and exercise habits. In section VIII each respondent had to rate personal attractiveness and body size. Each respondent was also asked how she or he felt others perceived her or his attractiveness and body size.

### Pilot study

A pilot study was conducted summer semester 2004 to test the effectiveness of the method and the stimuli. The test was administered in Spidle Hall Building's conference room, at the College of Human Sciences at Auburn University. Nine male and three female Auburn students voluntarily participated. Participants were given twenty seconds to evaluate each image in all four sections of the booklet for a total of 25-30 minutes. It took less than five minutes for participants to finish the last two sections consisting of a demographic questionnaire and personal evaluation of participant

attractiveness and body size. The study took approximately 30 minutes. Because of the participants' feedback, two additional sections were later added to the slide evaluation. The additional sections contained the women's body scan images of front and side views on the same slide. Thus, in addition to evaluating the images from separate front and side views, participants evaluated images' attractiveness and body size from the front and side view, side by side.

### Data Collection

A brief introduction was given prior to the study emphasizing the purpose of the investigation. The response instruments (Appendix B) and the informed consents (Appendix C) were distributed in the classes. The instruments consisting of a 5 point Likert-scale rating and multiple choices, were passed out to all male and female students in the class. Body scan images were projected in a Power Point slide format. Discussion among the subjects was discouraged. The subjects were instructed on how to fill out the images evaluation forms and the directions were read aloud.

First, the front and side view images were evaluated individually in different sections. Next, both front and side view images were evaluated at the same time. The images shown to respondents were randomly chosen within each iteration of 10 and projected using the Power Point slide show. Each of the front, side, and simultaneous front and side views images was projected for twenty seconds. Subjects were not told that they were evaluating the same ten images throughout the sections; the images were randomized in each section. Subjects viewed each slide, and immediately individually answered each question. The study took approximately 25-30 minutes.

After the results were collected, coded, and analyzed, all the information was organized in an Excel program. For the purpose of the study, the responses of the male and female students were analyzed both together and separately. The research questions were analyzed using the statistical methods given below:

Research Question 1: *How accurately can individuals perceive the four different body sizes as categorized by BMI?*

The analysis was performed to investigate college students' perceptions of four different body sizes, as categorized by BMI (underweight, normal, overweight, and obese), using projected women's body scan images from simultaneous front and side views. Subjects evaluated ten body scan images: two underweight, three normal, three overweight, and two obese images. The subjects evaluated each image (n=10) independently, picking from four possible answers (underweight, normal, overweight, and obese). Data was obtained from subjects' responses of Section VI in the questionnaires.

The data analysis was based on the total observations of each image. The total observations were determined by multiplying the total number of subjects by the total number of images (two or three) in one category. The percent of observations that perceived the underweight image as underweight was determined by the following equation:

Formula 1:

Participants' perceptions of two 'underweight' images =  $(x+y)/2n \times 100\%$  where

x: number of subjects who perceived the first 'underweight' image as underweight

y: number of subjects who perceived the second 'underweight' image as underweight

n: total subjects that participated in the study

The same calculation was applied to the obese category. As there were three images for the normal and overweight images; the percentage of observations as correct perceptions was obtained using Formula 2:

Formula 2:

Participants' perceptions of three 'normal' images =  $(x + y + z)/3n \times 100\%$  where

x: number of subjects who perceived the first 'normal' image as normal

y: number of subjects who perceived the second 'normal' image as normal

z: number of subjects who perceived the third 'normal' image as normal

n: total subjects that participated in the study

From the formula shown above, subjects' accurate and inaccurate perceptions of the body size images from the simultaneous view of both the front and side were tabulated. The percentages, representing frequencies, are presented in tables in chapter IV. A hypothetical example is shown in Table 2.

Table 2: Subjects' (n= # of subjects, in this example n=100) Correct and Incorrect Perceptions of Body Scanned Images

Simultaneous both front and side views		Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	<b>63%</b>	37%	0%	0%
	NOR	10%	<b>60%</b>	30%	0%
	OV	0%	0%	<b>80%</b>	20%
	OB	0%	0%	0%	<b>100%</b>

U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

The number of responses collected from the study is stated as a percentage. The bolded numbers represented respondents' correct perceptions. In this example, 63% of the total observations from the subjects on an underweight image perceived it correctly, but 37% of total observations from the subjects on an underweight image perceived it as normal.

Research Question 2: *Are there differences in perceptions of body sizes based on front and side views?*

Subjects assigned each of the 10 body scan images to size categories. Subjects viewed the randomly organized 10 front view images before viewing the 10 side view images. Subjects' correct and incorrect perceptions (in the form of percentages) of body sizes from front and side views were tabulated in different tables. Using the same formulas (Formula 1 for two images and Formula 2 for three images) as described for Research Question 1. Tables, where subjects' responses were stated as a percentage, were used to qualitatively analyze if differences in perceptions of body sizes based on front and side views existed.

Research Question 3: *Are there differences between men's and women's perceptions of women's body sizes?*

Male and female subjects' perceptions of body sizes from front, side, and simultaneous front and side views were tabulated in separate tables. The same formulas (Formula 1 and Formula 2) as for Research Question 1 were used to calculate percentage of correct and incorrect perceptions. Qualitative comparisons of tables were used to determine if differences between men's and women's perceptions of body size existed.

Research Question 4: *Are there differences in perceptions of attractiveness based on front views and side views of women's body images?*

Subjects assessed the attractiveness of women's body scan images from front, side, and simultaneous front and side views. The Likert scale included the following ratings: 1 is very unattractive, 2 is unattractive, 3 is average, 4 is attractive, and 5 is very

attractive. Each subject viewed the two underweight, three normal, three overweight and two obese images that were viewed for the size assessments.

The data analysis was based on the average attractiveness rating from the total observations on the images of each BMI category. The total observations were determined by multiplying the total number of subjects by the total number of images in one category.

The average attractiveness ratings for underweight and obese images were determined by the following equation:

Formula 3:

Participants' attractiveness ratings of two 'underweight' images:  $(x+y)/2n$

x: total attractiveness rating for the first 'underweight' image

y: total attractiveness rating for the second 'underweight' image

n: total that subjects participated in the study

For example, two underweight images were viewed independently. In order to get the average attractiveness rating of the underweight images, the total ratings of the first underweight image were added to the total ratings of the second underweight image and that number was then divided by the total observations on the underweight images.

The average attractiveness ratings for the normal and the overweight images were determined by the following equation:

Formula 4:

Participants' attractiveness ratings of three 'normal' images:  $(x+y+z)/3n$

x: total attractiveness rating for the first 'normal' image

y: total attractiveness rating for the second 'normal' image

z: total attractiveness rating for the third 'normal' image

n: total subjects that participated in the study

For normal images, subjects evaluated three different normal images independently. To get the average rating toward the three normal images, the rating of the first normal image, the second normal image, and the third normal image were added together and then were divided by the total observations on the normal images. The same calculation was applied to the three overweight categories.

The average attractiveness ratings were determined for each view and each BMI category of images. The values were presented in a table to compare the differences of attractiveness ratings between the front and side views.

*Research Question 5: Are there differences between men's and women's perceptions of attractiveness of women's bodies?*

Unlike Research Question 4, differences in perceptions of attractiveness of women's bodies between men and woman were evaluated here. Each subject assessed attractiveness when viewing two underweight, three normal, three overweight and two obese images at three different views: front, side and simultaneous front and side views. Data analysis was based on the average attractiveness rating of the total observations on the images of each BMI category. In this case, total observations can be determined by multiplying the total number of male (or female) subjects with the total number of images in one category. The average attractiveness ratings for underweight (using Formula 3) and obese images (using Formula 4) were determined using the equations described for Research Question 4. After the average attractiveness ratings for male and female

subjects were determined for each BMI category of images, the values were tabulated in a table, according to the front, side and simultaneous front and side views, to qualitatively compare the differences in attractiveness ratings between men and women.

Research Question 6: *Does body shape influence the perception of two body sizes, normal and overweight?*

Subjects' perceptions of three different body shapes in the normal and overweight BMI categories were tabulated. Subjects evaluated three normal and three overweight body sizes, each having one example of three body shapes (*hourglass, rectangular, pear*). Subjects were not told that they were evaluating images that had distinctive body shapes.

Subjects' observations of each normal or overweight image with a distinctive body shape were analyzed in the same way as for the preceding questions. For example, for the normal image that had an *hourglass* body shape, how many respondents would correctly perceive it as normal? Since the body shapes defined for this study are viewed only from the front, only front view responses could be analyzed.

Research Question 7: *Is there a relationship between perceptions of attractiveness and body size as categorized by BMI?*

The attractiveness ratings were summed according to the body sizes and the sums were averaged based on the number of body scans in each body-size category. For example, the sum of the attractiveness rating for the underweight or obese body size were divided by two (there were two underweight and two obese images shown); while the

sum of the normal and overweight were divided by three (there were three normal and three overweight images shown). Scatter charts were used to explain if there were linear relationships between perceptions of attractiveness and body size as categorized by BMI.

Research Question 8: *Is there a relationship between an individual's personal BMI score and the perception of body size?*

Subjects' self-reports of weights and heights were computed to find the BMI of each subject. Four values were assigned to the body-size classification accordingly (1-underweight, 2- normal, 3-overweight, 4-obese). All body-size perceptions from each subject were converted to these four numbers and summed for each individual subject. The sums were recorded according to the subject's BMI. Body size perceptions were averaged according to the BMI categories to which subjects belonged. Underweight subjects' average observations were put into one table, normal subjects' average observations were put into another and so on. Thus, underweight subjects' "average" assessment of underweight, normal, overweight, and obese scans would be observed in the table form. Each BMI category was tabled for qualitative comparison.

#### IV. PRESENTATION AND ANALYSIS OF DATA

The main objective of the study was to investigate college students' perceptions of female body size, shape, and attractiveness using 3-D body scan images. A convenience sample was drawn from female and male students at Auburn University. The ratings in the questionnaires used to measure the variables were similar to the scale

that was developed by Franzoi and Shields (1984). Simple statistical analyses were used to investigate the relationship between variables and to understand the objectives of each research question.

### Sample

Data were collected over a period of four weeks from August 24<sup>th</sup>, 2004, to September 26<sup>th</sup>, 2004. One hundred and forty six males and one hundred and fifty five females participated in this study. Data were self-reported. The convenience sample was drawn from students in Department of Health and Human Performance classes, Physical Education classes and the Auburn University marching band. The study was conducted in the classrooms at the end of classes for students in class, and at the end of band practices for the band members. The purpose of research was briefly explained to students before a series of slides depicting body scans of females was shown to each group.

### Demographic Profiles of Respondents

Demographic variables were coded individually for each piece of information. The demographic variables were summarized in the following sections. They included, age, race, major, participation in exercise, weight measurements and height measurements.

## Age

Table 3: Age

<b>Age</b>	<b>Male</b>	<b>Female</b>	<b>Total M &amp; F</b>	<b>%</b>
<b>19</b>	46	50	96	32
<b>20</b>	36	64	100	33
<b>21</b>	33	24	57	19
<b>22</b>	14	14	28	9
<b>23</b>	6	2	8	3
<b>24</b>	3	0	3	1
<b>25</b>	8	1	9	3
<b>Total</b>	<b>146</b>	<b>155</b>	<b>301</b>	<b>100</b>

Of the sample 46 males and 50 females were 19 years of age and 36 males and 64 females were 20 years of age. The majority of the sample (n=301) was between the age of 19 and 20, 32% of participants were 19 years of age and 33% were 20 years of age.

## Race

Table 4: Race

<b>RACE</b>	<b>%</b>
Caucasian	88%
African-American	9%
Others (Hispanic, Asian, Native American & Puerto Rican)	3%

From the percentages shown in Table 4, it may be noted that 88% of the sample (n=301) consisted of Caucasian Americans; hence, the results obtained from this study would be applicable to Caucasian American college students.

## Major

Table 5: Major

<b>Students' Majors</b>	<b>%</b>
College of Education	32%
College of Liberal Arts	15%
College of Business,	15%
College of Engineering	12%
College of Science and Mathematic	12%
College of Human Science,	5%
College of Architecture & Design	3%
College of Nursing	3%
College of Agriculture	1%

Of the respondents, 32%, (n=301) were in the College of Education. Many of the students who were band members majored in Music Education in the College of Education. Students enrolled in Health and Human performance classes were also in the College of Education in exercise science or physical education.

## Body Mass Index

The metric formula for calculating the BMI is [Weight in Kilograms / Height in meters square]. For the purposes of this study, the BMI categories for adults followed by the Center for Disease Control were used (see Table 6):

Table 6: BMI Chart

<b>BMI</b>	<b>Weight Status</b>
30.0 and above	Obese
Below 18.5	Underweight
18.5 - 24.9	Normal
25.0 - 29.9	Overweight

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

### BMI DISTRIBUTION FOR FEMALE PARTICIPANT

Table 7: BMI Distribution for Female Participants

<b>BMI</b>	<b>Frequency</b>	<b>%</b>
<b>&lt;18.5</b>	<b>15</b>	<b>10</b>
<b>18.5-25</b>	<b>108</b>	<b>70</b>
<b>25-30</b>	<b>25</b>	<b>16</b>
<b>&gt;30</b>	<b>7</b>	<b>5</b>

N = 155

All female respondents self-reported weight in pounds and height in feet. These values were then converted to the metric equivalent so BMI could be calculated. As seen in Table 7, 70% of the female participants' BMI fell under normal BMI category (BMI: 18.5-25). The frequency range with the highest number of respondents was 18.5-25 on the normal range.

### BMI DISTRIBUTION FOR MALE PARTICIPANT

Table 8: BMI Distribution for Male Participants

<b>BMI</b>	<b>Frequency</b>	<b>%</b>
<b>&lt;18.5</b>	<b>3</b>	<b>2</b>
<b>18.5-25</b>	<b>80</b>	<b>55</b>
<b>25-30</b>	<b>47</b>	<b>32</b>
<b>&gt;30</b>	<b>16</b>	<b>11</b>

N=146

All male respondents self-reported weight in pounds and height in feet. The values were then converted to the metric equivalent so BMI could be calculated. As seen

in Table 8, 55% of the male participants' BMI fell under the normal BMI category (BMI: 18.5-25). The frequency range with the highest number of respondents was 18.5-25.

The instrument was developed and used to investigate college students' perceptions of four different body sizes, as categorized by BMI (underweight, normal, overweight, and obese), and to explore college students' perceptions of attractiveness, using projected 3-D women's body scan images from front view, side view, and simultaneous front and side views. The research question results were based on the data obtained from subjects' responses to the instrument.

#### Analysis of Research Questions

*Research Question 1: How accurately can individuals perceive the four different body sizes as categorized by BMI?*

To answer this research question, male and female subjects viewed front and side views of women's body scan images together (see Figure 7) and categorized the images' body sizes according to BMI categories (underweight, normal, overweight, or obese).

Figure 7 is an example of one of the ten images. Figure 7 represents a woman's body scan image with a normal body size (BMI= 22.36). The study was conducted to determine if subjects could accurately categorized women's body sizes. The results of subjects' perceptions were collected, analyzed in the form of percentage, and tabulated in Table 9.

Figure 7: Body Scanned Image of a Woman. BMI=22.36 (Normal)

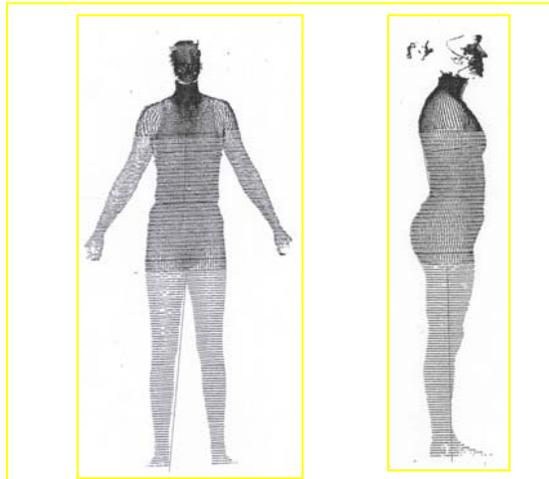


Table 9: Subjects' Correct and Incorrect Perceptions of Body Scan Images

Simultaneous both front and side views		Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	<b>32%</b>	66%	1%	0%
	NOR	4%	<b>84%</b>	12%	0%
	OV	0%	17%	<b>77%</b>	6%
	OB	0%	0%	24%	<b>75%</b>

N= 301 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: Because of rounding, some of the percentages did not add up to 100%.

Subjects' accurate perceptions of body sizes are represented in bolded percentages in Table 9. Students correctly perceived at least 75% of the normal, overweight and obese figures (84% of the normal, 77% of the overweight, and 75% of the obese). Underweight images, however, were correctly identified by only 32% of the subjects.

Research Question 2: Are there differences in perceptions of body sizes based on front and side views?

To answer this question, subjects viewed images from front and side view independently (see Figure 8). In Figure 8, the image represents a woman's body scan with a normal body size (BMI= 22.36) from the front view. Figure 8 is one of the examples of the ten images used in the stimuli. The study was conducted to test if the subjects could determine women's body sizes accurately from front or side view.

Figure 8: Front View Body Scan Image of a Woman. BMI=22.36 (Normal)

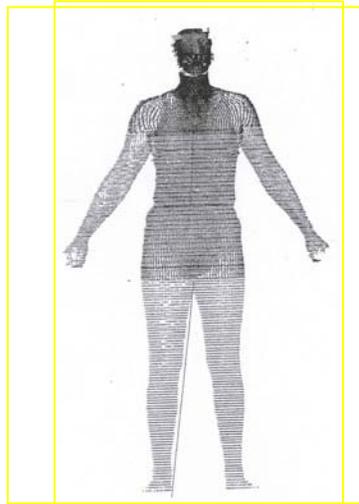


Table 10: Subjects' Perceptions: Viewing Images (n=10) From a Front View

Front View		Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	10%	85%	5%	0%
	NOR	1%	62%	37%	1%
	OV	0%	13%	67%	20%
	OB	0%	1%	34%	65%

N= 301 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: Because of rounding, some of the percentages did not add up to 100%.

In Table 10, subjects' correct and incorrect perceptions were summarized and stated as the percentage of the total result. The bolded number in Table 10 represents the correct perceptions of respondents evaluating the body sizes from scanned images according to the BMI chart as underweight, normal, overweight, or obese. Students correctly perceived at least 62% of the normal, overweight and obese figures (62% of the normal, 67% of the overweight, and 65% of the obese). Underweight images, however, were correctly identified by only 10% of the subjects.

In Figure 9, the image represents a woman's body scan from the side view.

Figure 9: Side View Body Scan Image of a Woman. BMI=22.36 (Normal)

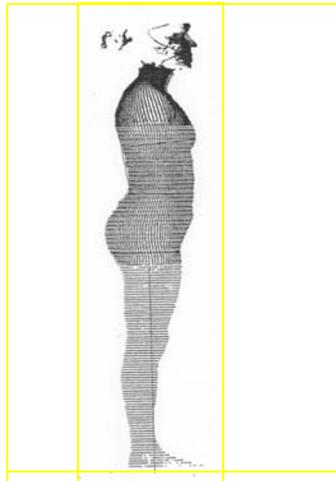


Table 11: Subjects' (n=301) Perceptions: Viewing Images (n=10) From a Side View

Side View		Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	<b>46%</b>	53%	0%	0%
	NOR	12%	<b>86%</b>	3%	2%
	OV	0%	30%	<b>68%</b>	20%
	OB	0%	1%	40%	<b>59%</b>

N=301 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: Because of rounding, some of the percentages did not add up to 100%.

In Table 11, the results from subjects' perceptions were summarized in the percentage of the total result. The bolded number represents the subjects' correct perceptions of respondents evaluating the images' body sizes. Students correctly perceived at least 68% of the normal and overweight figures (86% of the normal, and 68% of the overweight). For the underweight and obese images, the accuracy of their perceptions was not as high. The underweight images were correctly identified only by 46% of the subjects. The obese images were correctly identified by 59% of the subjects. Some students, however, perceived the obese images as being overweight (40%). While some obese figures appeared leaner to respondents, the underweight figures were viewed more accurately from the side view. So there was an increased in accuracy by 36% when viewing the underweight image from the side.

Research Question 3: Are there differences between men's and women's perceptions of women's body sizes?

To answer this question, one hundred and forty six males, and one hundred and fifty five females were the subjects in this study. The research questions were designed to investigate whether differences existed between men's and women's perceptions of women's body sizes. Male and female perceptions were analyzed separately and tabulated into separate tables. Male subjects' correct and incorrect perceptions of front view images were tabulated in Table 12.

Table 12: Male Subjects' Perceptions: Viewing Images (n=10) From a Front View

Front View		Male Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	12%	82%	6%	1%
	NOR	1%	58%	39%	1%
	OV	0%	12%	65%	23%
	OB	0%	1%	29%	69%

N =146 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: because of rounding, some of the percentage did not add up to a 100%

Table 12 shows male subjects' correct and incorrect perceptions of body sizes when viewing images from a frontal view. The male college students correctly perceived at least 58% of the normal, overweight, and obese figures (58% of the normal, 65% of the overweight, and 69% of the obese). Underweight images, however, were correctly identified by only 12% of the male subjects.

Table 13: Female Subjects' Perceptions: Viewing Images (n=10) From a Front View

Front View		Female Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	8%	87%	5%	0%
	NOR	0%	65%	34%	0%
	OV	0%	13%	68%	18%
	OB	0%	0%	37%	62%

N=155 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: Because of rounding, some of the percentages did not add up to 100%.

Table 13 shows female subjects' correct and incorrect perceptions of body sizes viewed from the frontal view. Female college students correctly perceived at least 62% of the normal, overweight, and obese figures (65% of the normal, 68% of the overweight, and

62% of the obese). Underweight images, however, were correctly identified by only 8% of the female subjects.

Table 14: Male Subjects' Perceptions: Viewing Images (n=10) From a Side View

Side View		Male Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	49%	50%	1%	0%
	NOR	13%	85%	2%	0%
	OV	0%	29%	67%	3%
	OB	1%	1%	35%	63%

N=146 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: Because of rounding, some of the percentages did not add up to 100%.

Table 14 shows male subjects' correct and incorrect perceptions when responding to a side view of each image. In Table 14, 49% of male subjects correctly perceived the images underweight body size as underweight, but half of participants (50%) misperceived the underweight image and labeled it as normal. The male college students correctly perceived at least 63% of the normal, overweight, and obese figures (85% of the normal, 67% of the overweight, and 63% of the obese). Images falling into the normal category were viewed the most accurately.

Table 15: Female Subjects' Perceptions: Viewing Images (n=10) From a Side View

Side View		Female Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	43%	57%	0%	0%
	NOR	10%	87%	3%	0%
	OV	0%	30%	68%	2%
	OB	0%	1%	44%	55%

N=155 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: Because of rounding, some of the percentage did not add up to 100%.

Table 15 shows female subjects' correct and incorrect perceptions when responding to a side view of each image. The female college students correctly perceived at least 68% of the normal and overweight figures (87% of the normal, and 68% of the overweight). The underweight images were correctly identified by only 43% of the female subjects while the obese images were correctly identified by 55% of the female subjects. The accuracy of perceiving the underweight images was increased by 25% from the side as compared to a frontal view. When students incorrectly perceived the obese images, 44% saw them as overweight. Female participants were less accurate for obese figures, and chose a smaller body category when they viewed the images from the side than when viewed them from a frontal stance.

Table 16: Male Subjects' Perceptions: Viewing Images (n=10) From Front and Side Views Together

Simultaneous both front and side views		Male Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	36%	61%	2%	1%
	NOR	4%	84%	11%	0%
	OV	0%	15%	78%	6%
	OB	0%	0%	21%	78%

N=146 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: Because of rounding, some of the percentages did not add up to 100%.

Table 16 shows male subjects' correct and incorrect perceptions of body size when viewing images from the front and the side together. The students correctly perceived at least 78% of the normal, overweight, and obese figures (84% of the normal, 78% of the overweight, and 78% of the obese). Underweight images, however, were correctly identified by only 36% of the male subjects. Although viewing the front and side view

images together did not increase the accuracy of perceiving the underweight images, it did increase accuracy for correctly identifying the overweight and the obese images.

Table 17: Female Subjects' Perceptions: Viewing Images (n=10) From Front and Side

Simultaneous both front and side views		Female Subjects' Perception			
		U	NOR	OV	OB
Actual BMI Category	U	29%	71%	1%	0%
	NOR	3%	84%	13%	0%
	OV	0%	19%	75%	6%
	OB	0%	1%	27%	73%

Views Together

N=155 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: Because of rounding, some of the percentages did not add up to 100%.

Table 17 shows female subjects' correct and incorrect perceptions of body size when viewing images from the front and the side together. Female college students correctly perceived at least 73% of the normal, overweight, and obese figures (84% of the normal, 75% of the overweight, and 73% of the obese). Underweight images, however, were correctly identified by only 29% of the female subjects. Women saw the underweight images better from the side view alone since the accuracy was higher from the side compared to the simultaneous views of both the front and side. Viewing the front and side view images together did increase the accuracy of perceiving the overweight and the obese images accurately.

In conclusion, although the differences between the male and female subjects' perceptions of the images were small, differentiation still existed. The review of male and female subjects differences were tabulated in Table 18.

Table 18: Front View Perception Compared to Side View Perception

	Front View		Side View	
	Men	Women	Men	Women
<b>U</b>	12%	8%	49%	43%
<b>NOR</b>	58%	65%	85%	87%
<b>OV</b>	65%	68%	67%	68%
<b>OB</b>	69%	62%	63%	55%

(Male, n=146 and Female, n=155)

Underweight, NOR-Normal, OV-Overweight, OB-Obese.

The results from Table 18 shows that men and women perceived the images body size more accurately from the side view. Accuracy in observing the same image from a different view (side) increased by 37% for men and 35% for woman for the underweight category. The accuracy of perceiving the normal and the overweight images were increased for women compared to men. But, more men accurately classified underweight and obese images than women.

*Research Question 4: Are there differences in perceptions of attractiveness based on front views and side views of women's body images?*

To answer this question, subjects were asked to rate a front view and a side view of scanned images using a 5-point Likert scale where 1 was very unattractive, 2 was

unattractive, 3 was average, 4 was attractive and 5 was very attractive. Subjects' responses are tabulated in Table 19.

Table 19: The Average Attractiveness Rating of Subjects

		<b>Subject's Attractiveness Rating</b>	
		<b>FV</b>	<b>SV</b>
<b>Actual BMI Category</b>	<b>U</b>	3.2	3.9
	<b>NOR</b>	2.7	3.5
	<b>OV</b>	1.9	2.1
	<b>OB</b>	1.3	1.3

N=301 U-underweight, NOR-normal, OV-overweight, and OB-obese  
 1-Very Unattractive, 2-Unattractive, 3-Average, 4-Attractive, 5-Very Attractive.

Table 19 shows the average attractiveness rating of each image according to category (underweight, normal, overweight, and obese) by each subject. From the front view, subjects rated the attractiveness of the underweight images as average (3.2), the normal images as between unattractive and average (2.7), the overweight images as nearly unattractive (1.9), and the obese images as very unattractive (1.3). From the side view, subjects rated the attractiveness of the underweight images as close to attractive (3.9), the normal images as falling between average and attractive (3.5), the overweight images as unattractive (2.1), and the obese images as very unattractive (1.3). Subjects' attractiveness ratings were higher when viewing the underweight, normal, and overweight images from the side view. The rating for the obese images stayed the same whether viewing it from the front or side view.

Research Question 5: Are there differences between men and women’s perceptions of attractiveness of women’s bodies?

To answer this question, one hundred and forty six male, and one hundred and fifty five female subjects were asked to rate women’s body scan images using a 5-point Likert scale where 1 was very unattractive, 2 was unattractive, 3 was average, 4 was attractive and 5 was very attractive. Subjects rated projected images from front view, side view, and front and side view together. The results from male and female subjects’ ratings were tabulated and compared in the following table (see Table 20).

Table 20: The Average Rating by Men and Women: Viewing images (n=10) From a Front View

Front View		Subject's Attractiveness Ratings	
		Women (n=155)	Men (n=146)
Actual BMI Category	U	3.2	2.9
	NOR	2.7	2.5
	OV	2.0	1.8
	OB	1.4	1.2

U-underweight, NOR-normal, OV-overweight, and OB-obese  
 1-Very Unattractive, 2-Unattractive, 3-Average, 4-Attractive, 5-Very Attractive.

Table 20 compared men and women’s average attractiveness ratings of each front view image according to category (underweight, normal, overweight, and obese). From the front view, women rated the underweight image as average in attractiveness and men rated front views as almost average in attractiveness (women =3.2, men = 2.9); both women and men rated the normal image as between unattractive and average (women = 2.7, men = 2.5). Women rated the overweight images as unattractive, but men rated

below the women’s rating of unattractive (women = 2.0, men =1.8). Finally women and men rated the obese images as very unattractive (women = 1.4, men = 1.2).

Table 21: The Average Rating by Men and Women: Viewing Images (n=10) From a Side View

Side View		Subject's Attractiveness Rating	
		Woman (n=155)	Man (n=146)
Actual BMI Category	U	4.0	3.6
	NOR	3.6	3.2
	OV	2.1	1.9
	OB	1.4	1.2

U-underweight, NOR-normal, OV-overweight, and OB-obese  
 1-Very Unattractive, 2-Unattractive, 3-Average, 4-Attractive, 5-Very Attractive

Table 21 compared men’s and women’s average attractiveness ratings of each side view image according to category (underweight, normal, overweight, and obese). From the side view, both women and men rated the normal images as above average in attractiveness (women = 3.6, men = 3.2). While women rated the overweight image as unattractive, men rated it nearly unattractive (women = 2.1, men = 1.9). Both men and women rated the obese images as very unattractive (women = 1.4, men = 1.2). The underweight images were rated as attractive (4.0) by women, slightly less attractive by men (3.6).

Table 22: The Average Rating by Men and Women: Viewing Images (n=10) From Front and Side Views Together

Front & Side Views		Subject's Attractiveness Rating	
		Woman (n=155)	Man (n=146)
Actual BMI Category	U	4.0	3.6
	NOR	3.3	3.0
	OV	2.1	1.8
	OB	1.4	1.2

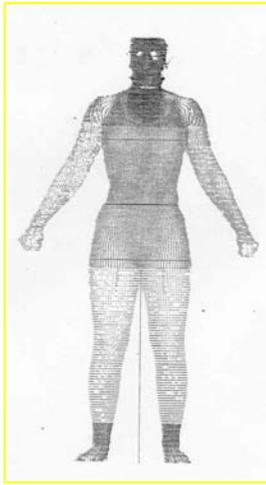
U-underweight, NOR-normal, OV-overweight, and OB-obese  
 1-Very Unattractive, 2-Unattractive, 3-Average, 4-Attractive, 5-Very Attractive

Table 22 compared men’s and women’s average attractiveness ratings of simultaneous front and side view scanned images according to category (underweight, normal, overweight, and obese). From the simultaneous front and side views, both women and men rated the normal image as average in attractiveness (women = 3.3, men = 3.0). While women rated the overweight images as unattractive, men rated it lower (women = 2.1, men = 1.8). Both women and men rated the obese images as very unattractive (women = 1.4, men = 1.2). The underweight images were rated as attractive (4.0) by women, but men rated it lower (3.6) on the attractiveness scale.

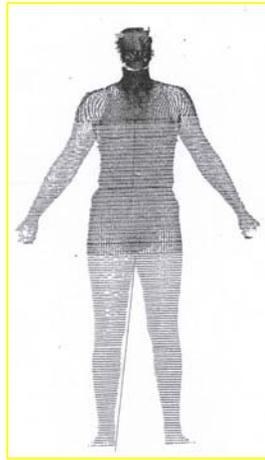
*Research Question 6: Does body shape influence the perception of two body sizes, normal and overweight?*

To answer this question, subjects were shown images of three different body shapes (*hourglass, rectangle, pear*) in normal and overweight body scans. Subjects were not told there were three different body shapes among the images shown during the study. Figure 10 shows the normal body size with three different body shapes. Subjects’ perceptions of normal body sizes relative to body shapes are summarized in Table 23 and 24 in the form of percentages. Subjects’ correct and incorrect perceptions of normal images were then tabulated into the table (see Table 23) in the form of total percentages.

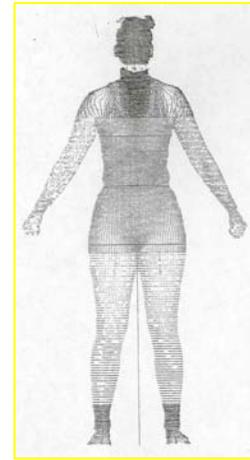
Figure 10: Three Normal Body Sizes with Three Different Body Shapes



Hourglass  
BMI= 22.54 (Normal)



Rectangle Shape  
BMI= 22.36 (Normal)



Pear Shape  
BMI= 21.52 (Normal)

Table 23: Subjects' Correct and Incorrect Perception: Perceiving Normal Image with Three Body Shapes (*Hourglass, Rectangular, Pear*)

		Normal		
		Hourglass	Rectangular	Pear
Subjects' Perceptions	U	0%	0%	2%
	N	<b>74%</b>	<b>49%</b>	<b>61%</b>
	OV	25%	50%	36%
	OB	0%	1%	1%

N=301 U-Underweight, NOR-Normal, OV-Overweight, OB-Obese.

Note: because of rounding, some of the percentage did not add up to a 100%

When looking at the hourglass body shape, 74% of participants accurately perceived the normal image as normal. But the normal image was perceived as overweight by some subjects (*hourglass: 25%, rectangular: 50%, pear: 36%*). When

subjects wrongly classified the normal image in the rectangular and pear shape, they were more likely to categorize them into a heavier category; the normal *rectangular* (50%) and *pear* (36%) were perceived as belonging to the overweight category.

Figure 11 shows overweight body size with three different body shapes that were projected during the study. Subjects' correct and incorrect perceptions of overweight images are tabulated in Table 24 in the form of total percentages.

Figure 11: Three Overweight Body Sizes with Three Different Body Shapes

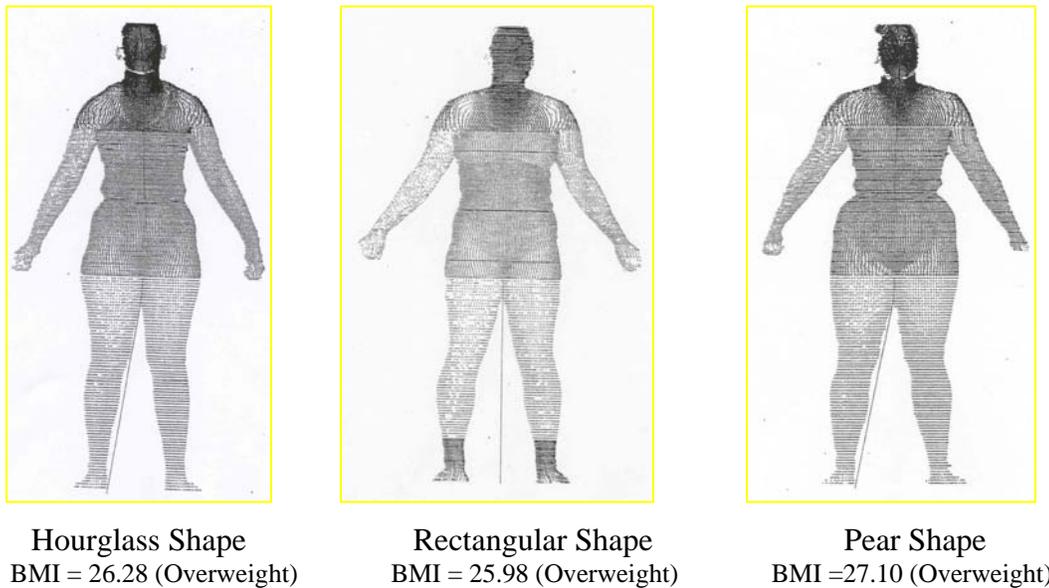


Table 24: Subjects' Correct and Incorrect Perception: Perceiving Overweight Image with Three Body Shapes (*Hourglass, Rectangular, Pear*)

	OV	Overweight		
		Hourglass	Rectangular	Pear
Subjects' Perceptions	OB	12%	0%	46%
	N	9%	25%	4%

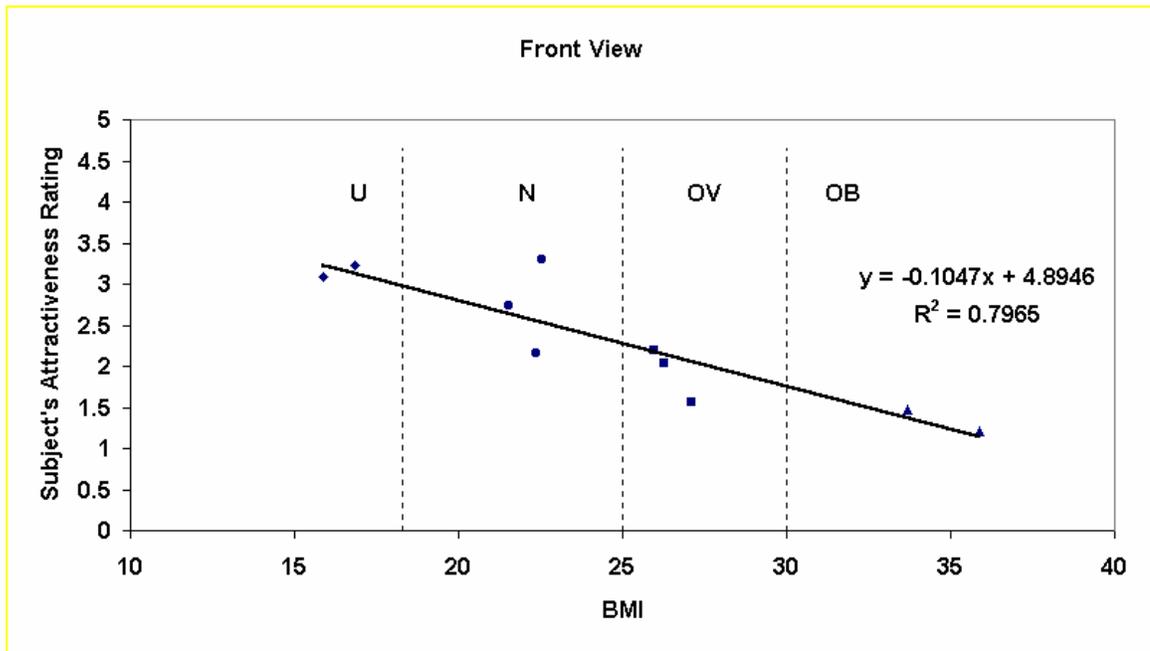
N=301            U-underweight, N-normal, OV-overweight, and OB-obese  
Note: Because of rounding, some of the percentages did not add up to 100.

Table 24 shows that accurate estimate of an overweight image was higher when the image had an hourglass body shape. But some subjects (25%) perceived the overweight image as normal when viewing a *rectangular* body shape. But 46% of the participants inaccurately perceived the overweight body as obese when a *pear* shape was viewed. Both the normal and the overweight images were classified more accurately than was the *hourglass* body shape was presented.

Research Question 7: Is there a relationship between perceptions of attractiveness and body size as categorized by BMI?

To answer this question, attractiveness ratings for scanned images (2 underweight, 3 normal, 3 overweight, and 2 obese) were obtained from 301 subjects. The attractiveness ratings for each image were averaged. The results are shown in Figure 12, 13, and 14.

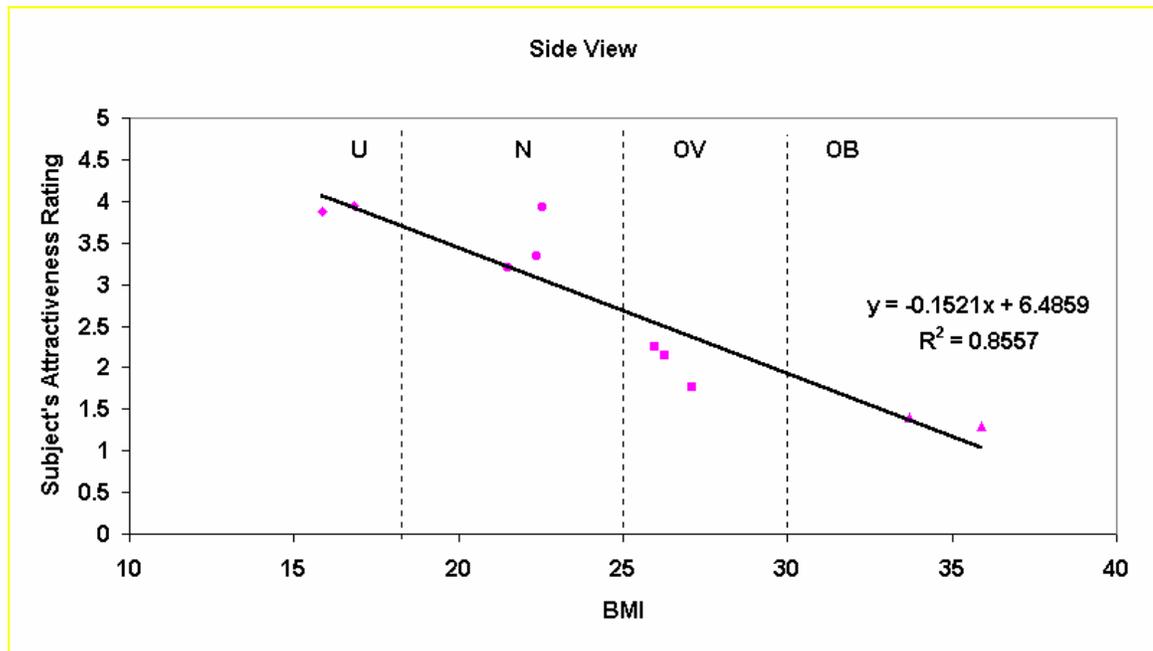
Figure 12: Subjects' Average Attractiveness Ratings of Images (n=10) as Categorized by BMI From a Front View



(N=301) 1-Very Unattractive, 2-Unattractive, 3-Average, 4-Attractive, 5-Very Attractive.  
 BMI: Underweight (below 18.5), Normal (18.5-24.9), Overweight (25-29.9), Obese (30 and above)

Figure 12 represents the average ratings of ten images of women’s body scans from a front view. In Figure 12, the trend line is plotted at a downward angle, but as can be seen, the line passes through the data points in different places. The two diamond and two triangle data points on the trend line represent the underweight (BMI: below 18.5) and obese (BMI: 30 and above) images. The three circle and three square data points represent the normal (BMI: 18.5 – 24.9) and overweight (BMI: 25 – 29.9) images with three different body shapes (hourglass, rectangular, pear). The underweight images were rated as average in attractiveness and the obese images were rated as very unattractive. While the normal images ranged from being unattractive to average, the overweight images ranged from being very unattractive to unattractive.

Figure 13: Subjects' Average Attractiveness Ratings of Images (n=10) as Categorized by



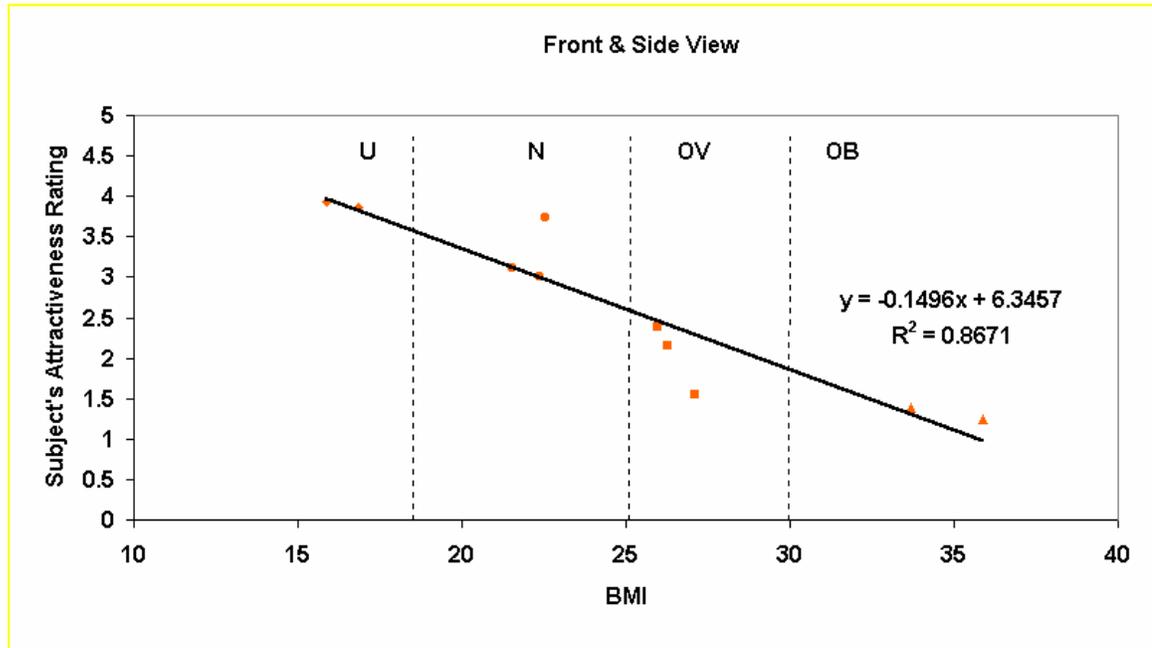
BMI From a Side View

(N=301) 1-Very Unattractive, 2-Unattractive, 3-Average, 4-Attractive, 5-Very Attractive.  
 BMI: Underweight (below 18.5), Normal (18.5-24.9), Overweight (25-29.9), Obese (30 and above)

Figure 13 represents each subject's average ratings of ten images of women's body scans from the side view. The trend line is plotted at a downward angle, but as can be seen, the line passes through the data points in different places. The two diamond and two triangle data points on the trend line represent the underweight (BMI: below 18.5) and obese (BMI: 30 and above) images. The three circle and three square data points represent the normal (BMI: 18.5 – 24.9) and overweight (BMI: 25 – 29.9) images with three different body shapes (hourglass, rectangular, pear). The underweight images were rated as attractive and the obese images were rated as very unattractive. While the normal

images ranged from being average to attractive, the overweight images ranged from being very unattractive to unattractive.

Figure 14: Subjects' Average Attractiveness Ratings of Images as Categorized by BMI



from Front and Side Views Together

(N=301) 1-Very Unattractive, 2-Unattractive, 3-Average, 4-Attractive, 5-Very Attractive.

BMI: Underweight (below 18.5), Normal (18.5-24.9), Overweight (25-29.9), Obese (30 and above)

Figure 14 represents each subject's average ratings of ten images of women's body scans from simultaneous front and side views. In Figure 14, the trend line is plotted at a downward angle, and the line passes through the data points in different places. The two diamond and two triangle data points on the trend line represent the underweight (BMI: below 18.5) and obese (BMI: 30 and above) images. The three circles and three square data points represent the normal (BMI: 18.5 – 24.9) and overweight (BMI: 25 – 29.9) images with three different body shapes (hourglass, rectangular, pear). The underweight images were rated as attractive and the obese images were rated as very

unattractive. Rating for the normal images ranged between very unattractive and unattractive.

From Figures 12, 13, and 14, it can be seen that as the BMI of images got higher, the attractiveness rating decreased. In addition, an inverse linear relationship was seen between the perception of attractiveness and the body size.

Research Question 8: Is there a relationship between an individual’s personal BMI score and the perception of body size?

To answer this question, the male and female self-reported weights and heights were computed to a BMI score. Subjects’ BMI scores were categorized into four different groups: underweight, normal, overweight, and obese. Personal BMI scores were classified as follows: 1 was for underweight, 2 was for normal, 3 was for overweight, and 4 was for obese. After subjects were put into groups based on their BMI, a comparison was made to find out if there was a relationship between an individual’s personal BMI score and the perception of body sizes based on ratings of the 10 body scans. Table 25 shows the underweight subjects’ perceptions of women’s body scan images.

Table 25: Body Size Evaluation By ‘Underweight’ Subjects (Female-n=15, Male-n=3)

		Female Underweight Subject's Perception	Male Underweight Subject's Perception
Actual BMI Category	U	1.8	1.7
	N	2.2	1.9
	OV	3.0	2.8
	OB	3.8	3.7

U-underweight, N-normal, OV-overweight, and OB-obese  
 1-underweight, 2-normal, 3-overweight, and 4-obese

Table 25 shows that female subjects who were underweight rated the underweight image close to normal (1.8), the normal image as normal (2.2), the overweight image as overweight (3.0), and the obese image as almost obese (3.8). Male subjects who were underweight rated the underweight image slightly below normal (1.7), the normal image as almost normal (1.9), the overweight image close to overweight (2.8), and the obese image as nearly obese (3.7).

Table 26: Body Size Evaluation By 'Normal' Subjects (Female-n=108, Male-n=80)

		Female Normal Subject's Perception	Male Normal Subject's Perception
Actual BMI Category	U	1.8	1.7
	N	2.1	2.1
	OV	2.9	2.9
	OB	3.7	3.8

U-underweight, N-normal, OV-overweight, and OB-obese  
 1-underweight, 2-normal, 3-overweight, and 4-obese

Table 26 shows the normal BMI subjects' perceptions of women's body scan images. From the table, it can be observed that female subjects who were normal rated the underweight image as nearly normal (1.8), the normal image as very close to normal (2.1), the overweight image as almost overweight (2.9), and the obese image closer to the obese (3.7) rating. Conversely, male subjects who had a normal BMI rated the underweight image as between being underweight and normal (1.7), the normal image as normal (2.1), the overweight image as nearly overweight (2.9), and the obese image as nearly obese (3.8).

Table 27: Body Size Evaluation By ‘Overweight’ Subjects (Female-n=25, Male-n=47)

		Female Overweight Subject's Perception	Male Overweight Subject's Perception
Actual BMI Category	U	1.5	1.6
	N	2.1	2.1
	OV	2.8	2.9
	OB	3.6	3.8

U-underweight, N-normal, OV-overweight, and OB-obese  
 1-underweight, 2-normal, 3-overweight, and 4-obese

Table 27 shows the overweight subjects’ perceptions of women’s body scan images. In Table 27, the results show that female subjects who were overweight rated the underweight image as between underweight and normal (1.5), the normal image as normal (2.1), the overweight image as nearly overweight (2.8), and the obese image as between being overweight and obese (3.6). Male subjects who were overweight rated the underweight image between underweight and normal (1.6), the normal image as close to normal (2.1), rated the overweight image as close to overweight (2.9), and rated obese image as nearly obese (3.8).

Table 28: Body Size Evaluation By ‘Obese’ Subjects (Female-n=7, Male-n=16)

		Female Obese Subject's Perception	Male Obese Subject's Perception
Actual BMI Category	U	1.3	1.6
	N	2.0	2.1
	OV	2.6	2.8
	OB	3.8	3.7

U-underweight, N-normal, OV-overweight, and OB-obese  
 1-underweight, 2-normal, 3-overweight, and 4-obese

Table 28 shows the obese subjects’ perception of each group toward women’s body scan images. The analysis in Table 28 shows that female subjects who were obese

were the most accurate in rating the underweight image closer to underweight (1.3), and the normal image as normal (2.0). The obese female subjects were the least accurate in rating the overweight image closer to normal (2.6) than subjects from other BMI categories. They more accurately rated the obese image as nearly obese (3.8). In contrast, the male subjects who were obese rated the underweight image slightly closer to normal (1.6) in size. The normal image was rated as nearly normal (2.1), while the overweight image was closer to overweight (2.8), and the obese image as being closer to obese (3.7).

The accuracy was high in classifying the normal images by all groups. The underweight and normal subjects classified the underweight images as between being underweight and normal. The overweight and obese subjects categorized the underweight images as underweight more accurately.

## V. SUMMARY, CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS

In a culture in which attractiveness is valued highly, appearance satisfaction plays an important role in the way we think of our bodies. “It is a fact that the ideal body weight in Western societies is often unrealistic to achieve and at times even unhealthy,” (Paeratakul, White, Williamson, Ryan, & Bray, 2002, p. 348). People, especially those in a younger generation such as college students, want to achieve a body that is considered acceptable or even desirable in the society.

The idea of satisfaction with one's body expands to how a person views and evaluates his or her weight, specific body parts, or overall shape in terms of how his or her body will fit the cultural standard (Cash & Pruzinsky, 2002). Primary research on perception of the female body has focused on understanding body image in regard to eating disorders. According to Tovee et al., "a disturbance in the evaluation of personal body mass and shape is a key feature of both anorexia and bulimia nervosa," (2000, p. 1240). This study examined perceptions of women's body sizes, shapes and attractiveness from college students' perspectives. The sample was composed of 146 males and 155 females; the majority of the sample was between the ages of 19 and 20. The sample primarily consisted of Caucasian Americans (88%), and many of the subjects were from the College of Education (32%). More than half of male (55%) and more than half of female participants (70%) had BMI scores that fell into the normal range. The subjects' BMI was calculated from self-reported heights and weights. Tehard, Van Liere, Nougue, and Clavel-Chapelon (2002) found self-reported measurements reliable when contrasting the self-reported measurement with technician measured measurement.

In this study, body scan technology was introduced as a stimulus to replace previously used line drawings or color photographs. "Line drawings did not give a good representation of a human body" (Tovee & Cornellsen, 2001, p. 399). Prior to this study, there had not been a perception research study using body scan images as the stimuli. Sets of three-dimensional female body scan images (Appendix D) used as stimuli in this study, included front, side, and simultaneous front and side views. The ten selected

women's body scan images contained two images each from the underweight and obese categories, and three images each with three different body shapes (*hourglass, rectangle and pear*) from the normal and overweight categories. The ten selected body scans represented a range of heights between 5'4' – 5'7', the images were randomized in each section, and subjects were not told that they were evaluating the same ten images throughout the sections.

## Discussion and Conclusions

### Research Question 1

*How accurately can individuals perceive the four different body sizes as categorized by BMI?*

Subjects viewed three dimensional body scans from both front and side views together. They were most correct in perceiving the normal (84%) and obese (85%). Overweight female figures were correctly perceived by 77% of the respondents; underweight images, however, were identified correctly by only 32% of the subjects. A majority of subjects perceived underweight female images as normal. This is a concern because respondents misjudged images to be normal which were classified by medical definition as underweight. However, it matched the cultural views where a western society embraces thinness in women.

Many studies have used images viewed from the front (Stunkard et al., 1980; Singh, 1993a, 1994; Henss, 2000; Rand & Resnick, 2000, Tovee, Emery, and Cohen-Tovee, 2000), and side-view (Sheldon, 1954; Douty, 1968; Douty, Moore & Hartford,

1974 ; Douty & Brannon, 1984; Tovee & Cornelissen, 2001). From a front view of a three dimensional female body scan, the common area of body fat distribution for women such as (abdomen, the breast and upper arm), may be difficult to see clearly. A side view tends to show more of the body fat deposition in the body, such as bust, abdomen, thighs and buttocks.

According to Tovee and Cornelissen (2001) women's body sizes and shapes should become more obvious in side view. When subjects viewed independently the same three-dimensional body scans images of women in front and side view, the curves that may not be perceived from the front view of the image are more apparent in a side view. Limited research has been conducted using both front and side view stimuli at the same time, and even fewer studies have used realistic images. Viewing a female image from both front and side views at the same time may have given subjects more information to accurately predict body image, where subjects were better able to classify what sizes (underweight, normal, overweight, or obese) actually are.

## Research Question 2

*Are there differences in perceptions of body sizes based on front and side views?*

When front and side views were seen separately, subjects' correct assignment of size was the most accurate for the side views for the underweight, normal and, overweight body categories. They were less accurate for the obese scans. From side view, women's body sizes and shape were more easily identified, especially for the shape

of buttocks and bust. This is consistent with Tovee and Cornelissen's (2001) findings. Only 10% of the subjects correctly classified underweight scans from the front view; 46% were correct when using the side view. Differences were not as vast for the normal (front - 62%, side - 86%) and overweight (front - 67%, side - 68%) groups. The subjects correctly perceived the obese figures slightly more accurately from the front (65%) than the side (59%). When subject's viewed the obese body from a side view, they categorized the body size as overweight (40%) rather than obese. From the side view where body curves appeared to help more correctly identify the lower body categories, subjects still misperceived the obese category.

The misperception is interesting, especially in light of body size as an indicator of health. If larger body sizes are being perceived on smaller body categories, it is possible that it is difficult to help people understand the health risk associated with obesity.

### Research Question 3

*Are there differences between men and women's perceptions of women's body sizes?*

There were differences in the frequencies of correct perceptions between men and women. This is consistent with Franzoi and Herzog, who stated "men and women appear to emphasize different body functions when assessing one another; men tend to place more importance on body functions directly related to sexuality, whereas women tend to emphasize physical stamina and condition" (1987, p. 29). Whether looking at the front, side, or front/side views together, there were more men than women who perceived the

correct sizes of the three dimensional images within the two end categories, underweight and obese. The correct comparisons were as follows: viewing the underweight figures from the front (men = 12%, women =8%), the side (men = 49%, women = 43%), and the front/side (men = 36%, women = 29%); viewing the obese figures from the front (men = 69%, women =62%), the side (men = 63%, women =55%), and the front/side (men = 78%, women = 73%). Subsequently, men's percentages of accuracy for the underweight and obese groups were higher than women.

Within the normal category, slightly more women (front = 65 %, side = 87%) than men (front = 58 %, side = 85%) were correct when observing the separate front and side views, but they were equal in accuracy when looking at the two views together (women = 84%, men = 84%). Accuracies of men and women were closer for all views of the overweight scans: women (front = 68 %, side = 68%, and front/side = 75%) and male (front = 65 %, side = 67%, and front/side = 78%).

The findings in this research similar to Tovee and Cornelissen's (2001) study which noted that there were not any significant differences between men's and women's perceptions of female body sizes.

#### Research Question 4

*Are there differences in perceptions of attractiveness based on front views and side views of women's body images?*

Tovee and Cornelissen (2001) asked 80 college students to rate a set of pictures of women for attractiveness from a front and side view. Their results showed no significant

differences in perceiving females' attractiveness between the front or side view of the female images. Subjects gave a slightly higher attractiveness rating to the side view images compared to the front view images.

In contrast, the present study showed different results: female images were found to look more attractive in side view when compared to the front view. According to Furnham and Radley (1989), and Furnham and Baguma (1994), as body sizes become progressively thinner or heavier, attractiveness ratings decrease. From this study, however, results showed that as body sizes become increasingly thinner, the attractiveness rating increases. This study supports the research findings by Douty et al. (1974), Douty and Brannon (1984), and Davis (1985), where they found subjects rated the ideal figure as being thin, having a small waist and hip, a fuller bust; as the image of the female body moves away from this ideal, it could be classified as less attractive. The attractiveness rating is higher from the side compared to the front view. Subjects in this study rated underweight images as more *attractive* when compared to normal, overweight and obese images. The underweight, normal and overweight images were perceived to be more attractive when looking at them from the side compared to the front. However, the obese images were perceived as very unattractive in either view.

Finally, although the medical field views the underweight body images as not being in a healthy range for the human body, college students perceived the images to be *attractive*. It could mean that being underweight is preferable and encouraged among the college population between the ages of 19 and 25 years old. Tovee, Benson, Emery,

Mason, Cohen-Tovee (2003) found that the ideal female BMI was a 20. Individuals with eating disorders had an ideal image with a BMI of 15.

#### Research Question 5

*Are there differences between men's and women's perceptions of attractiveness of women's bodies?*

The average scores for the men's attractiveness ratings of the body scans were always lower than the average for women's ratings; however, the differences did not appear to be large. On a 5-point scale, the differences ranged from 0.2 to 0.4. Tovee and Cornellisen (2001) found that no significant differences between men and women existed in rating female attractiveness. In this study, women considered images more attractive than men did in all BMI categories. Differences for underweight images are in line with Tovee and Cornellisen (2001), who found that the stimuli which both male and female subjects rated the most attractive, appeared to have similar BMI. Thus, men and women might be similar in their perception of attractiveness in women's bodies.

However, Fallon and Rozin (1985) and Rozin and Fallon (1988) suggested that gender differences existed when rating female images attractiveness. In this study, attractiveness ratings of images were higher for side views of underweight and normal figures in comparison to front views. This was true for male and female subjects. The underweight images were near *average* in the front view but, near *attractive* from the side. Normal images were rated almost *average* in the front view but slightly above *average* in the side view. Average attractiveness ratings for the overweight and obese

images stayed the same or nearly the same. Overweight images were rated *unattractive* in front and side views, and the obese images were rated very unattractive. The average attractiveness ratings, when viewing both front and side views simultaneously, were similar to the side view ratings, especially for the underweight, overweight and obese groups.

#### Research Question 6

*Does body shape influence the perception of two body sizes, normal and overweight?*

Women who have the same age and body size could have different body shapes (Alexander 2003). In the U.S., most sizing systems were based on the hourglass figure shape (Connell, Ulrich, Knox, Hutton, Trent, Woronka, & Ashdown, 2002). Alexander (2003) found that half of the women who saw themselves as an *hourglass* shape, were actually *pear* shape. Whether or not the subjects in this study recognized the *hourglass* shapes in images, the results determined that both normal and overweight *hourglass* were categorized more accurately as to BMI category.

Both normal and overweight figures were better classified when they had the *hourglass* body shape. Normal images were perceived as normal more accurately when they had an *hourglass* shape (74%) compared to *pear* (61%) or *rectangular* (49%) shape. The normal size *rectangular* body shape was perceived as being overweight by half (50%) of the participants. Overweight images were perceived as overweight more accurately when they had an *hourglass* shape (79%) compared to *rectangular* (71%) or *pear* (50%) shape. The *rectangular* body shape of the overweight image had the most “slim effects” as 25% of respondents misperceived the overweight image as normal.

Participants perceived the overweight images as obese when they had the *pear* shape (46%). Hence, body shape did appear to influence the perception of normal and overweight body sizes. Li (2003) and Alexander (2003) found that half of their samples incorrectly self-reported their body shapes. This could mean that many women and, perhaps, men may not be knowledgeable about body shapes.

#### Research Question 7

*Is there a relationship between the perceptions of attractiveness and body size as categorized by BMI?*

This study showed an inverse linear relationship between the perception of attractiveness and body size as seen from the front, side, or front and side together. As the BMI or body sizes increased, the attractiveness ratings decreased. The results from this research question are in contrast with the results of Furnham and Radley (1989), and Furnham and Baguma (1994), which stated that as body sizes become progressively thinner or heavier, attractiveness ratings decreased. In this study, as body sizes became thinner the attractiveness rating increased.

#### Research Question 8

*Is there a relationship between an individual's personal BMI score and the perception of body size?*

All subjects self-reported their weights and heights. Although Alexander (2003) reported that respondents (female in her study) were reliable sources of their measurements, Li (2003) revealed that female self-reported assessment of body measurement was inaccurate. Li (2003) discovered that in her study, female subjects who had smaller sizes tended to report larger measurements; on the other hand, female subjects who had larger sizes tended to report smaller measurements.

Corson and Andersen (2002) reported that although men were concerned about their weights, they were more preoccupied with body shape and muscularity. Men were more likely to accurately self-report their measurements than women. Stewart, Benson, Michanikou, Tsiota and Narli (2003) reported that males desired larger body features such as chest, thighs, arms and calves.

In this study a comparison was made to find out if a relationship existed between individuals' personal BMI scores and their perceptions of body size. Subjects were grouped into their BMI categories. Using numerical equivalents for the BMI categories (underweight =1, normal=2, overweight=3, obese=4), subjects' mean responses to size perception of images were calculated and tabled. The results suggested that participants' perceptions of body size were close to being accurate, across each of the subjects' BMI categories. For instance, whether underweight, normal, overweight, or obese, subjects' average perceptions of normal images were that they were normal (means of 1.9 – 2.2). Mean perceptions of obese images were 3.6 – 3.8 across the personal categories. There were a few slight variations. Overweight and obese female subjects rated underweight

images slightly smaller (1.3 – 1.5) than did the underweight and normal subjects (1.8). Thus, the overweight and obese females' assessment was more accurate.

These results are not consistent with the findings of Tovee, Emery, and Cohen-Tovee (2000), who found “as the BMI of the observer declines, the overestimation of body mass increases” (p. 1240). Rand and Resnick (2000) reported that almost half of the obese subjects in their study considered their body sizes as socially acceptable. This study did not measure social acceptability.

### Limitations

This was the first time that the projected printed images of body scans were used to study body perceptions. The stimuli may have presented some limitations:

- There were only ten images total (two underweight images, two obese images, three normal images, and three overweight images). Although the images were randomized, subjects evaluated the same images in every section and may have recognized the repetition.
- There were not enough body shapes variations.
- There were not images representing all women's body shapes for underweight and obese images.

The subjects presented other possible limitations. Many fell within the normal range of BMI; a limited number of subjects were underweight, overweight, and obese. Another limitation was the dominant number of Caucasian respondents in the sample. African

Americans, Hispanic Americans and Asian Americans were under represented. A more balanced variety of participants would have strengthened the findings and contributed to a more accurate representation of each ethnic group's perceptions. The sample used in this study only consisted of part of the southeastern region in the U.S., not a national representation. There is a possibility that the study could produce different results if subjects were from another university or from other regions in the U.S.

There were no criteria given to use in perceiving attractiveness. Subjects judged what they saw. Men and women may have judged women's bodies differently; some may have looked at bust size, buttocks, thighs, or shoulders, while others may have looked at body shapes or waist-to-hip ratio.

Subjects self-reported age, body measurements, and perceptions of their body sizes and attractiveness. Answers could be inaccurate because of respondents' lack of knowledge of their measurements or their desire to represent a more ideal body and perception of themselves. There are also possible problems with BMI scores. BMI is calculated with only the height and weight of a subject; body composition is ignored. For example, if an overweight person with excess body fat and another person with more muscle tone have the same height and weight, the person with muscle tone can be misclassified as overweight. "Weight does not take into account the body fatness and body fat distribution," (Paeratakul, White, Williamson, Ryan, & Bray, 2002, p. 349).

## Implications and Recommendations for Future Research

This study's results suggested that college students perceive underweight images as normal in size. Misperception would help explain why unhealthy, thin looks are preferred. More study of perception should be encouraged in order to explore how to educate people as to what a healthy weight really is. A majority of the subjects (70% of women and 55% of men) had normal BMI scores. Only 18 out of 301 were underweight, and 23 were obese. According to the CDC, 30% of people in the U.S. are obese; approximately 7 million females and 1 million males struggle with eating disorders (Katz, 2005). Therefore, collecting more data from non-normal would help to better understand specific BMI categories.

Additional studies should consider subjects' feedback. When subjects were asked opinions about the images, many suggestions emerged such as:

- A rotating three-dimensional image would be a better stimulus where everyone can see the overall image of a woman's body at the same time from the front, side and back.
- Three-dimensional images in color would look better to the participants.
- More body scan images of women with different body shapes would make the research study more significant.

Additional research would benefit from integrating greater ethnic diversity in the sample. "With the U.S. population being so diverse, missing this segment of the population would do a great disservice to researchers and businesses trying to target

particular consumers” (Pisut, 2001, p. 130). Also, research could be expanded to include populations in different countries. This would enable researchers to investigate more closely and to discover the perceptions of female body size and even female body shape in different cultures. It would also provide a means for comparing perceptions of female bodies in the U.S. and other countries. Of course, replicating the study with male body scan images would provide a new set of information about size and shape perception.

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## Appendix A

### **ATTENTION: STUDENTS**

The Department of Consumer Affairs in the College of Human Sciences is conducting a study about perception and attractiveness.

### **MEN AND WOMEN WHO PARTICIPATE WILL RECEIVE EXTRA CREDIT IN THIS CLASS**

(Make sure you sign the extra credit form)

If you choose to participate, you will be asked to fill out a survey after class that should take you about thirty minutes to complete. Your responses will be anonymous. If you would like to participate please stay after class and a graduate student will pass the survey for you to complete.

**After you complete the survey, sign a sheet for your instructor in order to receive extra credit.**

if you have any questions please contact **Shiara Farinah** at **Farinsh@auburn.edu**

APPENDIX B:

SECTION 1

Please circle the number from 1-5 that best represents your opinion of the attractiveness of each of the following images.

1. Rate the attractiveness of image 1

1            2            3            4            5

Very Unattractive

Very Attractive

2. Rate the attractiveness of image 2

1            2            3            4            5

Very Unattractive

Very Attractive

3. Rate the attractiveness of image 3

1            2            3            4            5

Very Unattractive

Very Attractive

4. Rate the attractiveness of image 4

1            2            3            4            5

Very Unattractive

Very Attractive

5. Rate the attractiveness of image 5

1            2            3            4            5

Very Unattractive

Very Attractive

6. Rate the attractiveness of image 6

1            2            3            4            5

Very Unattractive

Very Attractive

7. Rate the attractiveness of image 7

1            2            3            4            5

Very Unattractive

Very Attractive

8. Rate the attractiveness of image 8

1            2            3            4            5

Very Unattractive

Very Attractive

9. Rate the attractiveness of image 9

1            2            3            4            5

Very Unattractive

Very Attractive

10. Rate the attractiveness of image 10

1            2            3            4            5

Very Unattractive

Very Attractive

## SECTION 2

Please circle the number from 1-5 that best represents your opinion of the attractiveness of each of the following images.

1. Rate the attractiveness of image 1

1          2          3          4          5

Very Unattractive

Very Attractive

2. Rate the attractiveness of image 2

1          2          3          4          5

Very Unattractive

Very Attractive

3. Rate the attractiveness of image 3

1          2          3          4          5

Very Unattractive

Very Attractive

4. Rate the attractiveness of image 4

1          2          3          4          5

Very Unattractive

Very Attractive

5. Rate the attractiveness of image 5

1          2          3          4          5

Very Unattractive

Very Attractive

6. Rate the attractiveness of image 6

1          2          3          4          5

Very Unattractive

Very Attractive

7. Rate the attractiveness of image 7

1          2          3          4          5

Very Unattractive

Very Attractive

8. Rate the attractiveness of image 8

1          2          3          4          5

Very Unattractive

Very Attractive

9. Rate the attractiveness of image 9

1          2          3          4          5

Very Unattractive

Very Attractive

10. Rate the attractiveness of image 10

1          2          3          4          5

Very Unattractive

Very attractive

### SECTION 3

Please circle the letter from (A, B, C or D) that best represents your view of the person's size shown in each of the following images.

1. Looking at Image number # 1, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

6. Looking at Image number # 6, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

2. Looking at Image number # 2, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

7. Looking at Image number # 7, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

3. Looking at Image number # 3, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

8. Looking at Image number # 8, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

4. Looking at Image number # 4, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

9. Looking at Image number # 9, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

5. Looking at Image number # 5, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

10. Looking at Image number # 10, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

## SECTION 4

Please circle the letter (A, B, C or D) that best represents your view of the person's size shown in each of the following images.

1. Looking at Image number # 1, I think she is :

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

6. Looking at Image number # 6, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

2. Looking at Image number # 2, I think she is :

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

7. Looking at Image number # 7, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

3. Looking at Image number # 3, I think she is :

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

8. Looking at Image number # 8, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

4. Looking at Image number # 4, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

9. Looking at Image number # 9, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

5. Looking at Image number # 5, I think she is: :

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

10. Looking at Image number # 10, I think she is

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

## SECTION 5

Please circle the number from 1-5 that best represents your opinion of the attractiveness of each of the following images.

1. Rate the attractiveness of image 1

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

2. Rate the attractiveness of image 2

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

3. Rate the attractiveness of image 3

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

4. Rate the attractiveness of image 4

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

5. Rate the attractiveness of image 5

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

6. Rate the attractiveness of image 6

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

7. Rate the attractiveness of image 7

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

8. Rate the attractiveness of image 8

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

9. Rate the attractiveness of image 9

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

10. Rate the attractiveness of image 10

1      2      3      4      5

**Very Unattractive**

**Very Attractive**

## SECTION 6

Please circle the letter (A, B, C or D) that best represents your view of the person's size shown in each of the following images.

1. Looking at Image number # 1, I think she is :

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

6. Looking at Image number # 6, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

2. Looking at Image number # 2, I think she is :

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

7. Looking at Image number # 7, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

3. Looking at Image number # 3, I think she is :

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

8. Looking at Image number # 8, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

4. Looking at Image number # 4, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

9. Looking at Image number # 9, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

5. Looking at Image number # 5, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

10. Looking at Image number # 10, I think she is:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

## SECTION 7

Please answer the following questions about yourself. It is important that you answer as honestly as possible. Your answer will be kept confidential. Thank you for your cooperation and participation.

1. Sex: **(Circle ONE)**

Male

Female

2. How old are you? **(Circle ONE)**

19

20

21

22

23

24

25

over 25

3. Check the category that identifies your race. **(Circle ONE)**

African-American

Hispanic

Asian

Caucasian

Native American

Other (Specify): \_\_\_\_\_

4. Department **(Circle ONE)**

College of Human Science

College of Liberal Arts

College of Science and Mathematics

College of Veterinary Medicine

College of Business

College of Education

College of Architecture, Design & Construction

College of Engineering

Forestry and Wildlife Sciences

School of Pharmacy

School of Nursing

What is your MAJOR \_\_\_\_\_

5. How often do you exercise during a typical week? **(Circle ONE)**

No times

2-3 times a week

4-5 times a week

6-7 times a week

6. Please list your measurements in the appropriate spaces.

Weight (in pounds) \_\_\_\_\_

Heights (in feet and inches) \_\_\_\_\_

## SECTION 8

**Please circle the number from 1-5 that best represents your opinion about your personal attractiveness.**

1. Please rate your overall body image:

1                      2                      3                      4                      5

**Very  
Unattractive**

**Very Attractive**

2. Please describe how you feel others would rate your body image:

1                      2                      3                      4                      5

**Very  
Unattractive**

**Very Attractive**

**Please circle the letter from (A, B, C or D) that best represents your opinion about yourself.**

3. I think I am:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

4. How you think others would describe your body size:

- A. Underweight
- B. Normal
- C. Overweight
- D. Obese

Thank you for your participation ☺ !!!!!

APPENDIX C

# Auburn University

Auburn University, Alabama 36849-5603

Department of Consumer Affairs  
308 Spidle Hall

Telephone: (334) 844-4084  
FAX: (334) 844-1340

## INFORMATION SHEET FOR

### Perception of Women Body Size According to Body Mass Index among College Students

You are invited to participate in a research study that is designed to investigate perceptions of a wide range of women's body sizes and what are the socially acceptable women's body sizes among a college population. This study is being conducted by Shiara Farinah under the supervision of Dr. Lenda Connell and Dr. Pamela Ulrich. We hope to learn how people perceive women's body size within college students. You were selected to participate because you are a college student currently enrolled at Auburn University and are more than 19 years of age.

If you decide to participate, the survey typically takes 15 minutes and all information you provide will remain completely anonymous. You will begin by evaluating 40 images of women's body scans, 20 from the front and 20 from the side in each section, there are four sections involved in rating your perception of these images. After you have rated these images, we will ask you to evaluate your attractiveness and body size.

All responses are treated as anonymous, and in no case will responses from individual participants be identified. Rather, all data will be pooled and published in aggregate form only.

Students in HLHP 3020, 3680 and PHED 1100 102, 1300 103, 1300 105 and 1500 105 will receive one credit of research participation for taking part in the study. Participation is voluntary. You may withdraw from taking the survey without repercussion. However, after you have provided anonymous information, we will be unable to withdraw your data after participation since there will be no way to identify individual information.

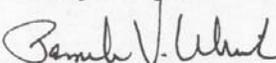
Information collected through your participation may be used to fulfill an educational requirement for the Master Degree, published in a professional journal, and/or presented at a professional meeting. Your decision whether or not to participate will not jeopardize your future relations with Auburn University or the Department of Consumer Affairs.

If you have any questions we invite you to ask them now. If you have questions later, the faculty advisor Dr. Lenda Connell (334) 844-3789 ([connelj@auburn.edu](mailto:connelj@auburn.edu)) or Dr. Pamela Ulrich (334) 844-1336 ([pulrich@auburn.edu](mailto:pulrich@auburn.edu)) will be happy to answer them.

For more information regarding your rights as a research participant you may contact the Office of Human Subjects Research by phone or e-mail. The people to contact there are Executive Director E.N. "Chip" Burson (334) 844-5966 ([bursoen@auburn.edu](mailto:bursoen@auburn.edu)) or IRB Chair Dr. Peter Grandjean at (334) 844-1462 ([grandpw@auburn.edu](mailto:grandpw@auburn.edu)).

**HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS LETTER IS YOURS TO KEEP.**

  
Investigator's signature      9/14/04  
Date

  
Faculty Advisor's signature      9/14/04  
Date

HUMAN SUBJECTS  
OFFICE OF RESEARCH  
PROJECT # 04-133 EX 0408  
APPROVED 8-25-04 TO 8-24-05

APPENDIX D

BODY SCAN IMAGES FROM FRONT VIEW

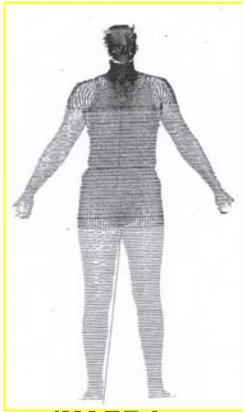


IMAGE 1

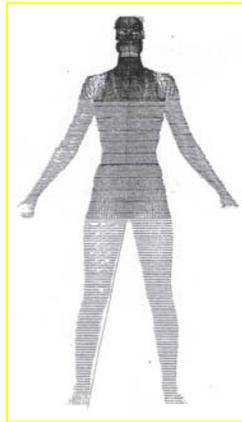


IMAGE 2

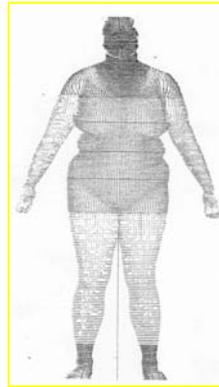


IMAGE 3

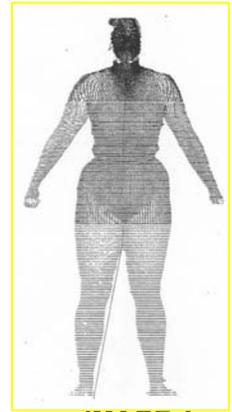


IMAGE 4

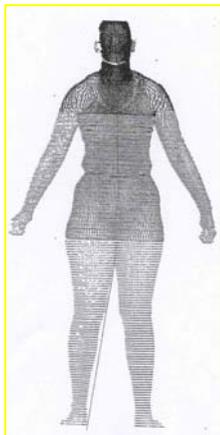


IMAGE 5

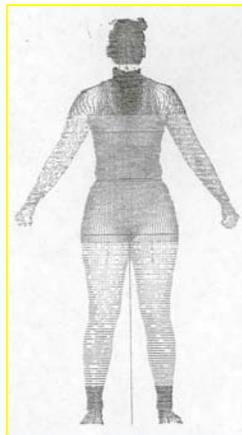


IMAGE 6

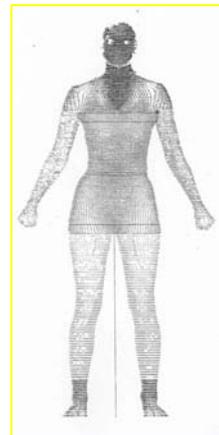


IMAGE 7

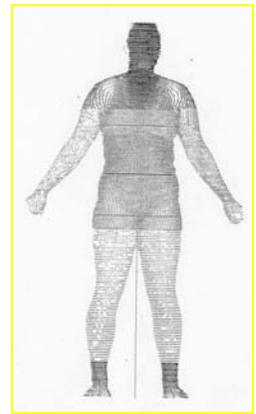


IMAGE 8

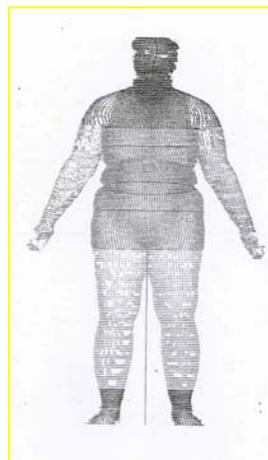


IMAGE 9

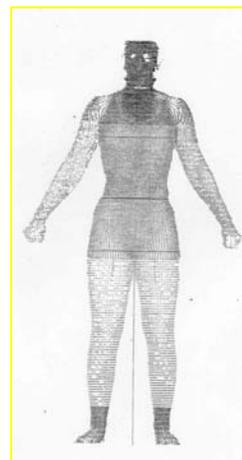
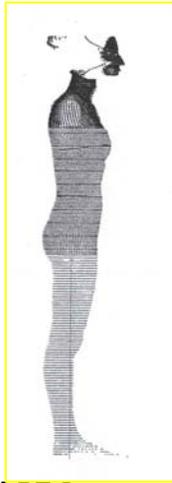


IMAGE 10

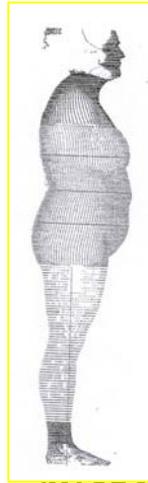
**BODY SCAN IMAGES FROM SIDE VIEW**



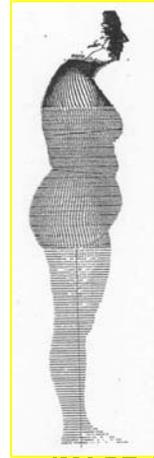
**IMAGE 1**



**IMAGE 2**



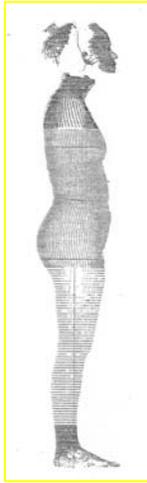
**IMAGE 3**



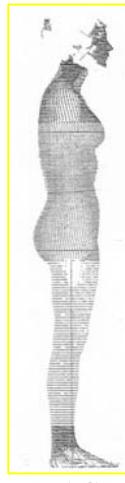
**IMAGE 4**



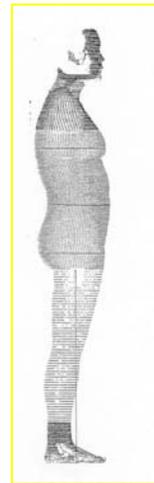
**IMAGE 5**



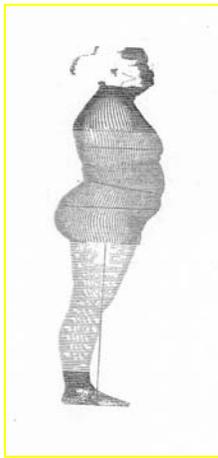
**IMAGE 6**



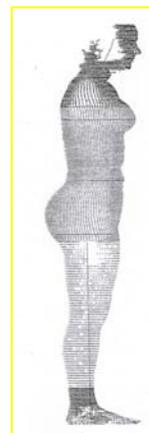
**IMAGE 7**



**IMAGE 8**



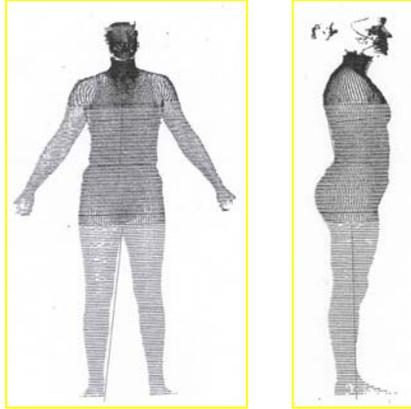
**IMAGE 9**



**IMAGE 10**

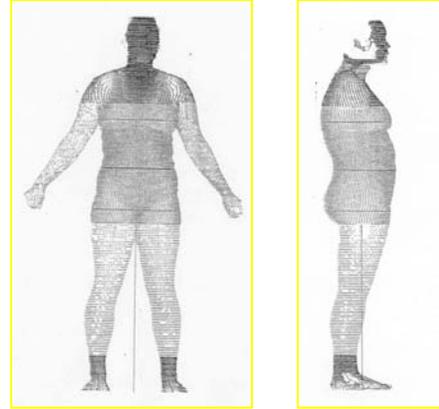
**BODY SCAN IMAGES FROM SIMULTANEOUS FRONT AND SIDE VIEWS**

**NORMAL IMAGES**

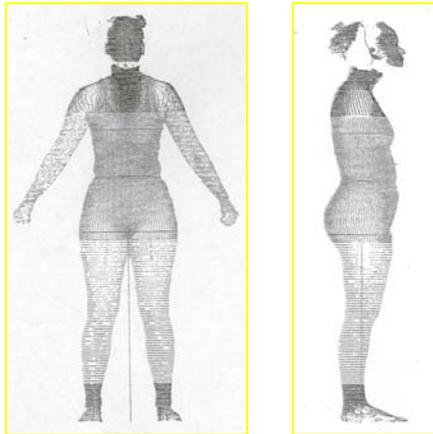


BMI: 22.36 (Normal), Rectangle Body Shape

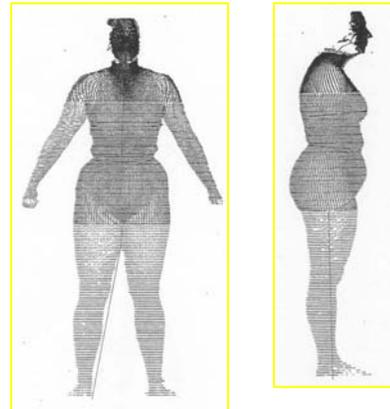
**OVERWEIGHT IMAGES**



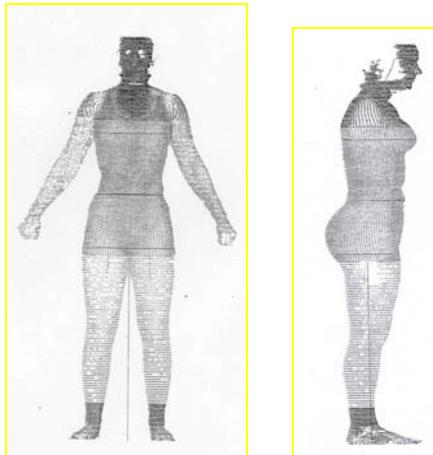
BMI: 25.98 (Overweight), Rectangle Body Shape



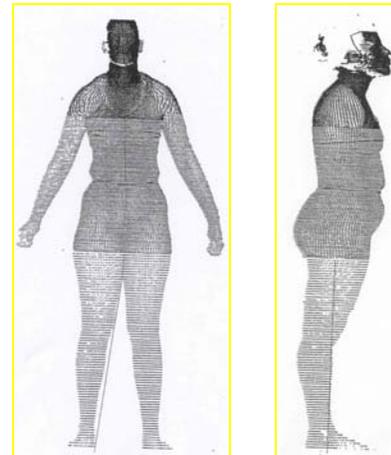
BMI: 21.52 (Normal), Pear Body Shape



BMI: 27.10 (Overweight), Pear Body Shape



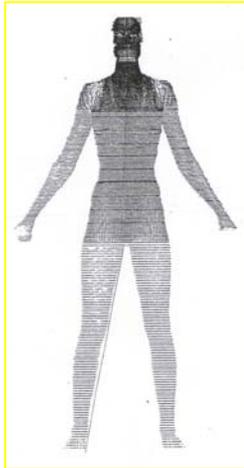
BMI: 22.54 (Normal), Hourglass Body Shape



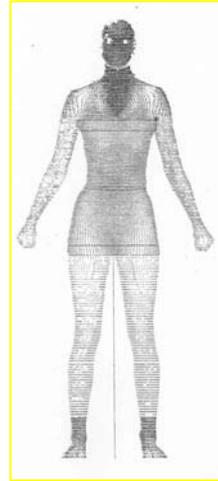
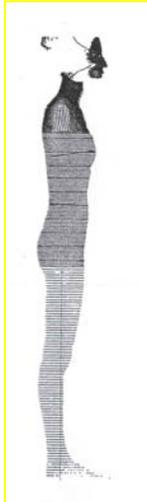
BMI: 26.28 (Overweight), Hourglass Body Shape

BODY SCAN IMAGES FROM SIMULTANEOUS FRONT AND SIDE VIEWS

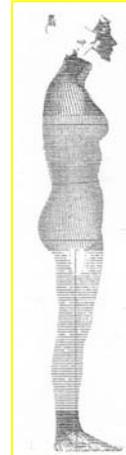
**UNDERWEIGHT IMAGES**



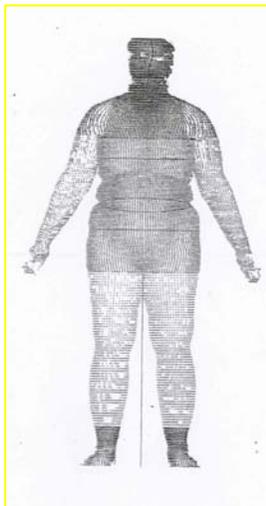
BMI: 15.86 (Underweight)



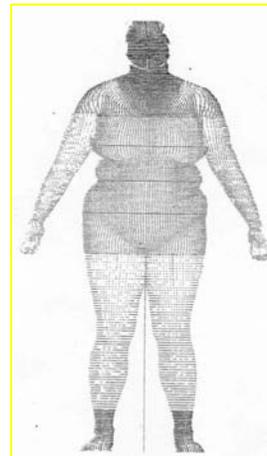
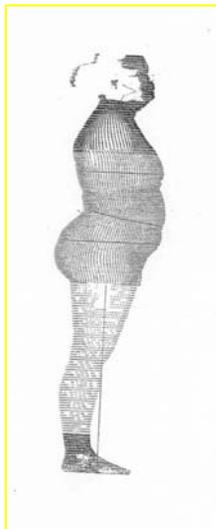
BMI: 16.84 (Underweight)



**OBESE IMAGES**



BMI: 33.70 (Obese)



BMI: 35.87





