
Body Weight, Waist-to-Hip Ratio, Breasts, and Hips: Role in Judgments of Female Attractiveness and Desirability for Relationships

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Morphological features such as overall body fat, body fat distribution, as measured by waist-to-hip ratio, breast size, and hip width have been proposed to influence female attractiveness and desirability. To determine how the variations of these morphological features interact and affect the judgment of female age, attractiveness, and desirability for romantic relationships, two studies were conducted. In Study 1, college-age men rated female figures differing in body weight, waist-to-hip ratio, and breast size for age, attractiveness, health, and desirability for short- and long-term relationships. Female figures with slender bodies, low waist-to-hip ratios, and large breasts were rated as most attractive, feminine looking, healthy, and desirable for casual and long-term romantic relationships. In Study 2, female figures with similar body weight and waist-to-hip ratios but differing hip widths and breast sizes were rated for the same attributes as in Study 1. Female figures with large breasts and narrow hips were rated as most youthful, attractive, and desirable for casual and long-term romantic relationships. It seems that larger body size, a high waist-to-hip ratio, and larger hips make the female figure appear older, unattractive, and less desirable for engaging in romantic relationships. Discussion focuses on the functional significance of interactions among various morphological features in determining female attractiveness.

KEY WORDS: Body weight; Breasts; Casual romantic relationship; Female attractiveness; Female body size; Health; Hips; Long-term relationship; Waist-to-hip ratio.

It has been amply documented that animals do not mate randomly and that sexual ornaments or secondary sexual traits play an important role in mate choice. However, the nature of information conveyed by secondary sexual traits in mate selection has been hotly debated. Darwin (1871) believed that

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mate choice was solely based on arbitrarily chosen features that were aesthetically appealing to the members of opposite sex, although such chosen features did not confer any survival advantage to the animal. Wallace (1889), on the other hand, argued that natural selection would not allow the selection of merely ornamental features "unless the most ornamental always coincide with the 'fittest' in every other respect" (p. 295). (For a historical account, see Cronin 1991.)

The modern interpretation of the utilitarian view of Wallace, or the so-called good gene hypothesis, has commonly been invoked to explain human mate selection (Buss 1987, 1994; Buss and Schmitt 1993; Daly and Wilson 1983; Symons 1979, 1992). Briefly, it is proposed that women, as a rule, can assess the "mate quality" of a man by attending to his resources or high status because these are usually achieved through competition with other members of the social and economical hierarchy. The mate quality of a woman, however, cannot be readily and accurately assessed because of the absence of any direct signals of ovulation or fertility. Men solve this problem by attending to physical attractiveness, because it is assumed that female attractiveness reliably signals mate quality (Symons 1979, 1995). The assumption that only those physical features that signal female reproductive capability are perceived to be attractive and preferred by males has prompted many investigators to examine and speculate upon the role of breasts, buttocks, pelvis (hip) width, overall body fat, and anatomical distribution of body fat as measured by a ratio of circumference of waist-to-hips (WHR) in determining female attractiveness (Anderson 1983; Anderson et al. 1992; Cant 1981; Caro 1987; Caro and Sellen 1990; Fisher 1992; Gallup 1986; Horvath 1979, 1981; Low, Alexander, and Noonan 1987; Morris 1967; Singh 1993a, b; Wiggins, Wiggins, and Conger 1968; Wilson 1989). However, there is no empirical evidence, relating variations in different morphological features to judgments of female attractiveness and desirability for relationships. For example, it is not known whether variations in morphological features such as breasts and pelvis width, which are directly involved in the act of childbearing and nursing, influence the degree of perceived attractiveness, health, and age as much as variations in overall body fat or WHR. Age assessment is assumed to be critical for men to choose females for short-term and long-term relationships. Men are proposed to prefer young nubile females because of their greater reproductive potential for long-term relationships over slightly older females; for short-term relationships, however, the preference is for females who have the highest fertility (present capability for conception and successful birth) or slightly older than nubile females (for detailed theoretical justification, see Buss and Schmitt 1993). Presently, there is no empirical evidence as to which female secondary sex characteristics provide reliable cues about age and hence desirability for short- versus long-term relationships. Two studies were conducted to investigate these issues.

STUDY 1

Overall body fat as inferred from body size, breast size, and buttock size has been most frequently investigated as a determinant of female attractiveness (for

literature review, see Brown and Konner 1987; Jackson 1992). The main justification for such studies is that, historically, humans faced unpredictable cycles of famine and plenty, and therefore females who were able to store surplus energy during the time of plenty were more reproductively successful. The energetic cost of pregnancy and milk production for one year is estimated to be equal to 16 kg of stored fat (Brown and Konner 1987), and hence a female capable of storing needed energy prior to pregnancy would have had more viable offspring than a female who did not. This reasoning was justified by the work of Frisch and her associates (Frisch 1990; Frisch and McArthur 1974), who demonstrated that a critical amount of body fat was essential for females to initiate and maintain the menstrual cycle. In addition, a review of ethnographic data on various preliterate non-Western societies reveals that most societies prefer and are attracted to plumper rather than slimmer women (Brown and Konner 1987; Ford and Beach 1951). Recently, Sobal and Stunkard (1989) found a positive correlation between body weight and female attractiveness in modern non-Western societies. Thus, any marker of stored fat in females, such as larger body, breasts, and buttocks, is assumed to be attractive to males (Anderson et al. 1992, Cant 1981; Low et al. 1987).

However, a large body of research has demonstrated that energy accumulation and expenditure in fat cells depends on their anatomical location (Björntorp 1987; for a review of research evidence, see Singh 1993a). Body fat distribution as measured by the WHR, rather than overall body fat mass, is found to be correlated with the onset of pubertal endocrinological activity (DeRidder et al. 1990) as well as with the probability of successful conception in women participating in an artificial insemination program (Zaasra et al. 1993). Furthermore, WHR is a more accurate predictor for various diseases and sex hormone aberration than either overall body fat or breast and buttock size (Björntorp 1988; Singh 1988a,b). Healthiness of one's mate increases the likelihood that one's offspring would inherit genetic protection from diseases and that the mate would be able to provide high-quality parental care (e.g., Hamilton and Zuk, 1982; Thornhill 1993). Thus, it would seem that WHR should play a more critical role in female attractiveness than overall body weight. It should be pointed out that females with low WHR can have breast sizes ranging from small to large, but so far there is no empirical evidence suggesting any regulatory role of breast size in successful conception or pregnancy outcome. However, unlike other primates, female breasts differ markedly in shape and size, and this fact has lead some investigators to propose that breasts are a sexually selected characteristic and are intimately involved in mate choice (Cant 1981; Morris 1967).

In spite of much speculation regarding the role of female breasts in sexual signaling (Fisher 1992; Gallup 1986; Low 1979; Low et al. 1987), their role in assessment of female attractiveness is not clear. Breast development in human females starts just prior to puberty, and unlike other primates, human females develop enlarged breasts prior to any lactational needs. It would appear, therefore, that relatively small breasts would be indicative of very young, not-yet-nubile

females, whereas large breasts, other things being equal, would be indicative of female reproductive capability.¹ The great economic investment in America in businesses that depend on large breasts to attract customers (e.g., *Playboy* and other so-called girlie magazines, pornography, topless bars, etc.) or on enhancing breast size for women who prefer large breasts (e.g., plastic surgery, specialty bras, etc.) would suggest a cultural consensus that men find large breasts appealing. (Incidentally, there is no corresponding industry for small breasts.)

There is also some empirical evidence suggesting that men prefer large breasts. Gitter et al. (1983) report that American and Israeli male students prefer larger to smaller breasts. Wiggins et al. (1968) found that men who prefer large breasts had a tendency to date more, had masculine interests, and had need for heterosexual contact. Recently, Thompson and Tantleff (1992) found that both male and female students believe that males prefer significantly larger breasts (4.5 out of possible size 5) and associate positive attributes (confidence, popularity) with larger breasts. These researchers also found that females desired breasts larger than their current size.

Obviously, breasts are reacted to in relation to other body parts and overall body shape. Breast size and shape changes caused by pregnancy or old age are not effective sexual signals. Similarly, large breasts on obese women are not judged very attractive (cf. Low 1979). As pointed out by Low, Alexander, and Noonan (1987), the sexual appeal of breast size depends on overall body fat, waist, and slenderness (or lack of it) of arms and legs. Low (1990) predicted that only thin young women with well-endowed breasts would be judged attractive. Taken together, these studies suggest that the effect of breast size on judgment of attractiveness and age estimation may depend on both overall body fat and the size of the WHR.

To investigate this issue, female figure line drawings depicting two levels of breast size (small or large), two categories of body weight (slender or heavy), and two levels of WHR (0.7 or 1.0) were used. The rationale for selecting 1.0 WHR, which is not typical of healthy and fecund females, was to examine the notion that the Western ideal of an attractive female body has undergone a dramatic change within the past century. For example, Garner et al. (1980) reported that during the past 30–40 years *Playboy* centerfolds and Miss America contestants have become thinner and more tubular. Similarly, Morris, Cooper, and Cooper (1989) concluded that British fashion models over the period of 1967–1987 exhibited a “trend toward a more ‘tubular or androgynous’ body shape” (p. 593). A female with a tubular body shape would have no body curves, and 1.0 WHR would approximate the body shape of such a female.

¹ The fact that pregnancy in females induces enlargement of breast size would suggest that the female with large breasts is nonovulating. This indeed would be true if one has observed the female over some period of time when she was not pregnant. However, when viewing a female for the first time it would be impossible to tell from breast size alone if she were pregnant or simply large breasted.

METHOD

Subjects

One hundred one male undergraduate students (mean age = 20.85) participated in this study as part of a requirement for a psychology course. To ascertain the subjects' degree of obesity, body mass index [weight (kg)/height m²; BMI] was calculated for each subject. The mean BMI of subjects was 22.83, *SD* = 3.91. None of these subjects had participated in any previous studies on female body shape or attractiveness.

Stimulus Material

Line drawings of female figures representing the factorial combination of two categories of body weight (slender and heavy), breast size (small and large), and WHR representing typically feminine (0.7) or typically masculine (1.0) ratios were used (Figure 1). The facial features and body posture were identical for all figures. Each figure is identified as heavy (H) or slender (S), feminine WHR (7) or masculine WHR (1), large breasted (LB) or small breasted (SB). For testing, figure order was randomized resulting in the following sequence: H7LB, S1SB, S7LB, H1LB, H1SB, H7SB, S1LB, S7SB. All eight figures were reproduced on a single sheet of white paper so the subjects could examine all figures simultaneously.

Procedure

All subjects were individually tested. Each was given a packet containing a brief description of the research project (to investigate whether body build can influence judgments of health, attractiveness and other attributes, as well as preference for romantic relationships), a page containing the stimulus figures, and a data sheet. After filling out the personal information sheet (age, weight, height, ethnic and religious affiliation), subjects were instructed to examine each figure and rate it on a scale of 0 (least) to 20 (most) for the following variables: attractiveness, healthiness, feminine looking, and kindness and understanding.² Then the subjects were required to rate their willingness to engage in a casual short-term romantic fling and to have a serious long-term romantic relationship on a scale of 0 (least willing) to 20 (very willing). Finally, all subjects were asked to estimate the age of each figure in years. Subjects were instructed to make an educated

² In a within-subject design in which the experimenter does not provide anchors for opposite poles of an attribute (e.g., feminine looking/masculine looking), subjects are forced to use their own criteria for defining attributes, and hence data are likely to be more variable than in studies in which the experimenter specifies anchors. This added variability in a within-subject design without experimenter specified anchors makes various comparisons across conditions less likely to be significantly different.

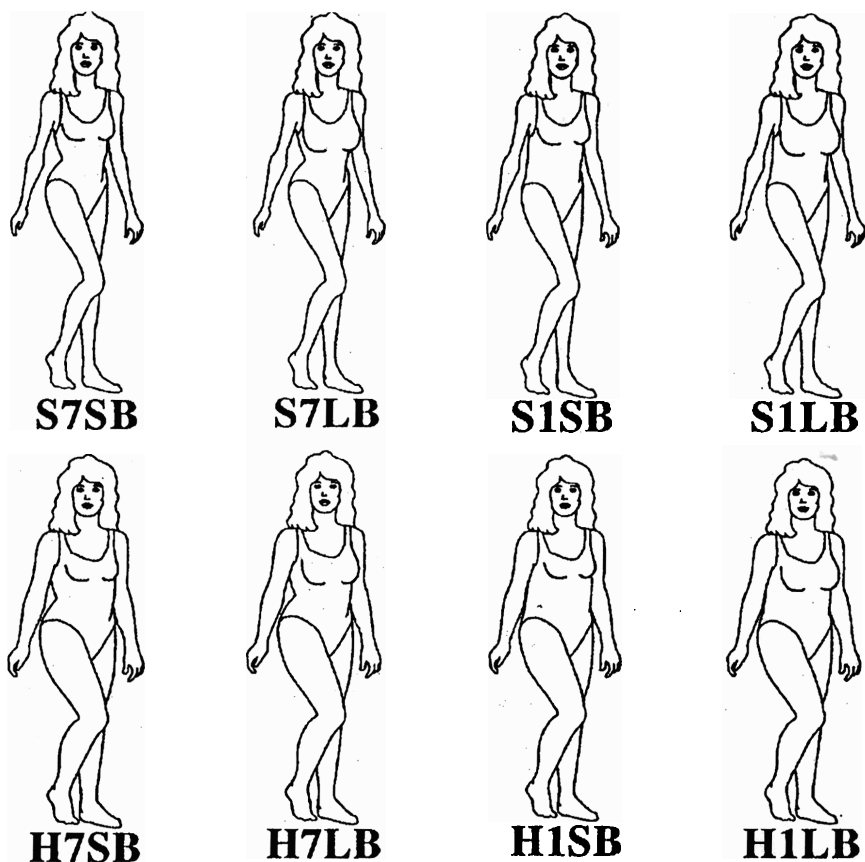


FIGURE 1. Stimulus figures representing two levels of body weight, waist-to-hip ratios (WHR), and breast sizes. Figures are identified as follows: heavy (H), slender (S), feminine WHR (7), masculine WHR (1), large breasts (LB), and small breasts (SB).

guess if they found it difficult to rate any figure for any attribute or relationship, but they were to assign a score to each figure for each attribute and relationship.

Results

It will be recalled that each subject rated eight figures arranged in a 2 (body size) \times 2 (WHR) \times 2 (breast size) factorial design. Each subject was asked to rate figures for personal attributes, two types of relationships, and age. To provide an idea of the strength of the variables manipulated, the ratings for four physical attributes and two types of relationship were summed for each subject and analyzed by use of analysis of variance (ANOVA). The results of the analysis indicated that the main effects of body weight $F(1, 98) = 143.39, p < .001$; WHR, $F(1, 98) = 200.57, p < .001$; breast size, $F(1, 98) = 105.77, p < .001$; as well as the

interactions of body weight \times breast size, $F(1, 98) = 11.37, p < .001$; weight \times WHR, $F(1, 98) = 21.19, p < .001$; and weight \times breast \times WHR, $F(1, 98) = 9.12, p < .003$, were significant. In general, slender figures, unlike the heavier figures, were judged to be attractive, healthy, feminine looking, and desirable for relationships. Subjects judged slender figures with low WHR and large breasts as attractive and healthy and preferred them for *both* short-term and long-term relationships.

As the composite scores do not provide any information about subjects' separate reactions for each physical attribute and relationship, separate ANOVAs were performed on each variable. Table 1 presents individual F -values for each physical attribute and relationship. As evident from Table 1, each of the F -values for the main effects of body weight, WHR, and breast size was significant. Additionally, interactions of body weight and WHR, as well as several interactions between body weight, WHR, and breast size, were also significant. In general, slender figures were rated higher than heavy figures, small WHR were rated higher than large WHR, and large breasts were rated higher than small breasts. With reference to the weight \times WHR interactions, heavy targets with high WHR were judged least attractive and assigned lower ratings on all other variables.

Personal Attributes

It should be recalled that subjects rated each figure for attractiveness, healthiness, feminine looks, and kindness and understanding. Figures with low WHR were rated as more attractive than figures with higher WHR, regardless of their breast size, in both body size categories. Heavy figures, regardless of WHR and breast size, were rated as less attractive than all slender figures. The effect of breast size was dependent on body size. While large breasts did increase attractiveness ratings of slender figures with high WHR over similar figures with small breasts, no such effect was evident for heavy figures; figures with large and small breasts were assigned quite similar low ratings if they had high WHR.

Table 1. Individual ANOVA's F -Values for Rated Variables for Eight Figures

| Rated variable | F-Values | | | | | | |
|-------------------------|-----------------|---------|-----------------|--------------|--------------|--------------|-------------------------|
| | Body weight (W) | WHR (R) | Breast size (B) | W \times R | W \times B | R \times B | W \times R \times B |
| Attractive | 216.92 | 239.26 | 69.67 | 26.36 | 10.63 | ns | ns |
| Healthy | 63.81 | 123.16 | 34.16 | 20.52 | 11.59 | 8.25 | ns |
| Feminine | 132.46 | 230.39 | 74.63 | 26.40 | 8.58 | ns | ns |
| Kindness | 6.74* | 13.13 | 4.05* | 6.84* | ns | ns | ns |
| Age | 183.92 | 28.19 | 16.17 | 7.37 | 31.16 | ns | ns |
| Short-term relationship | 197.38 | 134.46 | 88.20 | 16.30 | 11.49 | ns | ns |
| Long-term relationship | 132.81 | 125.58 | 60.35 | ns | ns | ns | 7.20 |

* $p < .05$; for all other reported F -values, $p < .01$.

$F(1, 99) = 3.94, p = .05$

$F(1, 99) = 6.90, p = .01$

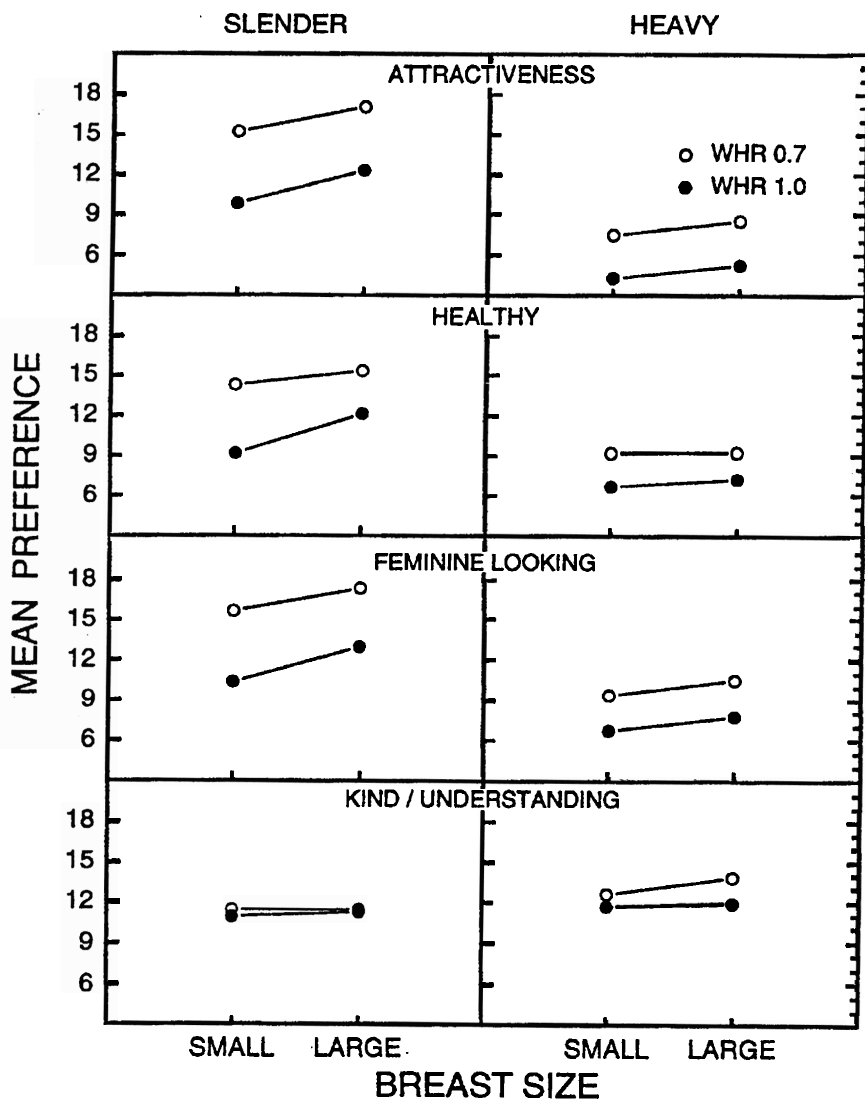


FIGURE 2. Mean rating (out of maximum 20) for stimulus figures for various attributes as a function of body weight, WHR, and breast size.

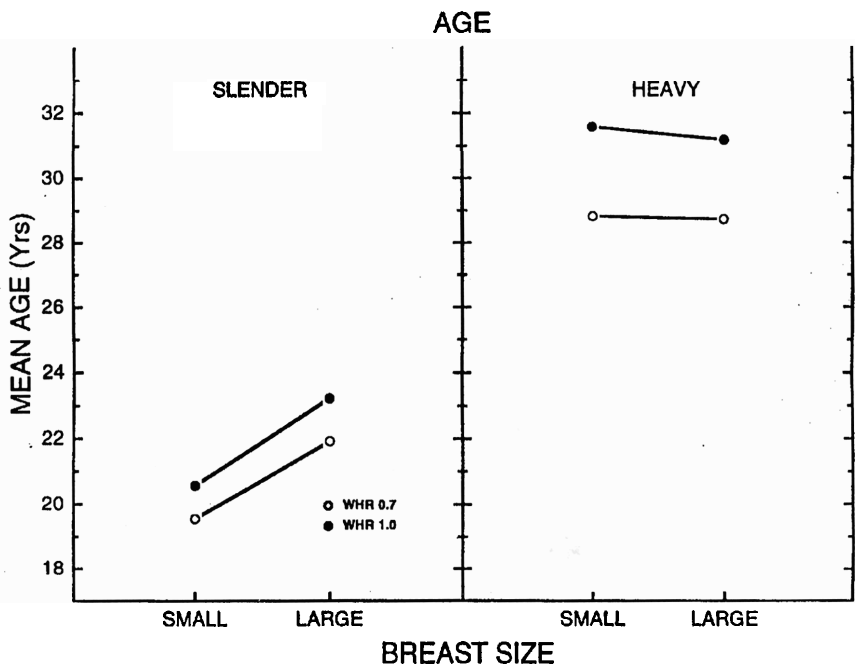
A strikingly similar trend was evident for healthiness and feminine looks (Figure 2). For these two variables, there appears to be a clear preference for slender figures over heavier figures, and large breasts significantly enhance the ratings for slender figures with low WHR compared to figures with high WHR.

As can be seen in Figure 2, all figures with low WHR were rated as healthier and more feminine looking than their respective high-WHR counterparts. Breast size did not significantly affect health ratings for either slender or heavy figures

with low WHR, although slender figures with high WHR and large breasts were rated as healthier than slender figures with the same WHR but small breasts. The effect of WHR was again evident in ratings of feminine looks; figures with lower WHR, whether heavy or slender, were rated as more feminine than figures with high WHR, regardless of their breast size. The figures with low WHR, within heavy and slender body conditions, were rated equally feminine whether they had small or large breasts, although it should be pointed out that heavy figures even with low WHR were not perceived as equally or more feminine than slender figures with high WHR. The ratings of kindness and understanding were affected by body size, WHR, and their interaction. Heavy figures were rated as more kind and understanding than slender figures, regardless of the size of WHR and breasts. The heavy figure with low WHR and large breasts was rated as the most kind and understanding. It should be noted that subjects' own degree of obesity as measured by BMI did not affect ratings of any of these variables.

Finally, age estimations of stimulus figures were significantly affected by body weight, WHR, breast size, and interaction among these variables. Heavy figures, regardless of breast size, were judged to be older than slender figures. Unlike breast size, the size of the WHR did significantly affect the age estimation of heavy figures. Heavy figures with low WHR were judged to be 29 years old, whereas heavy figures with high WHR were perceived to be 31–32 years old (Figure 3). Breast size, however, did affect perceived age of slender figures; for

FIGURE 3. Mean age (years) estimation of stimulus figure.

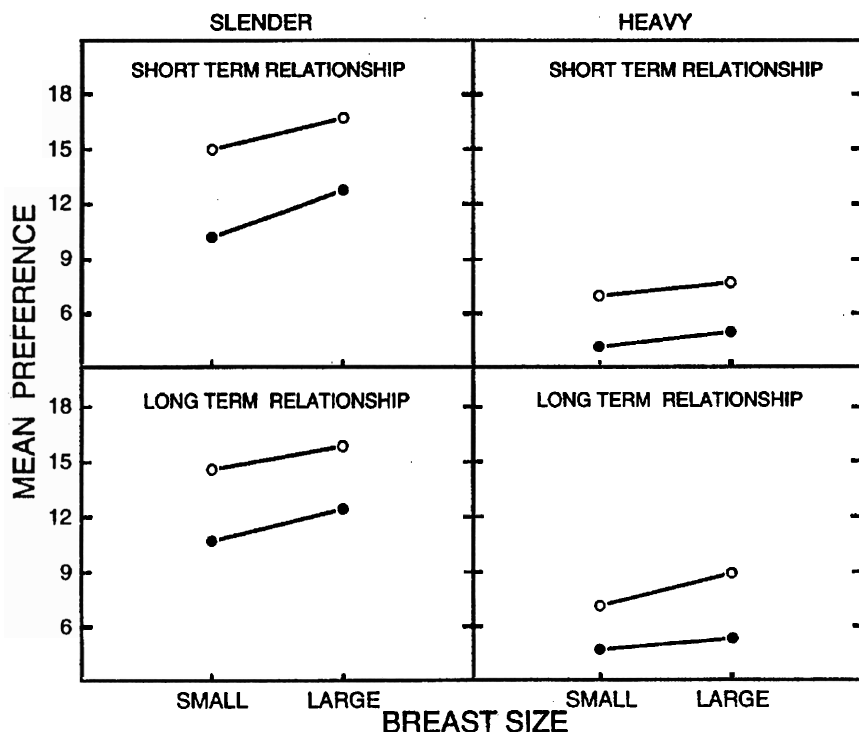


both WHR sizes, larger breasts were associated with higher age than small breasts. The low-WHR slender figure with small breasts was judged 19 years old; if the same figure had larger breasts, it was perceived to be 21 years old.

Desirability for Romantic Relationships

Slender figures were preferred to heavy figures for both short-term and long-term relationships. Figure 4 depicts the stimulus figures preferred for both short-term and long-term relationships. The most preferred figure for a short-term relationship was the slender figure with low WHR and large breasts. While slender figures with high WHR were not preferred for short-term relationships as much as slender figures with low WHR (both small and large breasts), the influence of breast size was evident: Figures with large breasts and high WHR were preferred over figures with high WHR but smaller breasts. Heavy figures, regardless of their breast size, were preferred for a short-term relationship if they had low WHR. A similar effect of body weight and the size of WHR was evident for a desire

FIGURE 4. Mean preference rating (out of maximum of 20) for short-term and long-term relationship of stimulus figures (open circle, WHR = .7; closed circle, WHR = 1.0).



for a long-term relationship. Subjects found figures with low WHR, within each body-size category, more desirable for long-term relationships than figures with high WHR.

In summary, for both short-term and long-term relationships, subjects preferred a slender figure with low WHR and large breasts (perceived to be 21 years old) over a slender figure with low WHR and small breasts (perceived to be 19 years old). Among heavy figures, the figure with low WHR and large breasts (perceived to be 29 years old) was preferred for a long-term relationship over a figure with low WHR but small breasts (also perceived to be 29 years old). It should be pointed out that slender figures with high WHR, whether depicting small or large breasts, were preferred for both short-term and long-term relationships over heavy figures, even those with low WHR and large breasts.

Finally, intercorrelations were computed on summed scores for each variable across the eight figures to examine the nature of the relationships among variables (Table 2). As is evident from Table 2, age was significantly negatively correlated with each variable, except for short-term and long-term relationships. Attractiveness was positively correlated with feminine looks, health, and desirability in both short-term and long-term relationships. The two types of relationships were highly correlated with each other, implying that subjects' decisions about both types of relationships were affected by similar considerations.

Discussion

In general, results show that body, breast, and WHR sizes interactively influence judgment of attractiveness, feminine looks, healthiness, and desirability for a relationship. Previous research that has reported breast size preferences did not vary either body size or WHR of their female figures (Gitter et al. 1983; Thompson and Tantleff 1992). It is clear from the present data that in order to understand the contribution of breast size to the perception of female attractiveness, body size and shape must be taken into account. Consistent with previous research, subjects preferred slender figures over heavier figures, although the notion that slender tubular women are perceived as more attractive was not evident; subjects significantly preferred slender curvaceous figures (low WHR) over slender figures with a tubular shape (high WHR). As predicted by Low (1990),

Table 2. Intercorrelation Matrix for Physical Attributes and Desirability for Relationships for Eight Stimulus Figures Combined

| | Age | Fem looks | Attractive | Healthy | Kind | Casual | Long-term |
|----------------------|-----|-----------|------------|---------|-------|--------|-----------|
| Age | — | -0.30 | -0.20 | -0.29 | -0.22 | -0.04* | -0.08 |
| Feminine looking | — | — | 0.61 | 0.69 | 0.59 | 0.49 | 0.63 |
| Attractive | — | — | — | -0.68 | 0.38 | 0.57 | 0.56 |
| Healthy | — | — | — | — | 0.47 | 0.46 | 0.46 |
| Kind & understanding | — | — | — | — | — | 0.38 | 0.42 |
| Casual relationship | — | — | — | — | — | — | 0.80 |

Note: All correlation significant at $P = .05$ or less except those with asterisks.

the slender figure with large breasts was perceived as more attractive than a slender figure with small breasts. Large breasts did not increase attractiveness of heavy figures, and they were judged as less attractive than slender figures with either large or small breasts. The same was true of WHR: Low WHR increased attractiveness of a slender figure but did not make a heavy figure with low WHR more attractive than a slender figure with high WHR. As a matter of fact, heavy figures with low WHR, whether depicted with small or large breasts, were judged to be less attractive than slender figures with high WHR and small breasts. Low ratings of attractiveness for heavy figures, despite low WHR, have been previously reported (Singh 1993a, b). Other investigators have also reported that overweight figures are neither judged attractive nor preferred for relationships (for literature review, see Jackson 1992). It seems that perceived obesity has greater influence on degree of attractiveness than either breast size or WHR. One possible reason for such a finding could be that heavy figures appear to be older; heavy figures with low WHR were perceived to be 29 years old, compared to 19–21 years of age assigned to slender figures with low WHR.

These findings are puzzling for two reasons. First, a low WHR is an indicator of greater fecundity and healthiness, and therefore it was expected that a heavy figure with low WHR will be judged more attractive and desirable than a slender figure with high WHR. It is difficult to understand how a figure depicting lower fecundity was rated as more attractive and more desirable for romantic relationships than a fecund figure. Second, the cross-cultural data suggest that the majority of non-western societies prefer plump or moderately plump women (Anderson et al. 1992; Brown and Konner 1987; Ford and Beach 1951). As stored body fat, especially distributed in gynoid fashion, enhances a woman's reproductive success, the critical question is why American males do not judge such a woman attractive and find her desirable for a relationship. A trend for preference for slender and thin women over plumper women has been reported for Americans over the past 30–40 years (Garner et al. 1980; Polivy, Garner, and Garfinkel 1986). Anderson et al. (1992) have extensively examined the cross-cultural data on the relationship between female attractiveness and fatness and have offered various socioecological hypotheses for explaining differences in societal attitude towards fatness. One hypothesis suggested by these investigators for preference for thinness in America is that American women enjoy relatively higher socioeconomic status than most non-western societies and, hence, can manage their bodies to adjust timing of reproductive effort in response to changing socioeconomic cues. Smuts (1992) attributes American idealization of thin female body to two ecological novelties: "chronic food surplus and the breakdown of barriers between men's and women's work" (p. 534). These investigators assume that being thin provides an advantage in coping with the current socioeconomic environment in America. Additionally, as suggested by Symons (1995), subjects might have perceived heavy female figures as less attractive because in modern industrialized societies fatter people are less healthy than thinner people. Symons proposes that "in modern industrialized societies males may perceive (presumably by some sort

of specialized association process) fatter females as being less healthy than average-weight females, for any given WHR" (pp. 104–105).

Finally, the findings that attractive figures were judged to be less kind and understanding and yet preferred for short- and long-term relationships needs to be explained. Practically all survey research shows that both men and women rank kindness and understanding as the most desirable attributes in a potential mate (Buss 1994). However, when men and women are asked to assess personal characteristics of photographs of attractive women, they perceive them to be conceited, egotistical, vain, and likely to obtain divorces (Dermer and Thiel 1975). This so-called "dark side of beauty" phenomenon is also evident with female-figure line drawings; attractive female figures with low WHR, while preferred for romantic relations, are perceived to be less kind, less understanding, and more unfaithful than figures judged unattractive (high WHR) by college-aged male U.S. residents, as well as by men and women from Indonesia (Singh and Luis 1995). Female subjects (18–69 years old) also label attractive and desirable male figures as unkind, unfaithful, and less understanding than unattractive figures (Singh, in press, a). It would appear that the order of importance of certain personality characteristics depends on the method of investigation (survey vs. examination of photographs and line drawings). One reason could be that in surveys, subjects may associate attractiveness to attributes in any order, whereas when they are provided examples of attractiveness, the order of importance of certain attributes associated with attractiveness changes.

STUDY 2

This study was conducted to examine the role of wide hips while keeping WHR constant. Two women can have identical WHR in spite of differences in hips or buttocks size; a woman with a comparatively thicker waist but very large hips can have the same WHR as a woman with smaller hips and a very narrow waist. While there are studies demonstrating that women with identical WHR but differing waist and hip size do not have different sex hormone profiles or risks for diseases, large hips have been shown to be preferred in many human societies (Ford and Beach 1951). Brown and Konner (1987) reported that 90% of non-Western preliterate societies prefer women with large or fat hips and legs. The Amhara tribal men of the Horn of Africa call women with thin hips ones with "dog hips" (Messing 1957, as quoted by Brown and Konner 1987). The Annang people of Nigeria believe that large hips reduce the length of labor in childbirth (Brink 1989). Low et al. (1987) have proposed that large hips and buttocks, like large breasts, "evolved in the context of females competing for the attention and parental commitment of powerful, resource-controlling males" (p. 249). Wilson (1989) has reviewed the evidence showing that European women with narrow pelves have greater marital dissatisfaction and a higher divorce rate than women with wider pelves (see also Schlegel 1983). Taken together, these findings suggest that

two women with identical WHR but differing hip size may differ in attractiveness and desirability for romantic relationships. To investigate this issue, figures with identical WHR (0.7) were created by varying the sizes of waist and hips.³ Furthermore, both hip and breast sizes were manipulated to examine the so-called "hourglass" figure. Traditionally, measurements of breasts, waist, and hips are reported for fashion models and beauty contestants, and it could be that figures approximating an hourglass (large breasts and large hips) would be rated as most attractive.

METHOD

Subjects

Two hundred and thirty-three undergraduate students (mean age = 21.55) participated in this study as part of a requirement for a psychology course. The majority of subjects were Caucasian American ($n = 195$) with 11 African-Americans, 18 Mexican-Americans, and 9 Asian-Americans. The mean BMI for subjects was 22.86, $SD = 4.50$. None of these subjects had participated in Study 1.

Stimulus Figures

All female figures were drawn to depict a 0.7 WHR. For large hip conditions, lines representing hip and waist were enlarged, whereas figures with smaller hips were produced by narrowing the waist and hip sizes. One figure from each hip-size category was drawn to depict small breasts, and the other two were drawn to depict larger breasts, thereby creating figures with small breasts and small hips (SBSH), small breasts and large hips (SBLH), large breasts and small hips (LBSH), and large breasts and large hips (LBLH). These figures are shown in Figure 5. To eliminate any potential position effects, four random sequences of figures were used. Each randomized sequence of four figures was reproduced on a single sheet of white paper so that the subjects could examine all figures simultaneously.

Procedure

Each subject was individually tested. As in Study 1, subjects were each given a packet containing the purpose of the study (the cover story), a page containing the four randomly arranged figures, and a data sheet. Again, as in Study 1, subjects were asked to rate each figure on a scale of 0 (least) to 20 (most) for attractiveness, health, feminine looks, kindness and understanding, and desirability

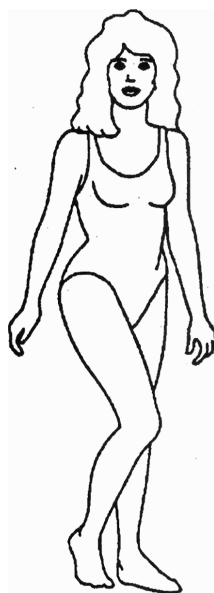
³ Normal weight figure was used for this study as normal weight figure with 0.7 WHR is judged by both young (18–22 years old) and older men (30–85 years) as most attractive and healthy (Singh 1993b).

Small Waists & Hips

WHR = 0.7



Large Breast



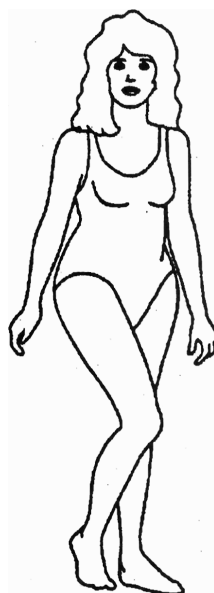
Small Breast

Large Waists & Hips

WHR = 0.7



Large Breast



Small Breast

FIGURE 5. Stimulus figures with identical waist-to-hip ratio (WHR) but differing in hip and breast sizes.

for short-term and long-term relationships. Finally, subjects were asked to estimate the age (in years) of each figure.

Results

The experimental design was a 2 (breast size) \times 2 (hip size) factorial. Analysis of four random sequences of figures failed to find any evidence of sequence of presentation effect. Similarly, the degree of subjects' own obesity as measured by BMI did not significantly affect the ratings. As in Study 1, initial analysis was conducted on all scores for all attributes summed across each stimulus figure. The results of ANOVA revealed a significant effect of hip size, $F(1, 220) = 988.74, p .001$, and breast size, $F(1, 220) = 15.30, p < .001$, but the interaction between these two factors was not significant, $F(1, 220) = .02, ns$. Individual ANOVAs were then performed on each of the rated variables. The F -values from these analyses are shown in Table 3. Figures with a narrow waist and small hips were rated higher than figures with a large waist and large hips. Figures with large breasts and small hips were generally rated higher than the other figures.

Personal Attributes

Attractiveness ratings were significantly affected by hip and breast sizes. Figures with large breasts and small hips (LBSH) were rated as significantly more attractive than figures with small breasts and small hips (SBSH). Both figures with large hips (LBLH and SBLH) were rated as equally unattractive compared to figures with small hips. Health ratings were affected by hip size but not by breast size. Subjects rated all small-hipped figures as equally healthy, and significantly more healthy than figures with large hips. Ratings of feminine looks were significantly affected by hip size as well as by breast size; figure SBSH was rated as more feminine looking than its corresponding figures with small breasts (SBSH), although this figure was rated as more feminine looking than both figures with large hips. Both figures with large hips were rated as not very feminine looking regardless of their breast size. Finally, ratings of kindness and understanding were not affected by either hip or breast size, although a hip size \times breast size interac-

Table 3. Individual ANOVA's F -Values for Rated Variables for Four Figures

| Rated variable | F -Values | | |
|-------------------------|-------------|---------|--------------|
| | Hips | Breasts | B \times H |
| Attractiveness | 1062.26 | 13.49 | ns |
| Healthiness | 551.78 | ns | ns |
| Femininity | 628.83 | 39.12 | ns |
| Kindness | ns | ns | 24.62 |
| Age | 401.82 | 71.56 | ns |
| Short-term relationship | 853.85 | 17.63 | ns |
| Long-term relationship | 702.39 | ns | ns |

All reported F -values, $p < .01$
 $F(1, 220) = 6.50, p = .01$

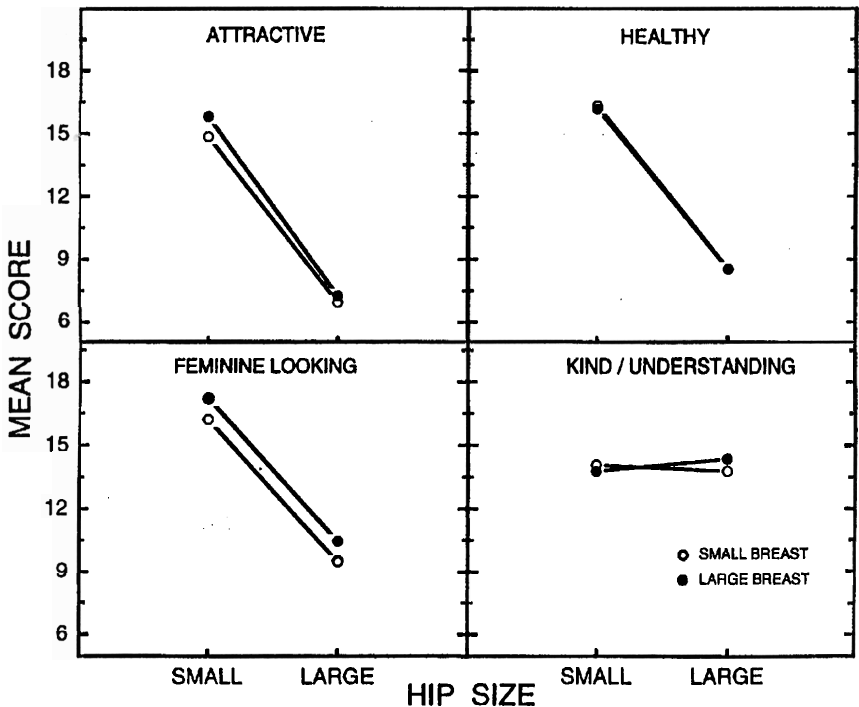


FIGURE 6. Mean rating (out of a maximum of 20) for stimulus figures for personal attributes as a function of hip and breast size.

tion was significant. The figure with large hips and breasts (LBLH) was rated as kinder and more understanding than figures with large hips and smaller breasts. Figure 6 depicts the effect of hip and breast sizes for all four personal attributes. It can be seen that large breasts enhance attractiveness and feminine looks only if the figure has small hips. Large hips, regardless of breast size, were associated with lower attractiveness, and lower ratings for feminine looks and healthiness.

The estimated age of stimulus figures was significantly affected by hip and breast sizes. Both large hips and large breasts made female figures appear older (Figure 7). The large-breasted figure with small hips (LSBH) was judged older (22 years) than the small-breasted figure with small hips (SBSH) (20 years). Hip size appears to be indicative of an older age, as the figure with both large hips and large breasts (LBLH) was perceived to be 31 years old, compared to the similar figure with small breasts (SBLH), which was estimated to be 29 years old.

Desirability for Romantic Relationship

Hip size affected a figure's desirability for both short-term and long-term relationships. Figures with large hips, SBLH and LBLH, were rated equally undesir-

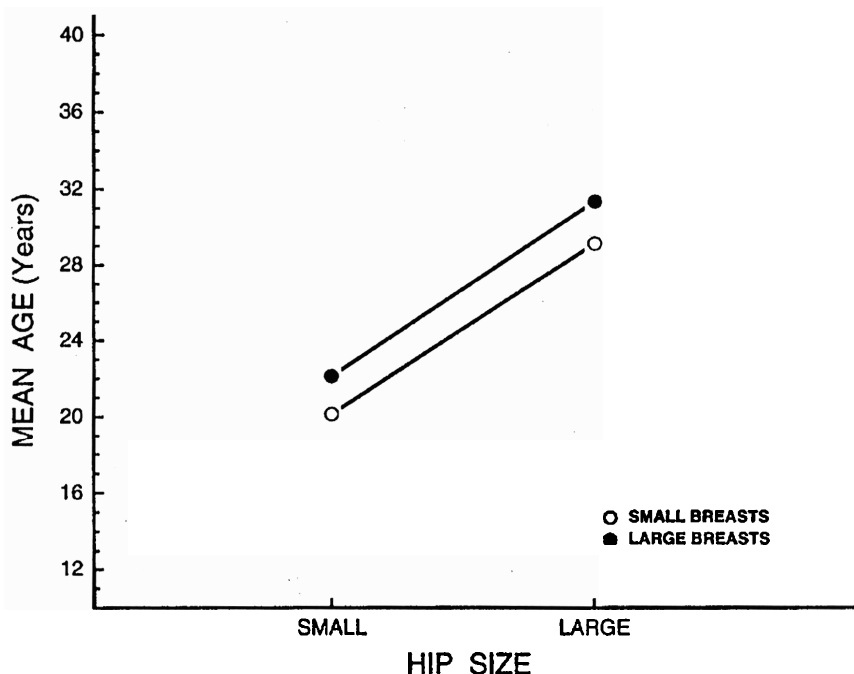


FIGURE 7. Mean age (years) estimation of stimulus figures.

able for both short- and long-term relationships compared to figures with small hips. As previously noted, large hips reduced attractiveness and made the figure look older. These two factors together apparently reduced the desirability of figures with large hips, regardless of breast size. Preference for small hips and large breasts, as opposed to small breasts and small hips, was significant for short-term relationships ($t = 4.16$, $df = 231$, $p < .001$). Subjects significantly preferred large-breasted female figures with small hips (SBSH) more than any other figure for short-term relationships. However, for long-term relationships, figures with small hips with either small or large breasts were equally preferred, and figures with large hips, regardless of their breast size, were least preferred (Figure 8).

Finally, the relationships among various personal variables and desirability for short-term and long-term relationships were strikingly similar to those reported for Study 1. The correlation coefficients for each variable, summed across all four figures, are shown in Table 4. Again as found in Study 1, ratings for health and attractiveness were highly and positively correlated. Attractiveness was positively correlated with all personal attributes as well as with desirability for both short-term and long-term relationships. Consistent with the findings of Study 1, short-term and long-term relationships were highly and positively correlated, suggesting that subjects were using quite similar criteria for determining desirability for both types of relationships.

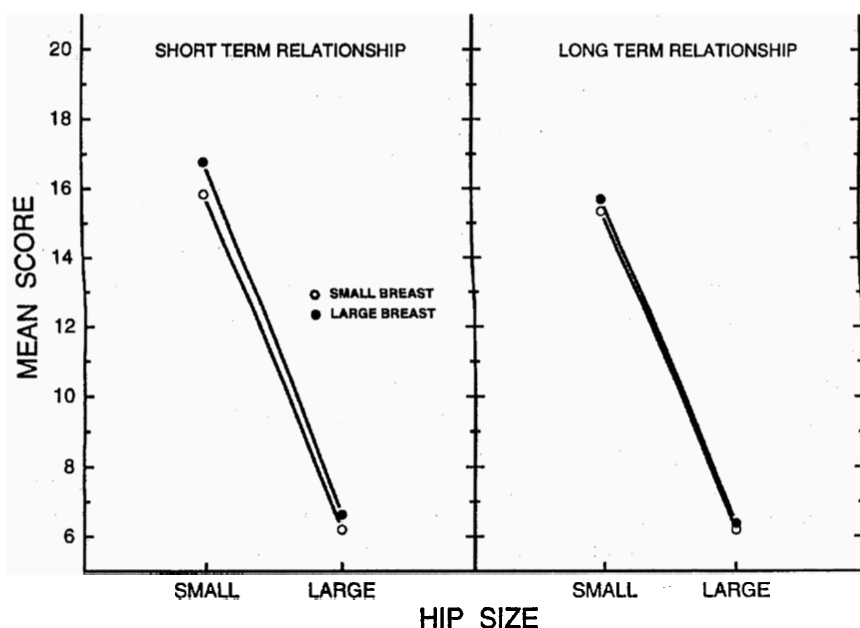


FIGURE 8. Mean preference rating (out of maximum of 20) for short-term and long-term relationship of stimulus figures.

Discussion

Subjects clearly did not find figures with large hips attractive, healthy, or feminine looking even when figures had large breasts and a gynoid body shape. Size of breasts did enhance attractiveness, but only if the figure had small hips. The figure with large breasts and small hips was judged more attractive and feminine looking than other figures. This figure was also preferred for short-term relationships, although for long-term relationships both figures with small hips were approximately equally preferred. While breast size did not affect the rating of healthiness of figures, breast size did affect perceived age. Figures with small

Table 4. Intercorrelation Matrix for Physical Attributes and Desirability for Relationships for Four Stimulus Figures Combined

| | Age | Fem looks | Attractive | Healthy | Kind | Casual | Long-term |
|----------------------|-----|-----------|------------|---------|--------|--------|-----------|
| Age | — | -0.11* | -0.14* | -0.10* | -0.03* | -0.06* | -0.02* |
| Feminine looking | — | — | 0.61 | 0.73 | 0.55 | 0.55 | 0.50 |
| Attractive | — | — | — | 0.74 | 0.38 | 0.57 | 0.61 |
| Healthy | — | — | — | — | 0.51 | 0.61 | 0.62 |
| Kind & understanding | — | — | — | — | — | 0.38 | 0.45 |
| Casual relationship | — | — | — | — | — | — | 0.71 |

Note: All correlation significant at $p .05$ or less except those with asterisks.

breasts and small hips were judged to be 20 years old, and large-breasted figures with small hips to be 22 years old. Figures with large breasts and large hips were judged about two years older (31 years) than figures with large hips and small breasts (29 years).

Thus, it appears that large hips and large breasts make the figures appear to be older than small-breasted figures with small hips. However, it should be noted that whereas large hips make the figure look 8–10 years older, large breasts add only 2–3 years to the perceived age of the figure. It would therefore appear that enlargement of the breasts may not be perceived as negatively in youth-oriented societies as increases in overall body weight and hip size may be perceived. This inference is consistent with the fact that attempts to make breasts large, either with the help of clothing or plastic surgery, are more prevalent in America than attempts to appear fatter and larger hipped.

Finally, as found in Study 1, subjects preferred the same figures for both short- and long-term relationships. It was expected that the younger looking figure (small breast with small hips who were judged to be 20 years old) would be preferred for long-term relationships. However, subjects equally preferred 20 year olds and 22 year olds for long-term relationships, but 22 year olds were judged most desirable for short-term relationships.

GENERAL DISCUSSION

Taken together, findings from the two studies show that large-breasted figures with low WHR are judged as highly attractive, feminine looking, and healthy, and are preferred for both short- and long-term relationships provided that such figures are slender and do not have large hips. Perceived age is more significantly affected by overall body size and largeness of hips than breast size: both being heavy or having large hips makes figures appear 8–10 years older, but large breasts make the figure look only 2–3 years older.

Obviously, breasts differ on many parameters other than size, such as shape and symmetry. We did not explore the role of these parameters on attractiveness, although it should be pointed out that most empirical research on the relationship between breast and attractiveness has explored only breast size (Furnham, Hester, and Weir 1990; Thompson and Tantleff 1992). Recently, Møller, Soler, and Thornhill (in press) have reported a negative relationship between the degree of breast asymmetry and number of children. Also, breast asymmetry in line drawings of female figures makes them look 2–3 years older and reduces their attractiveness more than comparable figures with symmetrical breasts (Singh, in press, b).

In our investigation of hip size, we did not explore the role of buttock size. Steatopygia in some Africans was noted by Darwin (1871), who reported that steatopygic women were preferred by men of those tribes. Cross-cultural studies indicate that men prefer women with wider hips (cf. Ford and Beach 1951; Frayser 1985). In the late 1800s and early 1920s European women also sought to enlarge

their buttocks with various devices and clothing (Rudofsky 1974). Our data indicate that young American males judge female figures with narrower hips and smaller waists to be most attractive, healthy, and desirable. Moreover, the attractiveness increases if they also have large breasts. Figures with wide hips are estimated to be significantly older than slender figures. Thus, being overweight and having large hips can make a figure look considerably older.

The impact of being overweight on judgments of attractiveness was strongly negative as subjects rated heavy figures with low WHR as less attractive and desirable for relationships than slender figures with high WHR. Could it be that fatness is such a powerful cue for old age that it overshadows other indices of health and fertility? There is some evidence showing that women become fatter as they grow older because of sex-hormone changes (Kirchengast 1993a, b). Post-menopausal women are reported to have greater body weight, larger chest, waist, and hip girths than pre-menopausal women, and these girth measurements are negatively correlated with estrogen, gonadotrophin, prolactin, and sex-hormone binding globulin levels. Although Kirchengast (1993a, b) did not systematically explore the effect of increasing age in fertile pre-menopausal women, there could be a progressive change in these anthropometric traits as women age. There is also some evidence that American women, both black and white, gain approximately 2–3 kg weight and develop higher WHR than primiparas women of comparable age and body weight after adjusting for physical activity level and caloric intake (Smith et al. 1994). If the argument that being overweight is indeed indicative of lower sex hormones, parity, or being older, men should not judge overweight women as attractive as normal weight women. Indeed, when African-American males and females (reported to prefer fatter women) and recently immigrated Indonesian males and females are asked to judge female line drawings representing underweight (labeled slender figures in the Study 1), normal weight, and overweight figures (labeled as heavy figures in Study 1), they all judge normal weight figures as most attractive, followed by underweight, and then overweight figures (Singh and Luis 1995). Similar judgments of attractiveness for these body weight categories are found when Caucasian men and women (age range 18–85 years old), are required to judge female figures (Singh 1993b). Uneducated landless laborers from India also preferred normal weight figures with low WHR, although unlike Americans and Indonesians, overweight figures with low WHR are judged to be second most attractive rather than underweight figures with low WHR (Singh n.d.).

It has been argued that reported preference for plumper women in non-Western developing countries may be more due to its association with status or affluence than due to physical attractiveness (Singh and Luis 1995). In countries where poverty or frequent food shortage is common, fatness may be admired because fat people symbolize economic success, power, and social status. For example, Brink (1989) reports that the function of fattening rooms for girls in Nigerian tribes is to show family status and wealth, and most of the people do not stay in the fattening room long enough to get fat.

The lack of any standardized definitions of what constitutes obesity, thinness, or plumpness makes it difficult to make any meaningful inference from the cross-cultural data about the relationship between fatness and attractiveness. Given the rarity of obesity in non-Western preliterate societies, which constitute practically all the data contained in Human Relation Area Files (HRAF), it is quite possible that some of these societies do not have any term for obesity or that they classify people only as thin or not thin. For example, the Tupinamba of Brazil do not have a term for obesity, but they do have one for thinness (Evereux 1864, referenced in Brown and Konner 1987). In such a society health and attractiveness may be associated with "not being thin" rather than being plump or obese. It is therefore difficult to estimate the number of societies that actually find plumpness or obesity attractive. In addition, there are no data showing that societies that find obesity attractive find all fat women attractive versus finding attractive only those fat women who have fatness distributed in gynoid fashion. Brown and Konner (1987) report that 90% of the societies idealized women with "desirable subcutaneous fat deposits" on hips and legs. As pointed out by Low (1990), socioecological differences should affect the idea of what is considered attractive, but the core cues signaling high reproductive values of a woman should be universal.

The gynoid body fat distribution, as indexed by low WHR, may be one of the core cues. Waist size appears to be a more reliable indicator of change in sex-hormone level than other anthropometric measures (cf. Björntorp 1988). For example, post-menopausal women using estrogen replacement have lower waist girth than women who do not take such medication, although the corresponding hip-size changes have not been reported (Haarbo et al. 1991). This may also explain why a small increase in waist size in photographs of women's lower torsos significantly decreases their attractiveness and make them appear to be overweight (Singh 1994). The positive relationship between small waist and attractiveness can also explain attempts of European women to reduce waist size with surgical removal of lower ribs (Morris 1985) and with corsets and wide belts (Posnick 1991; Rudofsky 1974).

Additionally, waist size is significantly correlated with many major diseases such as cardiovascular disorders, diabetes, and gallbladder problems. If health is one of the essential features of attractiveness (Hamilton and Zuk 1982; Symons 1979; Thornhill 1993), people should pay close attention to waist size as an indicator of risk for diseases and to assess hormonal status. The high positive correlation between attractiveness and healthiness supports the belief that health may be a defining feature of attractiveness. The health status of a woman would be important to men whether seeking a casual or a serious relationship (cf. Buss and Schmitt 1993). It could be that in those situations where the health of a potential mate must be evaluated at a glance such as for extra-pair copulation (cf. Hamilton 1990), a distal and orientation-independent cue such as the WHR plays an important role in initial attraction. One of the costs of extra-pair copulation is the risk of violence by jealous husbands or mates (Daly and Wilson 1988). If one could evaluate reproductive status (including whether the woman is al-

ready pregnant) and health of a woman with minimum investment of time and effort, it may justify the cost associated with extra-pair copulation.

Obviously, female attractiveness depends on many variables other than WHR, breast size, and body weight, such as facial features (Johnston and Franklin 1993), degree of fluctuating asymmetry (Thornhill 1993; Thornhill and Gangestad 1993), and skin color and complexion (Symons 1979). The critical question is whether these various features provide redundant, independent, or overlapping information about the mate quality of a female. Symons (1995) proposes that various morphological features make independent but additive contributions to the assessment of a female mate quality as some of these features provide information about reproductive potential (nubility), whereas others provide information about health and design quality. However, it is not known how these features interact with each other or whether enhancement in one feature can compensate for deficiencies in other features. The present study represents a preliminary attempt to explore this issue by examining a limited range of variations in breast size, body weight, and WHR. In a previous study, variations in breast asymmetry and WHR and their interactions were examined using similar female figure line drawings (Singh, in press, b). Line drawings provide limited and impoverished visual information, and therefore the use of actual photographs in which morphological features are systematically altered may provide more valid information about the role and interaction of various features determining female attractiveness.

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