National Library of Canada
Acquisitions and Bibliographic Services Branch
395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale du Canada
Direction des acquisitions et des services bibliographiques
395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

Canada

The Validity of Singh's (1993) Waist To Hip Ratio Measure: The Importance of Pose and Method of Presentation

By
Ann L. Flood
B. A. University of Calgary 1990

Thesis Submitted in Partial Fulfillment
of the
Requirements for the Degree of
Master of Arts

in the Department
of
Psychology

Simon Fraser University
August 1995

ISBN 0-612-06651-7

Approval

Name: Ann Lisa Flood

Degree: Master of Arts

Title of Thesis: The Validity of Singh's (1993) Waist To Hip Ratio Measure: The Importance of Pose and Method of Presentation

Examining Committee:

Chair: B. Turnbull

C. Crawford

M. Bowman

K. Jang
Assistant Professor
Department of Psychiatry
University of British Columbia
External Examiner

Date Approved: August 3, 1995

PARTIAL COPYRIGHT LICENSE

I hereby grant to Simon Fraser University the right to lend my thesis, project or extended essay (the title of which is shown below) to users of the Simon Fraser University Library, and to make partial or single copies only for such users or in response to a request from the library of any other university, or other educational institution, on its own behalf or for one of its users. I further agree that permission for multiple copying of this work for scholarly purposes may be granted by me or the Dean of Graduate Studies. It is understood that copying or publication of this work for financial gain shall not be allowed without my written permission.

Title of Thesis/Project/Extended Essay

The Validity of Singh's (1993) Waist to Hip Ratio Measure:

The Importance of Pose and Method of Presentation

Author: _____
(signature)

Ann Flood
(name)

Aug 9/95
(date)

Abstract

This paper presents a study on the effect of pose and method of presentation of Singh's (1993) waist - hip ratio (WHR) figures. The figures consist of 12 line drawings of women varying in weight and WHR. Singh found that figures with low WHRs were judged more attractive and reproductively capable than figures with higher WHRs. In the present study, it was hypothesized that (1) judgments of figures in a group would differ from judgments of figures presented individually, and (2) Singh's figures, posed as though in a beauty pageant, would be rated higher on courtship variables than figures in a natural standing pose. The subjects were 60 male and 60 female Simon Fraser University undergraduates who rated figures presented individually and in groups for various attributes. Results from a factor analysis supported both hypotheses. In addition, it was found that figure weight influenced ratings more than WHR.

Acknowledgments

This project would never have been completed without the help and support of a number of people. I would like to thank Charles Crawford and Marilyn Bowman for their guidance. The endless hours of statistical and computer aid donated by Ray Koopman and Joan Foster were invaluable. A special thanks goes to Maria Janicki and Tracy Lindberg for their artistic talents used for figure design. Finally, the constant stream of positive feedback supplied by the Evolutionary lab group was greatly appreciated.

For Bryan, Andrew, and Michael, who supplied both my biggest inspiration and greatest distraction.

Table of Contents

List of Tables

List of Figures

The Validity of Singh's (1993) Waist To Hip Ratio Measure: The Importance of Pose and Method of Presentation

INTRODUCTION

Everywhere you look, everywhere you go, you will find women concerned with dieting and body image, or more accurately, body image dissatisfaction. Seemingly normal weight girls in elementary school are going on diets. Magazines, newspapers, radio, and television provide constant encouragement to lose that last five pounds to make your life happier. Weight loss is a multimillion dollar industry. Why? Recent research has begun to unravel the mystery of the importance of body weight and shape and has deduced some surprising answers.

In our culture, researchers have often attributed the desire for a thin physique to the fact that thinness is associated with many positive characteristics, such as self discipline, intelligence and high status (Garner, 1986), whereas fatness is associated with negative characteristics such as sloppiness, unhappiness (Brenner & Hinsdale, 1978), loneliness, and laziness (Staffieri, 1972). Other researchers have proposed that characteristics displayed by a woman's family, such as rigidity and overprotection, may be responsible in part for a woman's excessive dieting behavior (Wertheim, Paxton, Maude, Szmukler, Gibbons, & Hiller, 1992). It is often assumed that women's obsession with weight is connected to their desire to be attractive to men, but some studies have demonstrated that this may not be the

case. For example, in studies done by Fallon and Rozin (1985) subjects were shown line drawings of women ranging from emaciated to extremely fat. It was generally found that women chose their ideal figure as thinner than what they believed men would prefer, and this tendency is evident by adolescence (Cohn, Adler, Irwin Jr., Millstein, Kegeles, & Stone, 1987).

Another hypothesis suggests that thinness is desired because by looking more masculine, women will better be able to compete with men in the business world (Orbach, 1978). In a similar vein, it has been suggested that curvaceous women are judged by personnel consultants as less competent and less intelligent than are their non curvaceous counterparts. As a result, as women's role in the professional workplace increases desire for a non curvaceous body also increases (Silverstein, Perdue, Peterson, Vogel, & Fantini, 1986). Perhaps the most common of the hypotheses that try to explain the drive for a thin physique in women is the societal pressure hypothesis. According to this hypothesis, the thin standard of beauty seen in the mass media encourages women to strive for unrealistically thin figures (Silverstein, Peterson, & Perdue, 1986).

Although each of the above hypotheses has some merit, none can fully explain women's obsession with body image and dieting. More recently researchers have focused on the role body shape, as opposed to weight, plays in body image dissatisfaction (Singh, 1993a; 1993b; Fonagy & Benster, 1990; Furnham, Hester, & Weir, 1990). For example, Davies & Furnham (1986) found that women whose shape did not conform to the current ideal, were dissatisfied with their bodies regardless of weight. Two women can be the identical weight

and height, but still have different body shapes because of different fat distributions (Singh, 1993a; b). According to the body shape hypothesis, a women who is considered overweight by current standards, but nonetheless displays an appropriate fat distribution, may be more satisfied with her body image than is a thinner woman with an inappropriate fat distribution (Radke-Sharpe, Whitney-Saltiel, & Rodin, 1990).

BODY FAT DISTRIBUTIONS AND WHR

Just what exactly are appropriate and inappropriate fat distributions? From birth to puberty boys and girls have a similar pattern of fat distribution. However, once puberty has occurred, women display what is known as a gynoid fat distribution. Specifically, estrogen causes fat to be laid down in the gluteofemoral region of the body, and inhibits the deposit of fat in the abdominal region of the body. Conversely, testosterone causes the body to accumulate fat in the abdominal region, and inhibits fat deposits in the gluteofemoral region. This masculine pattern of fat distribution is called android fat distribution (Singh, 1993a; 1993b; Bjorntorp, 1991a; 1991b).

Gynoid and android fat distributions can be measured by computing the waist/hip ratio (WHR). The WHR is obtained by taking an individual's waist measurement (narrowest point between the ribs and iliac crest) and hip measurement (at the point of the greatest protrusion of the buttocks) and finding the ratio of the two measurements. The WHR is a reliable index of the distribution of fat

between the upper and lower body (Leibel, Edens, & Fried, 1989) as determined by computed tomography which uses radiographic images to examine thin cross sections of any level of the body (Ashwell, Cole, & Dixon, 1985). The WHR is significantly correlated ($r = 0.61$, $p < 0.001$) to the intra-abdominal or visceral / subcutaneous fat ratio, whereas the measure that is often used in body image studies, the Body Mass Index [weight in kg/(height in m)2] is not (Leibel, Edens, & Fried, 1989). WHR is a stable measure that has high within - person reliability. Individuals of either gender can be moderately obese without any alteration of their fat distribution (Bjorntorp, 1991b). The loss or gain of up to ten kilograms does not appear to affect fat distribution (Leibel, Edens, & Fried, 1989). Finally, WHR is not affected by food availability; women of the !Kung tribe have a fat distribution pattern similar to that of North American women (Brown & Konner, 1987).

Because fat distribution is similar for both boys and girls before puberty, both sexes have similar WHRs at this time. However, once puberty is reached, WHR takes on a bimodal distribution for the population (Marti, Tuomilehto, Saloman, Kartovaara, Korhonen, & Pietinen, 1991). For the time period between puberty and menopause, healthy women have a WHR in the range of .67-.80 (Lanska, Lanska, Hartz & Rimm, 1985; Marti, et al., 1991). Healthy men typically have a WHR in the range from .85 -.95. WHR seems to correspond to the amount of androgens and estrogen in the system. When the ratio of testosterone to estrogen is high, then body fat distribution is android or apple - shaped, as is the case for men. On the other hand, when levels of estrogen are high in comparison to

testosterone, then WHR is low, as is found in post - pubertal premenopausal women. After menopause, a woman's WHR will increase as the ratio of androgens to estrogen increases (Kirschner & Samojilik, 1991).

Hirsutism is caused by elevated levels of androgens in some cases, and sensitivity of the hair follicle in other cases. Hirsute women who display increased testosterone levels also display upper body fat predominance regardless of their level of obesity (Evans, Barth, & Burke, 1988). Hirsute women who do not display an elevation of plasma androgens (hirsutism may be due to sensitivity of the hair follicle rather than androgen excess) do not have upper body fat predominance. Another example of the link between the ratio of androgens and estrogen and WHR is provided by males suffering from either Klinefelter's syndrome or cirrhosis. These disorders lead to a reduction in testosterone production, and males who are affected by either of these disorders display a gynoid fat distribution (Kirschner & Samojilik, 1991).

WHR HEALTH AND REPRODUCTIVE POTENTIAL

It has been determined that WHR is significantly related to a woman's health and reproductive function. Recent research has indicated that a woman's risk for disease is associated not with overall degree of obesity as was previously thought, but rather with fat distribution (Larsson, Svardsudd, Welin, Wilhelmsen, Bjorntorp, & Tibblin, 1984). Specifically, women who display an android or apple shaped fat distribution will experience more heart disease, stroke,

hypertension, and diabetes mellitus than will their counterparts who have a gynoid or pear shaped fat distribution (Rebuffe-Scrive, Lonnroth, Marin, Wesslau, Bjorntorp, & Smith, 1987).

Some evidence also suggests that WHR is associated with reproductive potential. For example, among girls with the same body weight, those with lower WHRs have experienced earlier pubertal endocrine activity. Specifically, it has been found that when the factors of body weight, height, pubic hair growth, age, and pelvic breadth are controlled for, girls with the lowest WHRs have the highest levels of estrogen and gonadotrophins, Lutenizing Hormone, and Follicle Stimulating Hormone (de Ridder, Bruning, Zonderland, Thijssen, Bonfrer, Blankenstein, Huisveld, & Erich, 1990). Also, married women with lower body mass indexes and higher WHRs have more trouble becoming pregnant than do their counterparts with lower WHRs (Kaye, Folsom, Prineas, Potter, & Gapstur, 1990). Even more convincing is data obtained by Zaadstra, Seidell, Van Noord, te Velde, Habbema, Vrieswijk, & Karbaat (1993). In this prospective study the subjects were women attending a fertility clinic over the course of two years. The researchers found that an increase in WHR of a mere 0.1 unit decreased the probably of conception per cycle by thirty percent, controlling for age, weight, reason for artificial insemination, cycle length and regularity, smoking and parity. In fact, the WHR provided the greatest independent significant contribution to probability of conception per cycle.

EVOLUTIONARY THEORY

Evolutionary theories of mate selection suggest that individuals of each sex select partners who increase their reproductive success. In the ancestral environment, women would have been interested in choosing partners who had high status and resources. Such a partner would have provided a woman with material stability, which would increase her chance of successfully rearing her offspring and provide advantages to her offspring through acquired social and economic benefit (Buss, 1989). On the other hand, men would have been interested in partners who were receptive, fecund and displayed characteristics suggestive of good mothering skills (Buss, 1989).

Using these criteria, it would have been relatively easy for a woman to judge the reproductive value of a man. High status and material wealth can easily be assessed by examining status and possessions. It would be much more difficult for a man to judge the reproductive value of a woman. The clues of fertility are not obvious. The man must, therefore, have used indirect cues such as attractiveness to determine the reproductive value of a partner. Evolutionary theory assumes that physical attractiveness, health, and youth reliably reflect fertility. Men should have found those features in potential mates that correlated with reproductive potential attractive (Buss, 1987; 1989). Therefore, the physical and behavioral cues that signal female reproductive capability should have been preferred by men and reflected in the female standard of beauty.

For the most part, researchers have overlooked the importance of body shape as a variable in the research on body image, perhaps because it seems to change over time. For example, it has often been suggested that the female figure has become more tubular over the past forty years (Garner, Garfinkel, Schwartz, & Thompson, 1980; Mazur, 1986). Typically, studies have looked at select groups of women, such as playboy centerfolds and Miss America contestants. Based on data from these populations, researchers have hypothesized that the female form is moving away from an hourglass shape and becoming more tubular. However, when the same data has been reexamined using the WHR, it has been found that despite a reduction in total body weight, WHR has remained fairly stable (.68 - .72) over the years examined (Singh, 1993a). These ratios are still very indicative of an hourglass form. If a woman had a tubular shape, her WHR would approach 1.0 (Singh, 1993a).

Although some aspects of attractiveness do change over time, it appears that the connection between attractiveness and a small waist has remained fairly constant, despite changes in the ideal body weight. Certainly, in western societies the trends have been for women to exaggerated the smallness of this feature with a few exceptions, such as the flapper period when waists were eliminated from the silhouette. At the extreme, some women had their two lower ribs removed to make their waists smaller (Morris, 1985). More often, the infamous corset was used to emphasize a small waist. No matter that a corseted woman probably could not eat and was in

constant danger of fainting. The corset was eventually replaced by other methods used to exaggerate a slender waist, such as belts and the use of vertical lines in clothing. While these methods are kinder than was a corset, their purpose is still to emphasize a narrow waist.

We know that many aspects of attractiveness do vary over time and cultures. Hairstyle, makeup application, ornamentation, perforated lips, bound feet, depressed and elongated foreheads are just a few examples of this variation. Hairstyles change over time within a culture, whereas other features are constrained by both culture and time, such as bound feet. Since beauty is in the eye of the beholder, how can attractiveness signal reproductive potential? Features that are considered attractive and are also linked to physiological mechanisms controlling some aspect of fitness, such as health, fecundity, and capacity to sustain pregnancy and nurse a child, must be isolated from those that have no bearing on reproductive ability. Obviously, characteristics such as hairstyle and ornamentation have little to do with a female's health or ability to sustain a pregnancy and nurse a child. This kind of attribute should have no bearing on mate selection until other features, such as a low WHR, which do reliably reflect reproductive capacity have cued the male (Singh 1993b).

SINGH'S STUDIES

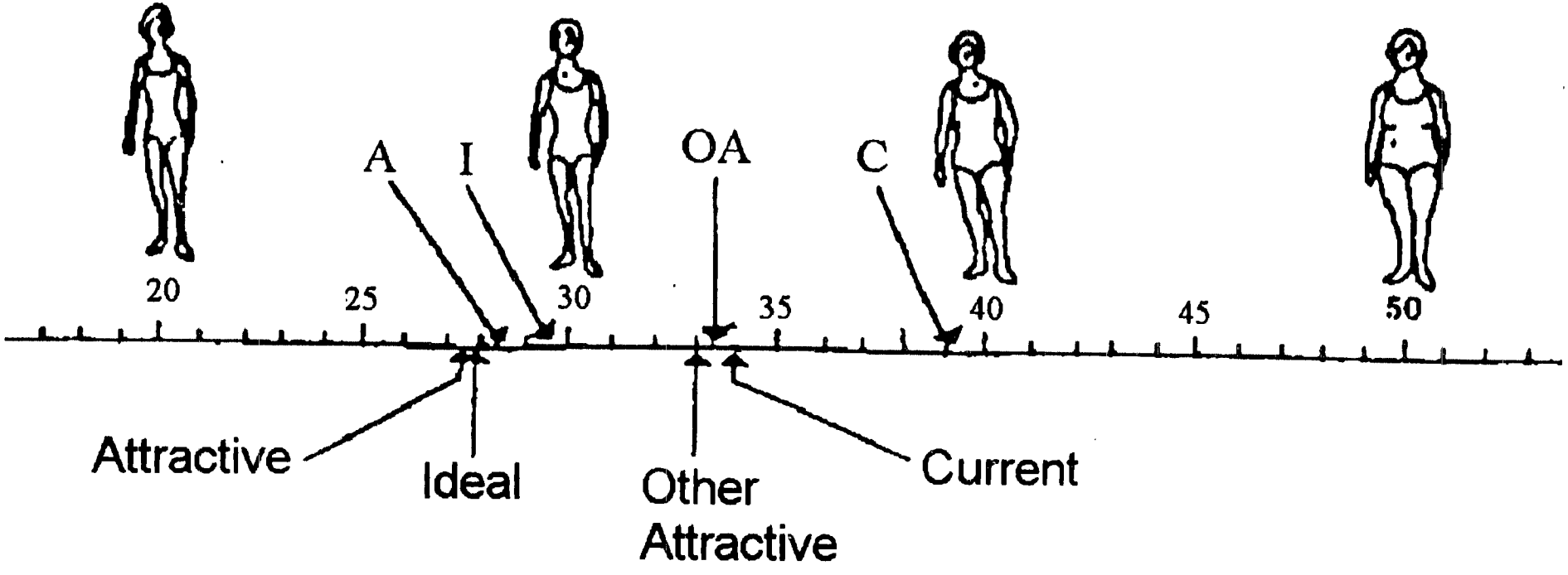
A low WHR is one aspect of attractiveness that does signal a woman's health and reproductive capacity. Preference for a low WHR in women has remained fairly constant over time. However, research

has often confounded body weight and body shape. For example, many studies of body image have used the figures originally designed by Stunkard, Sorenson, & Schulsinger (1983). These figures which are illustrated in Figure 1, were designed originally for the purpose of studying the genetic transmission of obesity.

Insert Figure 1 Here.

These figures range from very thin (number 1) to very obese (number 9), and changes in body weight, not shape are stressed. In later studies using these figures, Fallon & Rozin (1985) found that female subjects did not choose the thinnest figure as most attractive (attractive), but instead label the area between the second and the third thinnest figures as ideal. The figure selected as most attractive and closest to the ideal is thinner than both what the subjects thought men would find attractive, (other attractive) and their estimate of their own figure (current). As demonstrated in Figure 1, the second and third thinnest figures have a characteristic female shape as well as being very slender. Therefore, it is impossible to determine whether the basis of this preference lies in actual body weight or body shape (Singh, 1993a). Several other studies have employed line drawings that more closely resemble average female figures (Furnham, Hester, & Weir, 1990; Furnham & Radley, 1989; Davies & Furnham, 1986). However, body shape is not examined in isolation. If evolutionary theory is correct, then body shape should be at least as important in determining attractiveness and body image satisfaction as is weight. Singh (1993a; b) has demonstrated

Figure # 1. An example of typical body image figures (Stunkard, Sorenson, and Schulsinger, 1983) that confound body shape and weight



that both male and female subjects have the ability to use the WHR alone to make judgments about a woman's health, reproductive capability, attractiveness, and age, suggesting that body shape is a very important variable.

In these studies, subjects were shown a series of 12 line drawings of female figures that represented four levels of WHR (.7, .8, .9, and 1.0) and three levels of body weight (under, normal, and overweight). Subjects were shown a display of all twelve figures and asked to rank the drawings from most attractive to least attractive. Subjects were required to indicate their top three and lowest three rankings for the following characteristics: good health, youthful looking, attractive, sexy, desire for children, and capability for having children. Subjects were also asked to estimate the age of each drawing. The results of these studies indicate that subjects can make discriminations on the basis of both weight and WHR. Subjects prefer female figures with lower WHRs and find them more attractive, healthier, and of greater reproductive capability than those figures with higher WHRs. Both under and overweight figures were perceived as less attractive than were normal weight figures. However, within a weight category, those figures with lower WHRs were preferred. Subjects estimated that figures in the underweight category were between 17 - 19 years old, figures in the normal weight category were judged to be 23 -26 years old, and figures in the overweight category were judged to be 31 - 33 years old.

By changing perceived attractiveness judgments through manipulating only WHR, Singh's studies have demonstrated that female attractiveness is associated with low WHRs. Further, the link

between attractiveness, health and reproductive capacity has been strengthened by illustrating that changes in WHR not only affect rankings of attractiveness, but also affect the rankings of good health and reproductive capability. Singh has further demonstrated that this relationship is transgenerationally stable by using older subjects in his studies as well as university aged subjects (Singh, 1993a; 1993b). In a related study, Singh displayed heavy figures with low WHRs and thin figures with high WHRs. He found that the two heavy figures with the lowest WHRs were found most attractive, whereas the two thin figures with the highest WHRs were found least attractive. This further illustrates that fat distribution rather than body weight is the important factor in determining attractiveness and body image satisfaction. (Singh, 1993b). Finally, Singh has determined that the preference for small WHR is gender specific. That is, a low WHR is preferred only when the target figure is female. Male figures with low WHRs are judged as least attractive no matter what their weight category (Singh, 1993, in press).

Singh (1993a; b) suggests that the WHR acts as a wide first - pass filter in mate selection. That is, women who are unhealthy or have low reproductive capacity would be automatically excluded on the basis of the WHR. This means that if a woman has a WHR larger than some cut - off point she will not be considered attractive by men. According to Singh, this selection process may be unconscious. If WHR is acceptable, then other factors such as bodily features, facial attributes and personality become important in the further judgments of attractiveness.

RATIONALE FOR THE STUDY

The WHR is receiving a great deal of attention in current research dealing with body image satisfaction, fertility and health. This is hardly surprising considering the potential importance it may have in influencing judgments concerning an individual's health risk. It is likely research projects done in this area will multiply. Many of these studies may use the figures created by Singh. Before this happens it is vital to confirm the validity of the figures and to test subjects' sensitivity to slight changes in the figures.

Singh's studies have provided a great deal of information on the WHR. The purpose of this study was to examine whether subjects were able to make judgments on the basis of WHR when this factor was not emphasized. In Singh's studies, subjects were shown all twelve line drawings of female figures at one time and then asked to rank them for attractiveness and other attributes. Because subjects were shown the complete range of figures at the same time, they could easily determine that the factors being varied were WHR and weight and they could also see the extremes of each variable. Although the figures were presented in random order, each drawing could be compared to all the rest, and subjects could, therefore, make their judgments on a comparison basis. They could rearrange the figures by weight and WHR and guess the criteria of the experiment. Subjects might then use this information to make their judgments. For example, subjects may have tried to guess the study's hypothesis and responded accordingly.

This criticism was addressed in this study by having subjects rate a single figure presented in isolation without the benefit of seeing the whole range of figures. These ratings were compared to the ratings the subject made for the same figure when it was later presented in the context of the whole group of twelve figures.

A second criticism of the Singh studies has to do with the line drawings themselves. The female figures are drawn in such a way as to emphasize the WHR. Specifically, the female forms are presented in a "beauty pageant" pose with one leg bent at the knee, causing the hip to raise. What happens to judgments of the figures if they are presented in a more natural pose with both legs straight and slightly separated, de-emphasizing the WHR? Singh partially examined this idea by showing subjects an array of four photos of a female torso with both legs straight and separated, representing four levels of WHR (0.6, 0.7, 0.8, and 0.9). As with previous studies, he found that men of college age generally preferred photos with small WHRs. However, the photos used by Singh were an unfortunate choice in that the bikini bottom worn by the model was very ornate and bulky which added to the hips, again emphasizing the WHR.

To address this criticism, subjects were asked to rate figures that were similar to Singh's, but presented in a natural pose, with both legs straight and slightly separated, rather than in a beauty pageant pose with one knee bent to raise the hip. The change in pose reduced the saliency of the WHR.

PREDICTIONS

This study was designed to test the following predictions:

1). Overall, subjects are predicted to rate figures more positively when they are presented individually as compared to when they are presented in a group of twelve figures.

It is expected that when figures are rated in a group of twelve, the pattern of ratings will be similar to those found in the Singh studies. Specifically, subjects will rate figures with lower WHRs as more attractive, healthy, and reproductively capable than figures with higher WHRs within the same weight category. Figures in the normal weight category will be judged as more attractive, reproductively capable, and healthy than the figures in both the over and underweight categories.

When rating figures individually, subjects cannot compare the figure in question to specific figures in the range. Because subjects do not know if other figures are thinner or fatter, have smaller waists or larger waists, they will tend to rate the figure they are judging more positively than they would rate the same figure presented in the group setting. In the Singh studies, normal weight figures with WHRs of 0.7 are ranked highest. All of the other 12 figures are compared to this ideal, and ranked accordingly. A figure that is normal weight and has a WHR of 0.8 is ranked less then the normal weight figure with a WHR of 0.7.

When subjects are only shown the normal weight figure with a WHR of 0.8, it will receive higher ratings than it does in the group

setting, because the rater is unaware that there is a slightly more attractive figure. Therefore, the pattern of results will be the same for both presentations, but overall figures presented individually will be rated more positively.

2a). Subjects are predicted to give higher ratings to figures presented in the beauty pageant pose than figures in the natural pose for variables dealing with courtship, such as attractiveness, youth, and closeness to ideal shape.

2b). Subjects are predicted to rate figures presented in the natural pose more positively than figures presented in the beauty pageant pose for variables not related to courtship, such as likelihood of being pregnant.

WHR is directly linked to such things as health and reproductive ability, and therefore, will be very important in making judgments concerning courtship variables. This means that figures presented in a pose that emphasizes the WHR will be rated more positively on variables relating to courtship. WHR has less of an effect on variables such as employment and personality characteristics, and therefore, beauty pageant pose figures will not be rated more positively on these variables.

3). The mean difference between the beauty pageant pose and the natural pose will be more pronounced for males subjects than for female subjects.

Male subjects are predicted to rate figures presented in the beauty pageant pose more favorably than are female subjects. The beauty pageant pose is designed to make the figure attractive to men by emphasizing the WHR. In the natural pose, figures do not emphasize courtship, and should be less salient to men. Therefore, the differences found between ratings for the two poses should be more pronounced for male subjects than female subjects.

4a). Subjects are predicted to rate figures with low WHRs as more likely to be employed in an occupation usually viewed as female dominated - elementary school teacher (Glick, 1991) and more likely to display a personality characteristic that is typically viewed as feminine - compassionate (Bem, 1974; 1977).

4b). Subjects are predicted to rate figures with high WHRs as more likely to be employed in an occupation that is usually seen as male dominated - high school administrator (Glick, 1991) and to display a personality characteristic typically viewed as masculine - analytical (Bem, 1974; 1977).

These predictions are made on the basis of studies suggesting that females desire a thin, non curvaceous body shape in order to compete with males in the workplace (Orbach, 1978; Silverstein, et al., 1986), and because high WHRs are more typical of male figures than female figures.

5a). Figures with high WHRs will be judged as more likely to be pregnant than will figures with low WHRs.

5b). Figures with high WHRs will be judged as more likely to be post menopausal than figures with low WHRs.

6). Subjects will rate overweight figures as most likely to be on a diet, and underweight figures as least likely to be on a diet.

METHOD

Participants

One hundred and twenty Simon Fraser University undergraduate students (60 males and 60 females) participated in the study. The subjects partially fulfilled a course requirement by participating. All participants were treated in accord with the "ethical principles of psychologists and code of conduct" (American Psychological Association, 1992).

Materials

The stimuli used in this study consist of the 12 line drawings of female figures developed by Singh (beauty pageant pose) (1993a; b). The drawings are representative of three levels of body weight (under, normal, and overweight), and four levels of WHR (0.7, 0.8, 0.9, and 1.0). The figures vary only in terms of weight and WHR. All other features are held constant. The figures are drawn to represent a female who is 5 feet, 5 inches tall. The underweight figures represent females weighing approximately 90 pounds, the average weight figures represent females weighing approximately 120 pounds, and the overweight figures represent females weighing

approximately 150 pounds (Singh, 1993a). The validity of these weight categories was checked by asking undergraduate men (n=72) to identify figures they considered under, normal, and overweight. All of the subjects agreed on the weight classifications with the exception of three subjects (Singh, 1993a).

In addition to the original 12 figures developed by Singh, a second set of 12 figures (natural pose) was used in this study. These figures differ from the originals only in that the lower torso is drawn in a natural pose with both legs straight and separated, whereas the original drawings depict a female form on a slight angle with one leg bent at the knee in a kind of beauty pageant pose. Figures presented in a natural pose also represent four levels of WHR and three weight categories.

Each of the two sets of twelve figures was organized into two different orders. Both orders were used in the original Singh experiments. The two orders were used in an attempt to reduce the possibility of an effect occurring because of the presentation order of the figures rather than the figures themselves. All materials used in this study including the cover story, the two sets of figures, the questionnaire, and the answer sheet, are presented in Appendix A.

Procedure

Subjects were run in groups of approximately 5 individuals. They were first asked to read a page of information explaining the study. This was the cover story used in the original Singh studies. Subjects were told the study was about body shape, personality and people's ability to make accurate judgments about personality on the

basis of body shape. Participants provided information about their age, sex, weight, height, and ethnic background.

Subjects were then shown one figure from either the original set of 12 (beauty pageant pose) or the second set of twelve figures (natural pose) and asked to rate the following on a seven point scale; 1). Attractiveness to males, 2). Closeness to ideal female, 3). Health, 4). Capability for having children, 5). Probability of being on a diet, 6). Likelihood of being post menopausal, 7). Desire for having children, 8). Intelligence, 9). Need for weight loss, 10). Probability of being pregnant, 11). Likelihood of being employed as an elementary school teacher, 12). Likelihood of being employed as a high school administrator, 13). Likelihood of being described as analytical, and 14). Likelihood of being described as compassionate. Subjects were also asked to estimate the age of the drawing. Questions 1, 2, 3, and 4, are the same questions asked by Singh (1993 a).

Participants were then asked to answer the same questions for the corresponding figure from the alternate pose. More precisely, if a subject was first asked to rate an underweight figure with a WHR of 0.7 presented in the beauty pageant pose, he or she was then asked to rate the underweight figure with a WHR of 0.7 presented in the natural pose.

The order of presentation of the 2 poses was alternated so that some subjects viewed and rated a figure in a beauty pageant pose first, whereas other subjects viewed and rated a figure in a natural pose first. This order was tied to the weight and WHR of the figure in question. That is, all subjects who were rating underweight figures with a WHR of 0.7 judged the figure in a beauty pageant pose first,

followed by the figure in the natural pose. All subjects who were judging underweight figures with a WHR of 0.8 rated the figure in the natural pose first, followed by the figure in the beauty pageant pose. The presentation order of the figures alternated with each increase in weight and WHR. The ratings for each individually presented figure were later compared to the ratings for the same figure when presented within the entire set.

When subjects had finished rating the two figures, they were then shown the whole set of 12 figures in either the beauty pageant pose or the natural pose. They rated each of the 12 figures on the scales outlined above. Subjects then viewed the 12 figures of the remaining set and were asked to rate them on the same items.

Because each set of figures had two possible orders, subjects viewed the two sets of figures in one of the following four orders: (1). beauty pageant pose - order 1, followed by natural pose - order 2, (2). beauty pageant pose - order 2 followed by natural pose - order 1, (3). natural pose - order 1 followed by beauty pageant pose - order 2, and (4). natural pose - order 2 followed by beauty pageant pose - order 1. It should be noted that subjects completed part one of the study before beginning part two. This was to prevent subjects from guessing the hypotheses of the experiment, which was one of the problems in the original studies.

Results

General Results

The study utilized a "2 (sex of subject) X 2 (pose) X 3 (weight) X 4 (WHR) X 4 (order) X 13 (ethnic group of subject)" design. The study's subjects were 60 male and 60 female Simon Fraser University undergraduates. The subjects ranged in age from 18 to 42 years, and had a mean age of 23.083 years with a standard deviation of 4.347.

One of the fifteen individual questions subjects were asked was to estimate the age of the figure in question. This was the only question that could be answered in free form rather than on a scale from one to seven. As a result, the answers to this question had a large range and contained a few outliers resulting in a skewed distribution. A logarithmic transformation was performed on this variable to reduce its range and the effect of the outliers, making it more comparable to the other 14 questions. Summary statistics of the data can be found in Appendix B.

The variable ethnicity consisted of 13 levels. Most of these levels contained only one subject. Therefore, this variable was collapsed over its 13 levels to three levels. In essence, Caucasian Canadian, American, and European subjects were grouped together, subjects of Asian descent were grouped together, and the third group consisted of Indo - Canadians.

The data were pooled to make interpretation easier. A factor analysis of the data was performed in BMDP using the principle

component method. Scree plots were used to determine the number of factors to keep. Three factors were rotated using the varimax (Kaiser, 1958) procedure. In addition, one of the original 15 questions (How likely is it that the woman is on a diet) did not interact with any of the other questions, so it was examined separately.

The factors to emerge from the analysis were labeled the Courtship Factor, the Mother Factor, and the Occupation \ Personality Factor. The specific loadings for each of the three factors are outlined in Table 1.

Insert Table 1 Here

Factor scores were computed and ANOVAs were then performed on the factor scores. All results were tested using a $p < .05$ significance level.

The results of the study are divided into two parts for the purpose of discussion. The Courtship, Mother, and Occupation / Personality factors are discussed within the presentation section, where the effect of judging figures individually or as part of a group is examined. The pose section of the study examines the differences among the three factors that occur as a result of changing the pose of the figures. The complete ANOVA table for each factor can be found in Appendices C and D. The study resulted in a great deal of data, not all of which is examined in this paper. This includes some higher order interactions that were uninterpretable.

Table 1

Factor Loadings of the Courtship, Mother, and Occupation / Personality Factors.

	Courtship	Mother	Occup.
Attractiveness	.828	-.239	.032
Closeness to ideal	.867	-.197	.051
Health	.851	.068	.075
Cap. for child.	.503	.609	.082
Postmenopausal	-.390	.457	.174
Desire for children	.133	.727	.117
Intelligence	.397	.164	.435
Need to lose weight	-.502	.601	.067
Pregnant	-.250	.690	.127
School teach.	-.089	.482	.555
Administrator	-.072	.194	.712
Analytical	.088	-.145	.780
Compassionate	.073	.271	.565
Age	-.338	.524	.295
Variance explained	3.19	2.71	2.10
SS/N	.228	.194	.150

A Comparison of Individual and Group Presentation

Factor 1 - The Courtship Factor

The results of the ANOVA performed on the factor scores yielded a significant main effect, F (1, 96) = 23.81 for presentation style. As predicted, when figures were presented individually they were rated more positively than were figures rated as part of a group of twelve. The main effects for weight, F (2,96) = 62.10, and WHR, F (3,96) = 9.91 were also significant. Specifically, underweight figures were rated highest and overweight figures were rated lowest. Figures with lower WHRs were rated more positively than figures with higher WHRs for this factor.

In addition, the interaction between presentation and weight, F (2, 96) = 10.23 was also found to be significant at the $p < .05$ level. Normal and overweight figures were rated less favorably when judged in a group setting, whereas underweight figures were rated the same in both presentation conditions. The complete ANOVA table for this factor can be found in Appendix C (Table C1) located at the end of this report.

Factor 2 - The Mother Factor

The results of the ANOVA performed on the factor scores yielded a significant main effect for presentation, F (1, 96) = 5.09. Contrary to the prediction, subjects rated figures that were presented

within the group higher than they rated figures presented individually. A significant main effect for the variable weight, F (2, 96) = 3.24 was also found. Normal weight figures were rated highest, and underweight figures were rated lowest.

A significant 2 - way interaction was found between presentation type and pose, F(1. 96) = 7.48. The beauty pageant pose figures were consistently rated less positively then the natural pose figures for this factor, however, both types of figures were rated more positively when rated in a group as opposed to individual rating.

The complete ANOVA table for this factor can be found in Appendix C (Table C2).

Factor 3 - The Occupation/Personality Factor

The results of the ANOVA performed on the factor scores for the Occupation/Personality Factor resulted in a main effect for individual versus group presentation, F (1, 96) = 13.78. Subjects gave higher ratings to figures presented individually as compared to figures presented in a group setting. A significant main effect was also found for the variable weight, F (2, 96) = 14.56. Subjects gave the highest ratings to normal weight figures, followed closely by overweight figures. Underweight figures were judged least favorably for this factor.

In addition, an interaction between presentation and weight, F (2, 96) = 3.29 was also found to be significant. Figures were consistently rated less positively if they were judged as part of a

group. This difference was slight for both normal and overweight figures, but quite large for underweight figures. Finally, a 3 - way interaction between presentation type, sex and WHR, $F(3, 96) = 3.26$ was also found.

The complete ANOVA table for this factor can be found in Appendix C (Table C3).

If presentation style had only demonstrated a significant main effect, it could have been shown that presentation style was not an important variable because changing presentation type would be like adding or subtracting a constant, the actual order of the figure ratings would remain constant. However, the study's results demonstrate that the effect of presentation style is not a constant. Specifically, presentation style was found to interact with weight for both the Courtship and Occupation / Personality Factors, and with pose for the Mother Factor. Also, a 3 - way interaction between sex of the subject, presentation style and weight for the Occupation / Personality Factor was found to be significant. These interactions suggest that presentation style is an important variable that must not be disregarded.

Table 2 shows a comparison of significant results across all three factors for presentation type and pose.

Insert Table 2 Here

Table 2

A Comparison of Significant Results Across the Courtship, Mother, and Occupation / Personality Factors for Individual Versus Group Presentation, and Beauty Pageant Versus Natural Pose

	Presentation			Pose		
source	Court-ship	Mother	Occupat /Pers	Court-ship	Mother	Occupat /Pers
Presentation(P)	+**	+*	+**	N/A	N/A	N/A
weight	+**	+*	+**	+**	+**	+*
WHR	+**	-	-	+**	-	+*
Pres. x Weight	+**	-	+*	N/A	N/A	N/A
Pose	N/A	N/A	N/A	+**	-	-
Pose X Sex	N/A	N/A	N/A	+**	-	-
Pose X Weight	N/A	N/A	N/A	+**	+**	-
Pose X Pres.	-	+**	-	N/A	N/A	N/A
Pose X Pres. X WHR	-	-	+**	N/A	N/A	N/A

Note. - = not significant, +* = significant at the $p < .05$ level, and +** = significant at the $p < .01$ level.

A Comparison of the Beauty Pageant Pose and the Natural Pose

The Courtship Factor

Pose F (1, 96) = 17.38, had a significant main effect. Subjects rated figures presented in the natural pose less favorably than they did figures presented in the beauty pageant pose. Significant main effects were also found for weight, F (2, 192) = 61.92, and WHR, F (3, 288) = 78.87. Subjects rated underweight figures most positively, and overweight figures least positively. Figures with a WHR of 0.7 were rated highest for this factor, followed by 0.8, 0.9, and 1.0.

Two 2 - way interactions involving pose were found to be significant. First, pose x sex of the subject, F (1, 96) = 4.36 was significant. When rating figures presented in the beauty pageant pose, male subjects gave higher ratings than did female subjects. The opposite held true when rating figures presented in the natural pose.

The second 2-way interaction that was found to be significant was pose x weight, F (2, 192) = 9.12. Under and normal weight figures were rated similarly regardless of pose. However, overweight figures in the natural pose were given higher ratings than were overweight figures in the beauty pageant pose. Overall, subjects rated the overweight figures much less favorably on the Courtship Factor than they did under and normal weight figures. The complete ANOVA table for the Courtship Factor can be found in Appendix D (Table D1).

The Mother Factor

The results of the analyses performed on the Mother Factor did not yielded a significant main effect for pose. However, there was a significant main effect for weight, F (2, 192) = 153.46. For the Mother Factor, underweight figures were rated lowest, and overweight figures rated highest.

Two 2 - way interactions involving pose were significant. The interaction between pose and weight, F (2, 192) = 13.84 was significant. Under and overweight figures were both judged less positively when presented in the natural pose, but the opposite was true for normal weight figures.

The complete ANOVA table for the Mother factor can be found in Appendix D (Table D2).

The Occupation / Personality Factor

Pose did not have a significant main effect for this factor. There was a significant main effect for weight, F (2, 192) = 3.42. In this case, normal weight figures received the highest ratings, and underweight figures were rated lowest. There was also a significant main effect for WHR, F (3, 288) = 3.58. Figures with a WHR of 0.7 were rated highest on this factor, followed by 0.8, 0.9, and 1.0. The complete ANOVA table for the Occupation/Personality factor can be found in Appendix C (Table C3).

Table 2 shows a comparison of significant results across all three factors for the effect of pose.

Discussion

The results of this study provide mixed support for the validity of the WHR figures created by Singh (1993a; b). Before the results are examined in detail, it is important to note two problems in the study that may limit the implications these results have for the original hypotheses. To begin with, there is a confound in the part of the experiment that compares individual presentation to group presentation. Some of the variability found in this part of the study may be accounted for by pose order. That is, part of the difference found for presentation type may be due to a priming effect of seeing one pose first for a particular weight and WHR. Whether a subject rated an individual figure from the beauty pageant pose first, or the natural pose first, was dependent on the weight and WHR of the figure. Ideally, half of the subjects rating each figure should have rated the natural pose first, and the other half should have rated the figure presented in the beauty pageant pose first. Had this been the case, any effect caused by seeing one pose before another would have balanced out. In this study, all subjects who judged the underweight figure with a WHR of 0.7 rated the beauty pageant pose first. All subjects who rated the underweight figure with a WHR of 0.8 rated the natural pose first. However, because pose order was alternated with every increase in WHR and weight, any variability accounted for by pose order is expected to be very small.

The second problem in the study occurs because the study took a fairly long time to complete, and subjects viewed and rated a great many figures. It is possible that subjects gave less consideration to

the ratings made at the end of the study as compared to the ratings made at the beginning of the study. As a result, subject fatigue may be a factor in the results of the experiment. This may have led to finding so many higher order interactions that were largely uninterpretable.

The first prediction made in the study was that figures presented individually would be rated more positively than figures presented in a group of twelve. A significant main effect for all factors was found for this variable indicating that presentation does indeed make a difference in judgments, and that subjects do make use of the specific comparative information provided by the group setting in order to make their ratings.

As demonstrated in Figure 2, the effect of presentation type was not the same across all factors. Subjects rated figures more positively when presented individually for the Courtship Factor and the Occupation / Personality Factor. When rating figures presented in a group for courtship variables, subjects located the figure they thought was ideal. In this study, most subjects chose the underweight figure with a WHR of 0.7 as ideal. The remaining figures were compared to the ideal, and because only one figure can be ideal, the remaining figures were rated less favorably. In effect, figures were ranked from most attractive to least attractive. A figure presented individually was rated more positively than it was when presented in a group setting because such stringent comparison was not possible. That is, a figure with a slightly larger WHR or a slightly higher weight than ideal, received top ratings for attractiveness

unless it was directly compared to the ideal, at which point it was rated slightly less attractive.

Subjects also compared figures to the ideal when making judgments about variables concerning the Occupation / Personality Factor. For this factor, the normal weight figure with a WHR of 0.7 was rated most positively. All other figures were ranked against the ideal. The farther away from ideal a figure moved, the less positively it was rated. When a figure was rated individually, figures that were not ideal were rated more positively than they were when judged as part of a group because they could not be compared to the ideal and ranked accordingly.

When making ratings for the Mother Factor the ideal shape was still important. When figures were presented individually, it was hard for subjects to judge variables such as the likelihood of pregnancy. When figures were presented in a group, subjects again picked the underweight figure with a WHR of 0.7 as ideal. All other figures were compared to the ideal, and because they were heavier and had higher WHRs, they were given higher ratings for this factor. That is, when figures were presented as a group, it was easier to judge figures on variables such as likelihood of pregnancy, or need for weight loss, because subjects were able to see that some figures had larger WHRs and weighed more than others. Therefore, figures were rated more positively for variables relating to this factor when presented in a group setting.

Insert Figure 2 Here

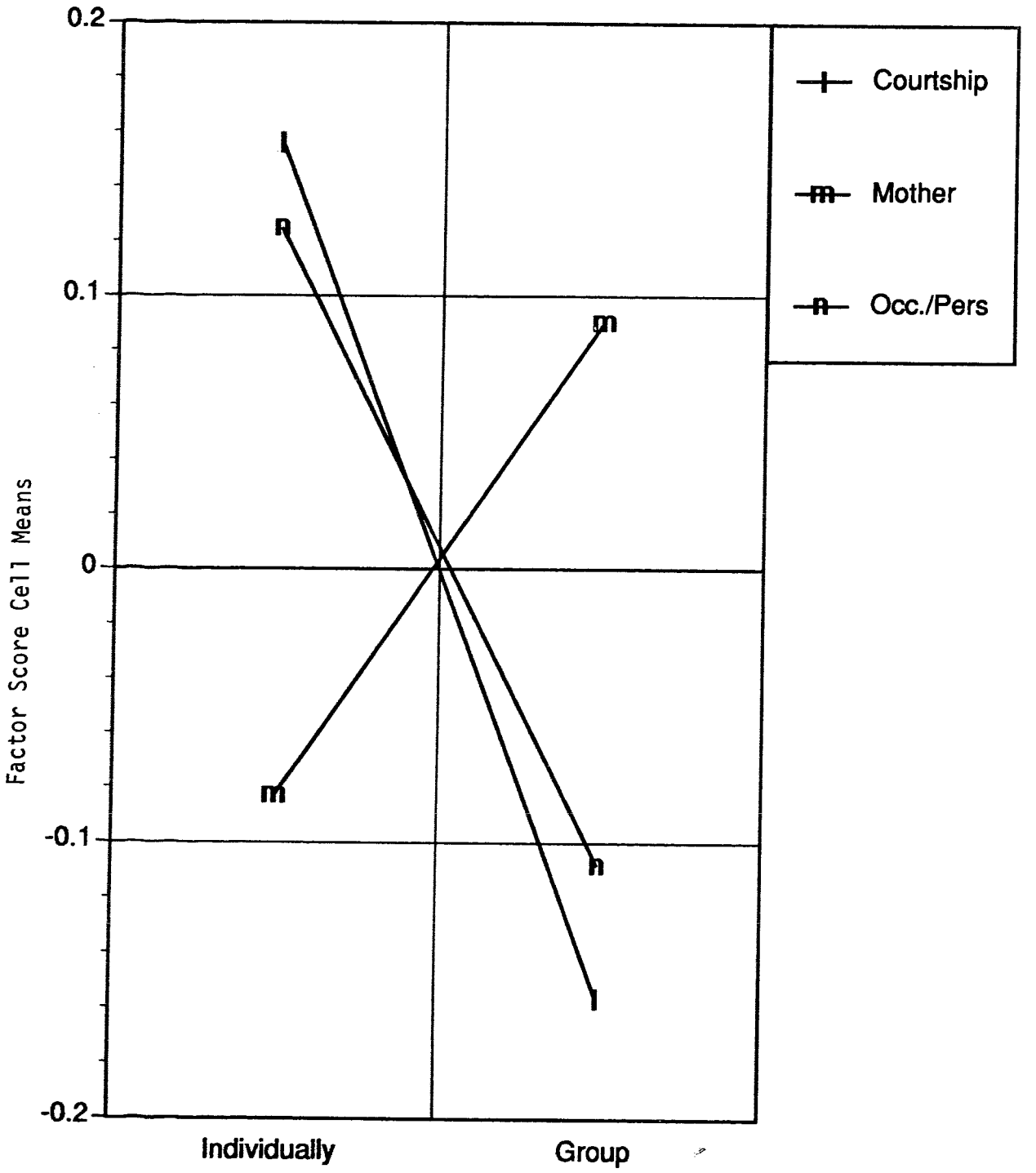


Figure 2. A comparison of the three factors across the variable presentation

Whether the figures were presented individually or as part of a group did not significantly interact with WHR. As in Singh's studies, figures with low WHRs in both presentation types were rated more attractive and healthy than were comparable figures with higher WHRs.

For both presentation types, normal weight figures were rated the highest for the Mother Factor and the Occupation / Personality Factor, whereas underweight figures were rated highest for the Courtship Factor. In the studies conducted by Singh (1993 a; b) subjects rated the normal weight figures most attractive.

Presentation type did interact with weight for the Courtship Factor and the Occupation / Personality Factor. For these two factors, the two weight groups that were rated less favorably overall (normal and overweight figures for the Courtship Factor, and under and overweight figures for the Occupation / Personality Factor), were also rated less favorably when they were judged in a group setting rather than an individual setting. This suggests that subjects were again using their ideal figure to help make judgments when possible. Although the pattern of results remained constant across presentation types, subjects gave lower ratings to figures when they could be compared to the ideal figure and ranked accordingly.

The second hypothesis of this study was that subjects would rate figures presented in the beauty pageant pose more positively for variables relating to courtship, whereas figures presented in the natural pose would be rated more positively for all other variables. In fact, the Courtship Factor was the only factor to have a significant main effect for pose. Subjects rated figures presented in the beauty

pageant pose more positively than they did figures presented in the natural pose. The courtship factor is concerned largely with attractiveness. Figures presented in the beauty pageant pose are drawn in a sexy pose that emphasizes WHR, maximizing attractiveness. Figures drawn in the natural pose are not presented in a sexy stance, and therefore, subjects rate them less favorably on this factor.

Pose of the figure did not significantly affect judgments made for the Mother Factor or the Occupation / Personality Factor. This suggests that judgments can be made without the benefit of an emphasized WHR when not dealing specifically with attractiveness.

The third prediction of the study was that male subjects would respond more favorably to figures presented in the beauty pageant pose than would female subjects. Indeed, as demonstrated in Figure 3, for the Courtship Factor, although the beauty pageant pose figures were rated more positively than the natural pose figures by both male and female subjects, the difference in judgments between the two poses was greater for male subjects. Men gave the highest ratings to figures presented in the beauty pageant pose and the lowest ratings to figures presented in the natural pose. The WHR helps a man to judge the reproductive capability of a woman. The beauty pageant pose is designed to make the figure attractive to men by emphasizing the WHR. The sex of the subject did not significantly affect the judgments made for either the Mother Factor or the Occupation / Personality Factor.

Insert Figure 3 Here

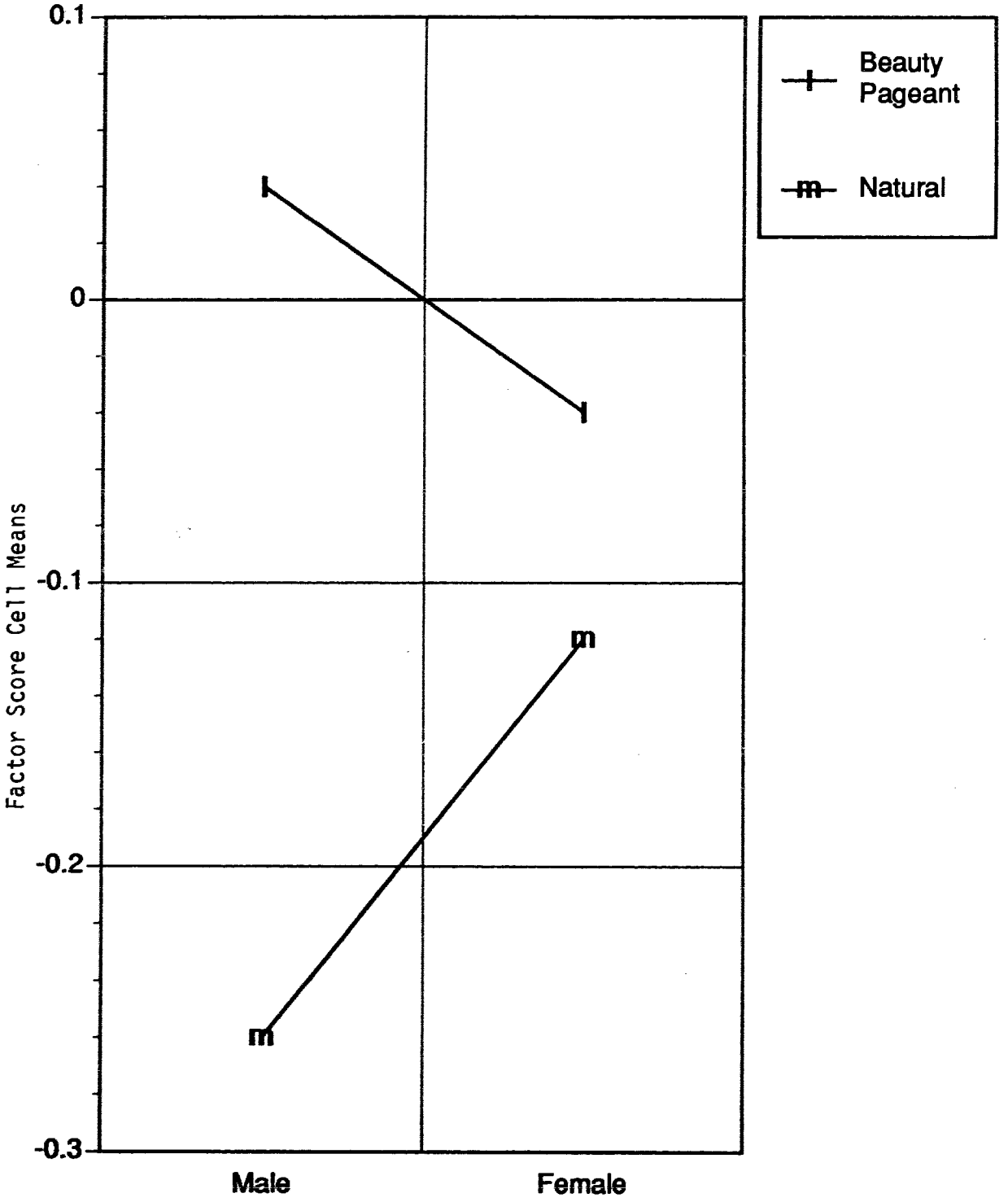


Figure 3. The interaction between pose and sex of the subject for the courtship factor

The study's fourth prediction was that figures with low WHRs would be associated with employment typically viewed as female dominant (elementary school teacher) and personality characteristics regarded as feminine (compassionate). On the other hand, figures with higher WHRs would be associated with employment typically viewed as male dominated (high school administrator) and characteristics thought of as masculine (analytical). Unfortunately, this prediction cannot be addressed by the present study. In the factor analysis, all employment questions and personality questions were grouped together to form one factor and so cannot be differentiated. For the combined factor, however, figures with low WHRs were rated higher than figures with high WHRs. This result is contrary to previous research that has found that curvaceous women are judged as less competent and intelligent than are their less curvaceous counterparts (Silverstein, et al., 1986).

The fifth prediction was that figures with high WHRs would be judged as more likely to be pregnant or post menopausal then would figures with low WHRs. Questions relating to these two variables were grouped in the Mother Factor. WHR did not have a significant main effect for this factor. On the other hand, weight of the figure was a very important variable when making judgments for this factor. Specifically, overweight figures received the highest ratings for this factor, followed by normal weight and then underweight figures. Therefore, weight was more important than WHR when deciding how likely it was that a figure was pregnant or post menopausal.

The sixth prediction was that subjects would rate overweight figures as most likely to be on a diet, whereas underweight figures should be judged least likely to be on a diet. However, a significant effect for weight was not found. After questioning subjects about this discrepancy, it was found that many subjects responded that under and normal weight subjects were more likely to be on a diet because they were not overweight. That is, the subjects felt that under and normal weight figures had to use a diet to maintain their figures. On the other hand, because it was felt they needed to lose weight and were not maintaining a slim figure, overweight subjects were rated as least likely to be on a diet.

Weight had a much stronger, more consistent effect on the results of this study than did WHR. The variable weight had a significant main effect for all factors regardless of presentation style or pose. WHR had a significant main effect only for the Courtship Factor in both presentation styles, and the Occupation / Personality Factor in the group presentation style. According to Singh's hypotheses, WHR should influence the judgments made by subjects just as much as, if not more than, weight. The results of this study suggest that this is only the case for variables relating to courtship. The courtship factor is concerned largely with attractiveness. The results of this study suggest that WHR is very important for judging the attractiveness of a figure, and somewhat less important for judging factors relating to mothering, occupation, and personality.

The results of this study suggest that further testing on the WHR figures created by Singh (1993a; b) is necessary before their validity and generalizability can be assured. In this study, WHR was

found to be as important a variable as weight for factors dealing with attractiveness. However, WHR did not influence judgments concerning mothering, personality or occupation to the same extent that the variable weight did. The results of this study also suggest that presentation style impacts subjects ratings of figures. Figures presented in a group are rated less positively for courtship and occupation / personality variables, and more positively for mothering variables. Also, pose of the figure affects only judgments of attractiveness, with figures drawn in a beauty pageant pose being rated as more attractive than figures drawn in a natural pose.

APPENDIX A

Many people believe that people with particular bodily features behave in certain ways or exhibit specific behavioral characteristics (e.g. red hair, beady eyes, etc.). Recent research shows that some behavior styles and belief systems (personality) are indeed affected by a person's shape and body build. Furthermore, and more intriguing, research shows that people can make amazingly accurate judgments about a person's personality by merely observing their full body photographs.

The research in which you will be participating is intended to replicate and confirm research findings about body shape and personality. We are interested in finding out whether mere line drawings, as opposed to photographs, can be used to judge a person's personality. Please take time to carefully observe each outline of the body shape. You will be asked to rate various shapes for some physical and psychological characteristics.

Thank you for your time and cooperation.

Please answer the following questions:

1). Sex: male / female

2). Age: _____

3). Height: _____

4). Weight:. _____

5). Ethnic Background:

6). How long have you lived in Canada?

QUESTIONNAIRE

Please answer the following questions about the woman represented by each figure. Place your answers on the answer sheet provided.

1). How attractive do you think most men would find the woman?

1	2	3	4	5	6	7
very unattractive			average			very attractive

2). How close is the woman to what the ideal woman should look like.

1	2	3	4	5	6	7
not at all close to ideal			average			very close to ideal

3). How healthy would you say the woman is?

1	2	3	4	5	6	7
very unhealthy			average			very healthy

4). How capable of having children would you say the woman is?

1	2	3	4	5	6	7
not at all capable			average			very capable

5). How likely is it that the woman is on a diet?

1	2	3	4	5	6	7
very unlikely			average			very likely

6). What is the likelihood that the woman is post menopausal?

1	2	3	4	5	6	7
very unlikely			average			very likely

7). How much does the woman want a child?

1	2	3	4	5	6	7
not at all			average			very much

8). How intelligent is the woman ?

1	2	3	4	5	6	7
not at all intelligent			average			very intelligent

9). How much weight do you think the woman needs to lose?

1	2	3	4	5	6	7
no weight			average			a great deal of weight

10). How likely is it that the woman is pregnant?

1	2	3	4	5	6	7
not at all likely			average			very likely

11). How likely is it that the woman is employed as an elementary school teacher?

1	2	3	4	5	6	7
not at all likely			average			very likely

12). How likely is it that the woman is employed as a high school administrator?

1	2	3	4	5	6	7
not at all likely			average			very likely

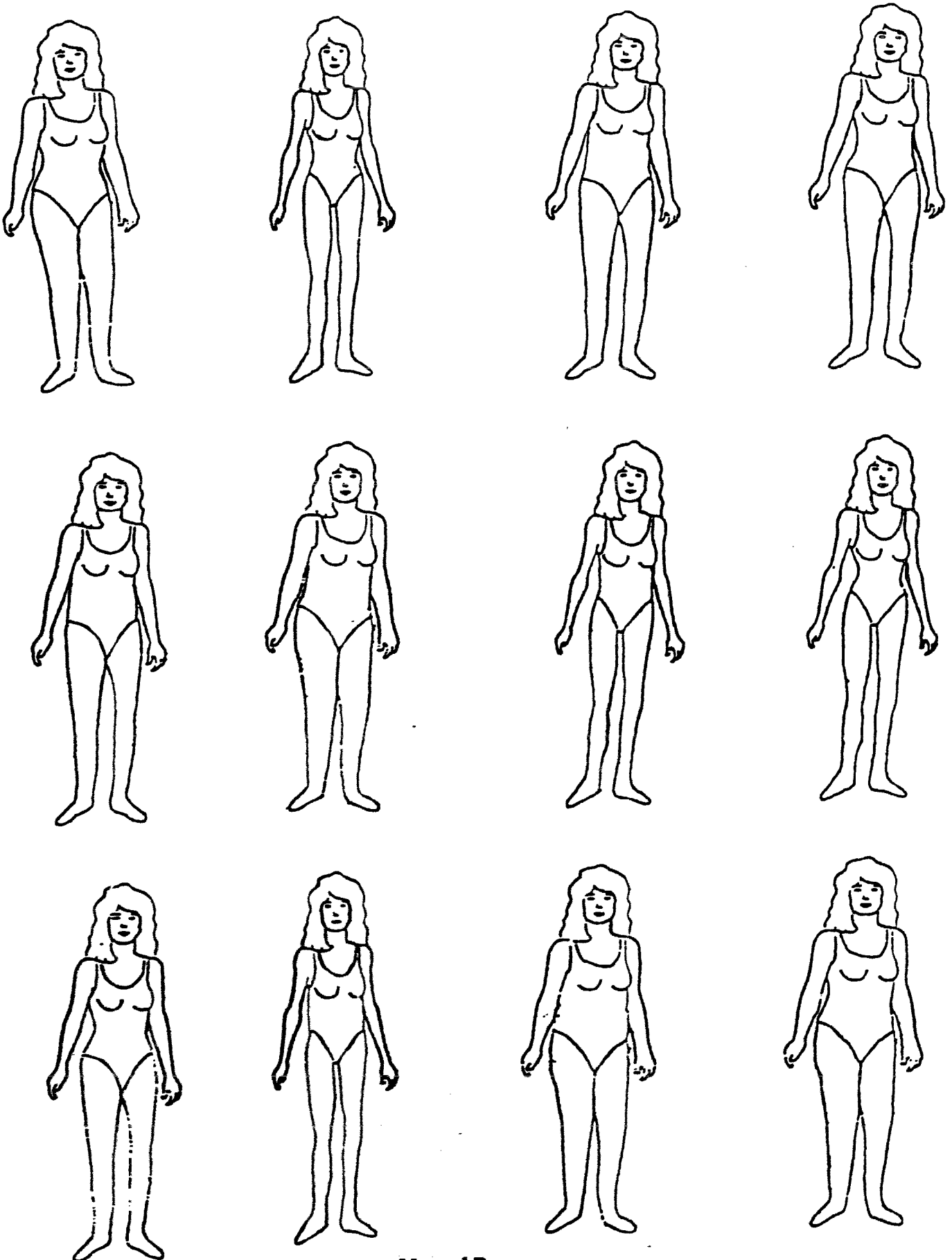
13). How well does the characteristic "analytical"describe the woman?

1	2	3	4	5	6	7
not at all			average			very well

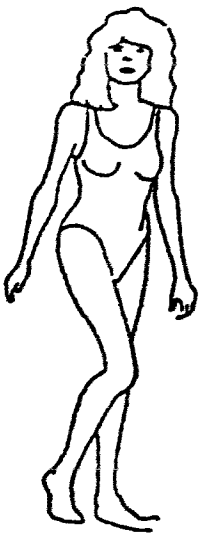
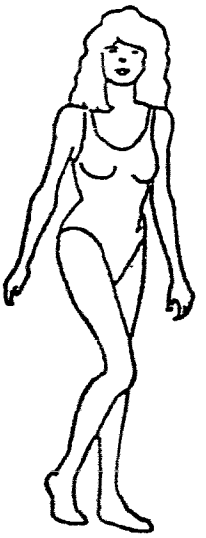
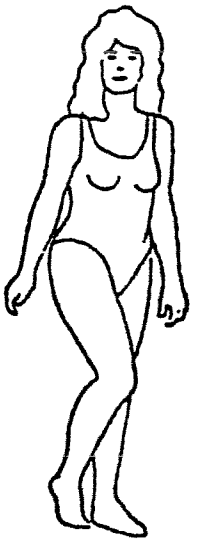
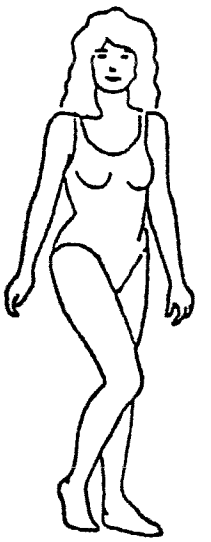
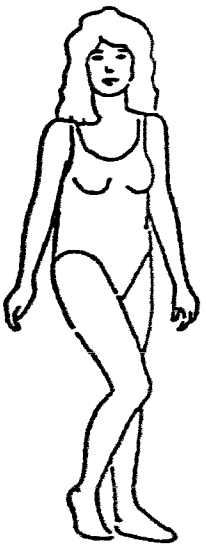
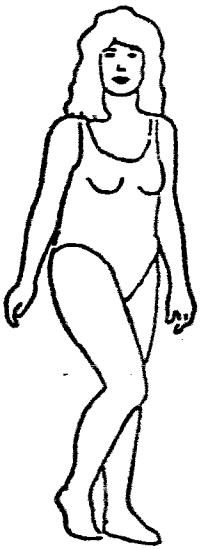
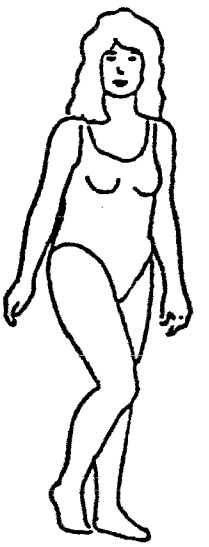
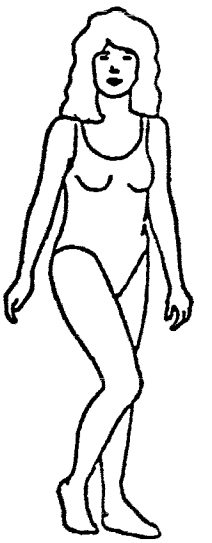
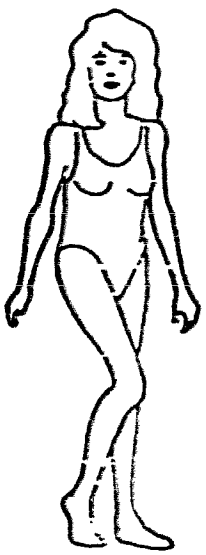
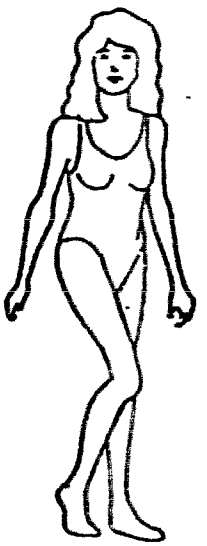
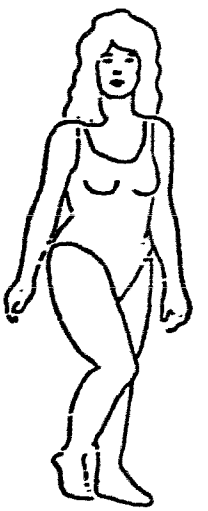
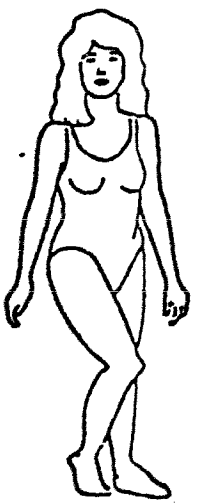
14). How well does the characteristic "compassionate" describe the woman?

1	2	3	4	5	6	7
not at all			average			very well

15). How old do you think the woman is?



Natural Pose

Beauty Pageant Pose

APPENDIX B

Table B1

Summary Statistics For the Variates

Variate	Count	Mean	ST_Dev	Max.	Min.
attrac	2880	3.989	1.658	7.000	1.000
ideal	2880	3.864	1.637	7.000	1.000
healthy	2880	4.108	1.427	7.000	1.000
capchild	2880	4.754	1.499	7.000	1.000
diet	2880	4.150	1.659	7.000	1.000
pmeno	2880	3.246	1.575	7.000	1.000
wantchil	2880	4.000	1.138	7.000	1.000
intell	2880	4.380	0.981	7.000	1.000
weightlo	2880	3.039	1.909	7.000	1.000
pregnan	2880	3.299	1.560	7.000	1.000
schteach	2880	4.026	1.226	7.000	1.000
admin	2880	3.767	1.312	7.000	1.000
analyt	2880	3.937	1.179	7.000	1.000
compass	2880	4.368	1.176	7.000	1.000
age	2880	27.73	7.176	70.00	13.00

Table B2

Male Subjects Summary Statistics For the Variates

Variate	Count	Mean	ST_Dev	Max.	Min.
attrac	1440	4.022	1.606	7.000	1.000
ideal	1440	3.879	1.570	7.000	1.000
healthy	1440	4.026	1.372	7.000	1.000
capchild	1440	4.667	1.440	7.000	1.000
diet	1440	4.081	1.624	7.000	1.000
pmeno	1440	3.298	1.479	7.000	1.000
wantchil	1440	4.082	1.087	7.000	1.000
intell	1440	4.335	0.946	7.000	1.000
weightlo	1440	3.116	1.920	7.000	1.000
pregnan	1440	3.038	1.445	7.000	1.000
schteach	1440	4.018	1.102	7.000	1.000
admin	1440	3.722	1.256	7.000	1.000
analyt	1440	3.967	1.057	7.000	1.000
compass	1440	4.375	1.009	7.000	1.000
age	1440	26.816	6.188	50.00	13.00

Table B3

Female Subjects Summary Statistics For the Variates

Variate	Count	Mean	ST_Dev	Max.	Min.
attrac	1440	3.956	1.708	7.000	1.000
ideal	1440	3.849	1.702	7.000	1.000
healthy	1440	4.189	1.476	7.000	1.000
capchild	1440	4.841	1.551	7.000	1.000
diet	1440	4.219	1.691	7.000	1.000
pmeno	1440	3.194	1.665	7.000	1.000
wantchil	1440	3.918	1.181	7.000	1.000
intell	1440	4.425	1.013	7.000	1.000
weightlo	1440	2.961	1.896	7.000	1.000
pregnan	1440	3.290	1.667	7.000	1.000
schteach	1440	4.034	1.339	7.000	1.000
admin	1440	3.810	1.364	7.000	1.000
analyt	1440	3.908	1.289	7.000	1.000
compass	1440	4.360	1.323	7.000	1.000
age	1440	28.642	7.942	70.00	13.00

Table B4

Beauty Pageant Pose Summary Statistics For the Variates

Variate	Count	Mean	ST_Dev	Max.	Min.
attrac	1440	4.190	1.691	7.000	1.000
ideal	1440	4.039	1.679	7.000	1.000
healthy	1440	4.287	1.475	7.000	1.000
capchild	1440	4.866	1.462	7.000	1.000
diet	1440	4.167	1.676	7.000	1.000
pmeno	1440	3.217	1.584	7.000	1.000
wantchil	1440	4.006	1.164	7.000	1.000
intell	1440	4.369	0.985	7.000	1.000
weightlo	1440	3.008	1.919	7.000	1.000
pregnan	1440	3.260	1.549	7.000	1.000
schteach	1440	4.024	1.254	7.000	1.000
admin	1440	3.739	1.336	7.000	1.000
analyt	1440	3.903	1.215	7.000	1.000
compass	1440	4.345	1.201	7.000	1.000
age	1440	27.533	6.940	65.00	13.00

Table B5

Natural Pose Summary Statistics For the Variates

Variate	Count	Mean	ST_Dev	Max.	Min.
attrac	1440	3.787	1.599	7.000	1.000
ideal	1440	3.690	1.574	7.000	1.000
healthy	1440	3.929	1.354	7.000	1.000
capchild	1440	4.642	1.527	7.000	1.000
diet	1440	4.133	1.643	7.000	1.000
pmeno	1440	3.275	1.567	7.000	1.000
wantchil	1440	3.994	1.112	7.000	1.000
intell	1440	4.392	0.976	7.000	1.000
weightlo	1440	3.069	1.899	7.000	1.000
pregnan	1440	3.338	1.570	7.000	1.000
schteach	1440	4.029	1.198	7.000	1.000
admin	1440	3.796	1.286	7.000	1.000
analyt	1440	3.972	1.141	7.000	1.000
compass	1440	4.390	1.150	7.000	1.000
age	1440	27.924	7.402	70.00	13.00

Table B6

Individual Presentation Summary Statistics For the Variates

Variate	Count	Mean	ST_Dev	Max.	Min.
attrac	1440	4.327	1.485	7.000	1.000
ideal	1440	4.196	1.536	7.000	1.000
healthy	1440	4.460	1.355	7.000	1.000
capchild	1440	5.100	1.484	7.000	1.000
pmeno	1440	3.119	1.576	7.000	1.000
wantchil	1440	4.002	1.063	7.000	1.000
intell	1440	4.456	0.906	7.000	1.000
weightlo	1440	2.991	1.781	7.000	1.000
pregnan	1440	3.135	1.414	7.000	1.000
schteach	1440	3.935	1.118	7.000	1.000
admin	1440	3.773	1.218	7.000	1.000
analyt	1440	3.785	1.146	7.000	1.000
compass	1440	4.402	1.128	7.000	1.000
age	1440	3.286	.248	2.485	4.285

APPENDIX C

Table C1

Analysis of Variance for The Courtship Factor, A Comparison Of Individual and Group Presentation.

Source	DF	F
Sex (S)	1	2.73
Weight (I)	2	62.10**
WHR (W)	3	9.91**
SI	2	0.47
SW	3	0.16
IW	6	1.07
SIW	6	1.94
Error	96	(1.27)
Indiv/Group(G)	1	23.81**
GS	1	0.09
GI	2	10.23**
GW	3	0.62
GSI	2	0.57
GSW	3	0.55
GIW	6	0.67
GSIW	6	0.46
Error	96	(0.48)
Pose (P)	1	12.75**
PS	1	2.22
PI	2	11.84**
PW	3	2.36
PSI	2	0.20
PSW	3	0.68
PIW	6	2.09
PSIW	6	1.56
Error	96	(0.25)
GP	1	0.56
GPS	1	0.10
GPI	2	0.35
GPW	3	1.21
GPSI	2	3.05
GPSW	3	1.30
GPIW	6	1.43
GPSIW	6	0.69
Error	96	(0.15)

Note. Values enclosed in parentheses represent mean square errors. *p<.05, **p<.01.

Table C2

Analysis of Variance for The Mother Factor, A comparision of Individual and Group Presentation.

Source	DF	F
Sex (S)	1	0.86
Weight (I)	2	3.24*
WHR (W)	3	0.48
SI	2	0.57
SW	3	0.57
IW	6	0.30
SIW	6	0.88
Error	96	(2.32)
Indiv/Group(G)	1	5.09*
GS	1	2.07
GI	2	0.64
GW	3	0.74
GSI	2	1.49
GSW	3	1.30
GIW	6	1.18
GSIW	6	1.03
Error	96	(0.70)
Pose (P)	1	3.04
PS	1	0.26
PI	2	0.05
PW	3	1.06
PSI	2	2.64
PSW	3	0.59
PIW	6	1.33
PSIW	6	0.75
Error	96	(0.57)
GP	1	7.48**
GPS	1	3.42
GPI	2	0.28
GPW	3	0.81
GPSI	2	1.28
GPSW	3	0.77
GPIW	6	0.50
GPSIW	6	0.88
Error	96	(0.42)

Note. Values enclosed in parentheses represent mean square errors. *p<.05, **p<.01.

Table C3

Analysis of Variance for The Occupation / Personality Factor, A Comparison of Individual and Group Presentation.

Source	DF	F
Sex (S)	1	0.24
Weight (I)	2	14.56**
WHR (W)	3	1.12
SI	2	0.26
SW	3	1.05
IW	6	1.14
SIW	6	0.55
Error	96	(1.94)
Indiv/Group(G)	1	13.78**
GS	1	3.79
GI	2	3.29*
GW	3	0.78
GSI	2	1.39
GSW	3	3.26*
GIW	6	1.33
GSIW	6	1.72
Error	96	(0.60)
Pose (P)	1	5.06*
PS	1	0.16
PI	2	0.47
PW	3	4.39**
PSI	2	0.04
PSW	3	2.35
PIW	6	0.43
PSIW	6	0.52
Error	96	(0.51)
GP	1	0.33
GPS	1	0.17
GPI	2	1.34
GPW	3	0.97
GPSI	2	0.61
GPSW	3	1.15
GPIW	6	2.02
GPSIW	6	0.92
Error	96	(0.34)

Note. Values enclosed in parentheses represent mean square errors. *p<.05, **p<.01.

APPENDIX D

Table D1

Analysis of Variance for The Courtship Factor, A Comparison of the Beauty Pageant Pose and the Natural Pose.

Source	DF	F
Sex (S)	1	0.07
Order (O)	3	0.16
Ethnic (E)	2	3.77*
SO	3	0.26
SE	2	0.03
OE	6	0.67
SOE	6	0.52
Error	**96**	(5.13)
Pose (P)	1	17.38**
PS	1	4.36*
PO	3	0.91
PE	2	0.71
PSO	3	1.08
PSE	2	3.11
POE	6	1.11
PSOE	6	1.46
Error	**96**	(0.74)
Weight (I)	2	61.92**
IS	2	0.19
IO	6	0.28
IE	4	0.83
ISO	6	0.69
ISE	4	0.26
IOE	12	0.86
ISOE	12	1.18
Error	**192**	(2.04)
PI	2	9.12**
PIS	2	1.46
PIO	6	0.90
PIE	4	1.09
PISO	6	0.98
PISE	4	2.10
PIOE	12	0.64
PISOE	12	0.72
Error	**192**	(0.45)

WHR (W)	3	78.87**
WS	3	0.51
WO	9	1.32
WE	6	0.41
WSO	9	0.99
WSE	6	0.99
WOE	18	0.84
WSOE	18	0.88
Error	288	(0.51)
PW	3	0.99
PWS	3	0.44
PWO	9	2.13*
PWE	6	0.70
PWSO	9	0.48
PWSE	6	0.81
PWOE	18	0.91
PWSOE	18	1.26
Error	288	(0.23)
IW	6	10.76**
IWS	6	1.69
IWO	18	1.32
IWE	12	0.97
IWSO	18	1.70*
IWSE	12	1.23
IWOE	36	1.25
IWSOE	36	0.93
Error	576	(0.25)
PIW	6	2.73*
PIWS	6	0.57
PIWO	18	2.77**
PIWE	12	0.89
PIWSO	18	0.86
PIWSE	12	0.91
PIWOE	36	0.87
PIWSOE	36	0.79
Error	576	(0.23)

Note. Values enclosed in parentheses represent mean square errors. *p<.05, **p<.01.

Table D2

Analysis of Variance for The Mother Factor, A Comparison of the Beauty Pageant Pose and the Natural Pose.

Source	DF	F
Sex (S)	1	0.71
Order (O)	3	0.22
Ethnic (E)	2	2.42
SO	3	2.11
SE	2	0.31
OE	6	0.77
SOE	6	0.58
Error	96	(3.49)
Pose (P)	1	3.40
PS	1	3.04
PO	3	0.26
PE	2	0.79
PSO	3	0.22
PSE	2	1.26
POE	6	1.27
PSOE	6	1.22
Error	96	(0.63)
Weight (I)	2	153.46**
IS	2	2.97
IO	6	0.67
IE	4	1.42
ISO	6	0.97
ISE	4	0.80
IOE	12	0.57
ISOE	12	0.41
Error	192	(1.83)
PI	2	13.84**
PIS	2	0.17
PIO	6	0.70
PIE	4	1.97
PISO	6	1.94
PISE	4	0.67
PIOE	12	0.78
PISOE	12	1.46
Error	192	(0.44)

WHR (W)	3	0.98
WS	3	0.63
WO	9	1.15
WE	6	2.45*
WSO	9	0.30
WSE	6	1.58
WOE	18	1.81*
WSOE	18	0.91
Error	288	(0.36)
PW	3	4.44**
PWS	3	1.05
PWO	9	1.08
PWE	6	1.46
PWSO	9	0.67
PWSE	6	0.49
PWOE	18	0.93
PWSOE	18	1.39
Error	288	(0.25)
IW	6	3.30**
IWS	6	1.58
IWO	18	0.51
IWE	12	0.91
IWSO	18	1.16
IWSE	12	0.64
IWOE	36	0.55
IWSOE	36	0.69
Error	576	(0.34)
PIW	6	1.45
PIWS	6	0.17
PIWO	18	1.83*
PIWE	12	0.83
PIWSO	18	0.80
PIWSE	12	0.89
PIWOE	36	0.98
PIWSOE	36	1.11
Error	576	(0.29)

Note. Values enclosed in parentheses represent mean square errors. *p<.05, **p<.01.

Table D3

Analysis of Variance for The Occupation / Personality Factor, A Comparison of the Beauty Pageant Pose and the Natural Pose.

Source	DF	F
Sex (S)	1	0.00
Order (O)	3	0.89
Ethnic (E)	2	0.53
SO	3	0.59
SE	2	0.13
OE	6	0.41
SOE	6	1.32
Error	96	(10.23)
Pose (P)	1	1.21
PS	1	1.00
PO	3	1.68
PE	2	0.30
PSO	3	0.11
PSE	2	0.68
POE	6	1.28
PSOE	6	1.17
Error	96	(1.02)
Weight (I)	2	3.42*
IS	2	0.26
IO	6	0.66
IE	4	1.56
ISO	6	0.79
ISE	4	1.00
IOE	12	0.67
ISOE	12	3.61**
Error	192	(1.76)
PI	2	1.18
PIS	2	0.35
PIO	6	0.95
PIE	4	0.96
PISO	6	2.39*
PISE	4	0.31
PIOE	12	0.67
PISOE	12	1.44
Error	192	(0.59)

WHR (W)	3	3.58*
WS	3	0.33
WO	9	0.66
WE	6	0.41
WSO	9	0.52
WSE	6	0.61
WOE	18	0.95
WSOE	18	1.39
Error	288	(0.52)
PW	3	2.09
PWS	3	1.47
PWO	9	2.26*
PWE	6	1.35
PWSO	9	0.74
PWSE	6	0.75
PWOE	18	0.75
PWSOE	18	1.38
Error	288	(0.33)
IW	6	2.24*
IWS	6	0.44
IWO	18	0.61
IWE	12	1.24
IWSO	18	0.68
IWSE	12	0.64
IWOE	36	0.54
IWSOE	36	1.00
Error	576	(0.43)
PIW	6	1.05
PIWS	6	2.35*
PIWO	18	1.26
PIWE	12	0.77
PIWSO	18	0.73
PIWSE	12	0.42
PIWOE	36	1.05
PIWSOE	36	0.86
Error	576	(0.38)

Note. Values enclosed in parentheses represent mean square errors. *p<.05, **p<.01.

REFERENCES

Ashwell, M., Cole, T. J., & Dixon, A. K. (1985). Obesity: new insight into the anthropometric classification of fat distribution shown by computed tomography. British Medical Journal, 290, 1692 - 1694.

Bem, S. L. (1974). The measurement of psychological androgyny. Journal of Consulting and Clinical Psychology, 42 (2), 155 - 162.

Bem, S. L. (1977). On the utility of alternate procedures for assessing psychological androgyny. Journal of Consulting and Clinical Psychology, 45 (2), 196 - 205.

Bjorntorp, P. (1991a). Adipose tissue distribution and function. International Journal of Obesity, 15, 67 - 81.

Bjorntorp, P. (1991b). Visceral fat accumulation: the missing link between psychosocial factors and cardiovascular disease? Journal of Internal Medicine, 230, 195 - 201.

Brenner, D., & Hinsdale, G. (1978). Body build stereotypes and self - identification in three age groups of females. Adolescence, 13 (2), 551 - 561.

Brown, P. J. & Konner, M. (1987). An anthropological perspective on obesity. Annals of the New York Academy of Sciences, 499, 29 - 46.

Buss, D. M. (1987). Sex differences in human mate selection. In C. Crawford, M. Smith, and D. Krebs (Eds.), Sociobiology and Psychology: Ideas, Issues and Application. (pp. 335 - 351). New Jersey: Lawrence Erlbaum Associates.

Buss, D. M. (1989). Sex differences in human mate selection: evolutionary hypotheses tested in 37 cultures. Behavioral and Brain Sciences, 12, 1 - 49.

Cohn, L. D., Adler, N. E., Irwin Jr., C. E., Millstein, S. G., Kegeles, S. M,. & Stone, G. (1987). Body - figure preference in male and female adolescents. Journal of Abnormal Psychology, 96 (3), 276 - 279.

Davies, E. & Furnham, A. (1986). The dieting and body shape concerns of adolescent females. Child Psychol. Psychiat., 27 (3), 417 - 428.

de Ridder, C. M., Bruning, P. F., Zonderland, M. L., Thijssen, J. H. H., Bonfrer, J. M. G., Blankenstein, M. A., Huisveld, I. A., & Erich, W. B. M. (1990). Body fat mass, body fat distribution, and plasma hormones in early puberty in females. Journal of Clinical Endocrinology and Metabolism, 70 (4), 888 - 893.

Evans, D. J., Barth, J. H., & Burke, C. W. (1988). Body fat topography in women with androgen excess. International Journal of Obesity, 12, 157 - 162.

Fallon, A. E., & Rozin, P. (1985). Sex differences in perceptions of desirable body shape. Journal of Abnormal Psychology, 94 (1), 102 - 105.

Fonagy, P. & Benster, R. (1990). The psychophysics of sex differences in body image. British Journal of Psychology, 81, 159 - 171.

Furnham, A., Hester, C., & Weir, C. (1990). Sex differences in the preferences for specific female body shapes. Sex Roles, 22 (11/12), 743 - 754.

Furnham, A. & Radley, S. (1989). Sex differences in the perception of male and female body shapes. Personality and Individual Differences, 10 (6), 653 - 662.

Garner, D. M.. (1986). Cognitive behavioral therapy for eating disorders. Clinical Psychologist, 39, (2), 36 - 39.

Garner, D. M.., Garfinkel, P. E.., Schwartz, D. & Thompson, M. (1980). Cultural expectation of thinness in women. Psychological Report, 47, 483 - 491.

Glick, P. (1991). Trait - based and sex based discrimination in occupational prestige, occupational salary, and hiring. Sex Roles, 25 (5/6), 351 - 378.

Kaiser, H. F. (1958). The varimax criterion for analytic rotation in factor analysis. Psychology, 23, 187 - 200.

Kaye, S. A., Folsom, A. R., Prineas, R. J., Potter, J. D., & Gapstur, S. M. (1990). The association of body fat distribution with lifestyle and reproductive factors in a population study of postmenopausal women. International Journal of Obesity, 14, 583 - 591.

Kirschner, M. A. & Samojilik, E. (1991). Sex hormone metabolism in upper and lower body obesity. International Journal of Obesity, 15, 101 - 108.

Lanska, D. J., Lanska, M. J., Hartz, A. J., & Rimm, A. A. (1985). Factors influencing anatomic location of fat tissue in 52 953 women. International Journal of Obesity, 9, 29 - 38.

Larsson, B., Svardsudd, K., Welin, L., Wilhelmsen, L., Bjorntorp, P., & Tibblin, G. (1984). Abdominal adipose tissue distribution, obesity, and risk of cardiovascular disease and death: 13 year follow up of participants in the study of men born in 1913. British Medical Journal, 288, 1401 - 1404.

Leibel, R. L., Edens, N. K., & Fried, S. K. (1989). Physiologic basis for the control of body fat distribution in humans. In R. E. Olsen, E. Beutler, and H. P. Broquist (Eds.), Annual Review of Nutrition, 9, 417 - 443. New York: Annual Reviews INC.

Marti, B., Tuomilehto, J., Saloman, V., Korhonen, H. J., & Pietinen, P. (1991). Body fat distribution in the Finnish population: environmental determinants and predictive power for cardiovascular risk factor levels. Journal of Epidemiology and Community Health, 45, 131 - 137.

Mazur, A. (1986). U. S.. trends in feminine beauty and overadaptation. Journal of Sex Research, 22, (3), 281 - 303.

Morris, D. (1985). Bodywatching. Crown Publishing. New York.

Orbach, S. (1978). Fat is a Feminist Issue. Paddington Press. London.

Radke-Sharpe, N., Whitney-Saltiel, D., & Rodin, J. (1990). Fat distribution as a risk factor for weight and eating concerns. International Journal of Eating Disorders, 9 (1), 27 - 36.

Rebuffe-Scrive, M., Lonnroth, P., Marin, P., Wesslau, C., Bjorntorp, P., & Smith, U. (1987). Regional adipose tissue metabolism in men and postmenopausal women. International Journal of Obesity, 11, 347 - 355.

Silverstein, B., Perdue, L., Peterson, B., Vogel, L., & Fantini, D. A. (1986). Possible causes of the thin standard of bodily attractiveness for women. International Journal of Eating Disorders, 5, (5), 902 - 916.

Silverstein, B., Peterson, B., & Perdue, L. (1986). Some correlates of the thin standard of bodily attractiveness for women. International Journal of Eating Disorders, 5, (5), 895 - 905.

Singh, D. (1993a). Adaptive significance of female physical attractiveness: role of waist to hip ratio. Journal of Personality and Social Psychology, 65, (2), 293 - 307.

Singh, D. (1993b). Body shape and women's attractiveness. Human Nature, 4 (3), 297 - 321.

Staffieri, J. R. (1972). Body build and behavioral expectations in young females. Developmental Psychology, 6, (1), 125 - 127.

Stunkard, A. J., Sorenson, T. & Schulsinger, F. (1983). Use of the Danish adoption register for the study of obesity and thinness. In S. Kety (Ed). The Genetics of Neurological and Psychiatric Disorders. 115 - 120. Raven Press. New York.

Wertheim, E. H., Paxton, S. J., Maude, D., Szmukler, G. I., Gibbons, K., & Hiller, L. (1992). Psychosocial predictors of weight loss behaviors and binge eating in adolescent boys and girls. International Journal of Eating Disorders, 12 (2), 151 - 160.

Zaadstra, B. M., Seidell, J. C., Van Noord, P. A. H., te Velde, E. R., Habbema, J Dik F., Vrieswijk, B., & Karbaat, J. (1993). Fat and female fecundity: prospective study of effect of body fat distribution and conception rates. British Medical Journal, 306, 484 - 487.