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A Critical Test of the Waist-to-Hip Ratio Hypothesis of Women's Physical Attractiveness in Britain and Greece

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Body mass index (BMI) and body shape as measured by the waist-to-hip ratio (WHR) have been reported to be the major cues to women's bodily attractiveness. The relative importance of each of these cues was examined cross-culturally in two distinct countries, Greece and Britain. Fifty Britons, 25 British-Greeks, and 25 participants in Greece were asked to rate a set of images of real women with known BMI and WHR. The results showed that, regardless of the cultural setting, BMI is the primary determinant of women's physical attractiveness, whereas WHR emerged as a significant predictor for the Greek groups but not the British group. This finding is discussed in terms of the different gender roles occupied by Britons and Greeks. The discussion critically evaluates evolutionary psychological and sociocultural explanations of preferences for body weight.

KEY WORDS: physical attractiveness; body mass index; waist-to-hip ratio; gender roles.

Investigators within the field of evolutionary psychology have argued that there exist universally shared criteria of attractiveness, which are potent cues to a person's potential reproductive success (Buss, 1994, 1999; Buss & Schmitt, 1993). Within this paradigm, men and women are believed to select partners who will enhance their reproductive success, and there has been a concurrent emphasis on the attractiveness of salient morphological features. The latter are said to signal that one individual is more "desirable" than another (Buss, 1994, 1999). In women, two potentially critical cues are body shape, as measured by the ratio of the circumference of the waist to the circumference of the hips (the waist-to-hip ratio, or WHR), and weight scaled for height, also known as the body mass index (BMI).

Although overall body weight is the most noticeable change caused by pubertal onset in women, much of the research in this field has focussed on the WHR. Singh (2002) argued that a low WHR (i.e., a curvaceous body) corresponds to the optimal fat distribution for high fertility and health, and so this shape should be highly attractive. According to Singh, to overcome the problem of identifying healthy and fertile women, men use "perceptual mechanisms" to detect and use information conveyed by the WHR in determining a woman's attractiveness as a potential mate. Because of this, it is possible systematically to change men's evaluations of women's attractiveness by manipulating the size of the WHR alone. Singh used a set of line drawings of the female figure and found a negative correlation between WHR and women's attractiveness; line drawings with gynoid WHRs (typically 0.7, which corresponds to the optimum WHR for health and fertility) were judged by participants as the most attractive. This led Singh (1993, p. 304) to argue that the WHR acts as a "wide first-pass filter, which would automatically exclude women who are unhealthy or who have low reproductive capacity." It is only after this "culturally invariant" filter is passed that other features such as the face, skin, or weight (preference for which may

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vary between cultures) become utilised in final mate selection.

However, Singh's line-drawn figures suffer from a serious methodological flaw. The figures are arranged in three series: underweight, average, and overweight. Within each series, the WHR is varied by altering the torso width around the waist. The problem with this approach is that when the figures are modified by altering the width of the torso around the waist, this alters not only the WHR, but also the apparent body weight. As the value of the WHR rises, so does that of the apparent body weight, and so it is not possible to say whether changes in attractiveness ratings are made on the basis of WHR or body weight, or both (Tovée & Cornelissen, 1999; Tovée, Maisey, Emery, & Cornelissen, 1999). This problem is also found in studies that used edited photographic images of women, where their WHR had been artificially altered by thickening or narrowing their torsos (Henss, 2000). However, to get around this problem, it is possible to ask observers to estimate the body weight of each image, and thus to control for this co-variation. Studies that used this approach have shown that WHR does play a role in attractiveness judgments, but the results do not dispute that WHR only predicts preference when the effect of weight is removed (Henss, 2000; Streeter & McBurney, 2003).

Furthermore, studies that used modified line drawings to test the degree to which various body shape characteristics influence women's ratings of attractiveness of female figures have shown that participants preferred figures that had WHRs around 0.7, but that as body size increased, larger WHRs tended to be preferred (Forestell, Humphrey, & Stewart, 2004). Figures with small and medium waists and hips were generally preferred regardless of body weight, but figures with large hips were preferred less regardless of other shape characteristics, which fits nicely with reports that women are particularly self-conscious about the distribution of fat on their thighs and buttocks (Radke-Sharpe, Whitney-Saltiel, & Rodin, 1990). In addition, when photographs of women with WHR manipulated either by hip or waist changes are used, attractiveness seems to be more influenced by changes in waist than hip size (Rozmus-Wrzesinska & Pawłowski, 2005). It seems likely, therefore, that body weight, waist size, and hip size all interact to influence women's ratings of attractiveness of other female figures (Harrison, 2003).

A further problem with most line drawing studies is that they typically do not use WHRs below 0.7 (Tassinary & Hansen, 1998). It is possible, therefore, that men might prefer even lower WHRs, but are constrained to select the predicted value of 0.7 by the absence of these body shapes. To investigate this possibility, Heaney (2000) conducted a study with line drawings based on Singh's original stimuli, but manipulated the waist to include figures with WHRs as low as 0.5. The overwhelming preference of male participants was for figures in the "normal" weight range with a WHR of 0.5. Given that WHRs of 0.5 and 0.6 are not normally attainable, evolutionary explanations must struggle to account for this seemingly non-adaptive preference. One potential explanation is that this task may tap into a generic psychological mechanism for enhanced responding to exaggerated features, or "supernormal" stimuli (Gray, Heaney, & Fairhall, 2003); this explanation would not require any evolved psychological mechanism for adaptive mate selection.

These studies all point to the fact that WHR is a weak predictor of women's physical attractiveness. When images of real women (Tovée et al., 1999; Tovée, Mason, Emery, McCluskey, & Cohen-Tovée, 1997; Tovée, Reinhardt, Emery, & Cornelissen, 1998), computer-generated photographic stimuli (Puhl & Boland, 2001), and three-dimensional images (Fan, Liu, Wu, & Dai, 2004) are used as stimuli, body weight as measured by BMI appears to be a far more important factor than WHR in judgments of women's physical attractiveness. The finding that BMI may be the primary determinant of women's attractiveness is consistent with the fact that successful female fashion and glamour models all fall within a narrow BMI range (Tovée et al., 1997). It is well established that changes in BMI also have a strong impact on health (Manson et al., 1995; Willet et al., 1995) and reproductive potential (Frisch, 1988; Lake, Power, & Cole, 1997; Reid & Van Vugt, 1987), and so a mate choice strategy based on BMI also favours reproductive success.

If judgments of attractiveness are an innate preference, as evolutionary psychological explanations suggest, then it might be expected that these preferences should be consistent across cultures. Many studies of observers from industrialised societies show similarities in their preferences, especially with regard to a low WHR (e.g., Furnham, McClelland, & Omer, 2003; Furnham, Moutafi, & Baguma, 2002; Henss, 2000; Markey, Tinsley, Ericksen, Ozer, & Markey, 2002; Singh, 2002). However, other cross-cultural studies, particularly those that have included observers from rural or non-industrialised cultures, have shown apparent differences in the preferences

expressed by people in different cultures across the world (e.g., Furnham & Alibhai, 1983; Furnham & Baguma, 1994; Marlowe & Wetsman, 2001; Wetsman & Marlowe, 1999; Yu & Shepard, 1998). Swami and Tovée (2005), for example, showed that preferences for different body weights in Malaysia and Britain varied with socioeconomic status and that body shape played a relatively minor role. The authors concluded that perception of physical attractiveness was linked less with innate psychological mechanisms or ethnicity than with socioeconomic development and modernity.

The work of Hofstede (1980, 1998) is relevant here. He argued that, although an individual can have both masculine and feminine traits, a country's culture is either masculine or feminine. "Masculinity stands for a society in which men are supposed to be assertive, tough, and focused on material success; women are supposed to be more modest, tender, and concerned with the quality of life. The opposite pole, femininity stands for a society in which both men and women are supposed to be modest, tender, and concerned with the quality of life" (Hofstede, 1998, pp. 6–7).

Hofstede (1980) developed a "masculinity index" for many of the world's countries, based on his analysis of work goals of employees of a large multinational company with offices in 40 different countries. This provides one possible way of classifying differences found between different national cultures in terms of preference for body shape. In the present study, therefore, we examined cultural differences in preference for body shape between two countries that score differentially on Hofstede's (1980) Masculinity-Feminity dimension (MAS), which provides a measure of gender role stereotyping. The two countries were Britain (a rich, less gender role stereotyped European country) and Greece (a poorer, more gender role stereotyped European country). When measured on the MAS, Britain scored 9, which indicates a culture with minimised gender roles and more women in professional jobs, whereas Greece scored 31, which indicates a culture where gender roles are differentiated and fewer women are in professional jobs. As an extension, we also looked at Greek residents in Britain, who form a relatively close-knit community that maintains traditional values and practises. We expected that Greeks and British-Greeks would show greater similarities with one another than with Britons. If such similarities were found, it would illuminate the way sociocultural factors might affect selection for mating preferences and challenge evolutionary psychological explanations of such preferences.

METHOD

Participants

The participants in this study were recruited from two countries, Britain and Greece. All participants were men. The first group consisted of a convenience sample of 50 British university students (mean age = 24.66, $SD = 6.10$). The second group consisted of 25 Greek university students who have always been residents in Britain (mean age = 20.12, $SD = 1.67$), but who maintain Greek culture and traditions. For example, all participants in this group retained close contact with the extended family, where traditional values are upheld. The third group consisted of 25 Greek university students resident in Athens (mean age = 20.04, $SD = 1.57$). The British group is slightly older, $F(2, 99) = 13.05$, $p < .05$, but a previous study of British observers has shown that age appears to have no significant impact on the attractiveness judgments of observers (George, Cornelissen, & Tovée, in press).

Materials

Participants in each group were asked to rate black and white images of 50 real women in front view. To generate the images, consenting women were videoed standing in a set pose at a standard distance, wearing tight grey leotards and leggings. Images were then frame-grabbed and stored as 24-bit images (see Tovée, Hancock, Mahmoudi, Singleton, & Cornelissen, 2002, for an example). The use of high-resolution photographic images is more realistic than the line drawings used in previous studies, but it should be noted that a two-dimensional image is unlikely to capture all the visual cues available from a three-dimensional image seen from the same viewing point (DeSoto & Kopp, 2003). However, a recent study that compared the ratings of two-dimensional photographs with ratings of movie clips of the same bodies rotated through 360° showed no differences (Smith, Cornelissen, & Tovée, 2005), which suggests that two-dimensional photographs can capture much of the visual information available in three-dimensional images.

The heads of the women in the images were obscured so that they could not be identified and so that facial attractiveness would not be a factor in participants' ratings. For the stimulus set of this experiment, 10 images of women were drawn from each of the five BMI categories (Bray, 1998): emaciated (below 15 kg/m^2), underweight (15–18.5 kg/m^2), average (18.5–24.9 kg/m^2), overweight (25.0–29.9 kg/m^2), and obese (over 30 kg/m^2). The range of BMI values was 11.6–41.2. The women in our study varied in WHR from 0.68 and 0.98; the ranges of BMI and WHR values represented the widest range that we have available. In a previous study, Tovée et al. (1999) examined the effect of varying the relative ranges of BMI and WHR for images in front view, and found that BMI remained the primary predictor even when the range of BMI was very narrow relative to the WHR range.

The images of women were printed on sheets of A4 paper (210 mm × 297 mm), so that each image covered the entire page. Participants were presented with a booklet to record their ratings; the first page consisted of brief instructions and an example of a rating, and the final page requested participants' demographic details (age, gender, ethnicity, weight, and height). Other pages in the booklet provided a 9-point Likert scale, which appeared below the question 'How beautiful is the person in the photograph?' and on which participants were asked to record their ratings.

Procedure

All participants were tested individually, and the only difference in procedure between the different settings was the language used. The questionnaire was in English for both groups in Britain, and it was translated into Greek for the Greek sample. Within the image set, individual images were presented in a randomised order, and participants were presented with the entire set twice. In the first run through, participants were asked to state verbally if the woman depicted was pregnant or not. This was done to make participants aware of the range of variability of body features represented in the images and to encourage participants to use the whole set of attractiveness ratings from 1 (*least attractive*) to 9 (*most attractive*). Participants were only asked to rate the images according to the leading question on the second run through. The entire procedure took approximately 40 min to complete.

RESULTS

To check that the observers in each group were rating the images in the same way, we carried out an intra-class reliability measure on each group. Using the Shrout–Fleiss intra-class reliability for k means, we found a high degree of agreement in all the observer groups (Shrout & Fleiss, 1979): for the British observers it was 0.99, for the British-Greek observers it was 0.97, and for the Greek observers it was 0.98.

A multiple polynomial regression was used to model the contributions of BMI and WHR to the attractiveness ratings. Figure 1 shows plots of attractiveness ratings as a function of BMI for all three groups, and all sets were significantly explained by BMI ($p < .001$ in all cases). It is clear from these figures that the relationship between BMI and attractiveness is non-linear. That is, increases or decreases in BMI at either side of the peak of the curve reduce the attractiveness rating. Figure 2 shows the corresponding relationship between attractiveness and WHR, and both Greek sets were significantly explained by WHR ($p < .01$). By contrast, there was no significant effect of WHR for the British group ($p > .05$). This suggests that the WHR does have an effect on attractiveness ratings for Greek participants, but not for Britons.

There are a large number of non-linear functions that could be used to model these data. Following Tovée et al. (1999), we chose the simplest approach possible, which was to include second- and third-order terms in a multiple regression model (see Altman, 1991), to estimate the variance of attractiveness ratings explained by BMI and WHR. There appears to be little justification in the psychological literature for fitting a more complex function. The model, run separately for the different groups, was:

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e,$$

where y is the attractiveness rating, a the intercept, x_1 the WHR, x_2 the BMI, x_3 the BMI^2, x_4 the BMI^3, and e is random error.

The total variance explained by this model for the relationship between BMI and attractiveness ratings (between 70.3 and 73.3%) is shown in Table I, and is dramatically different from the effect sizes for the relationship between WHR and attractiveness ratings (between 7.1 and 23.3%). Although the latter relationship was significant in most cases, it is noticeable that BMI accounted for approximately five times more variance than WHR did, which suggests that BMI is a considerably stronger

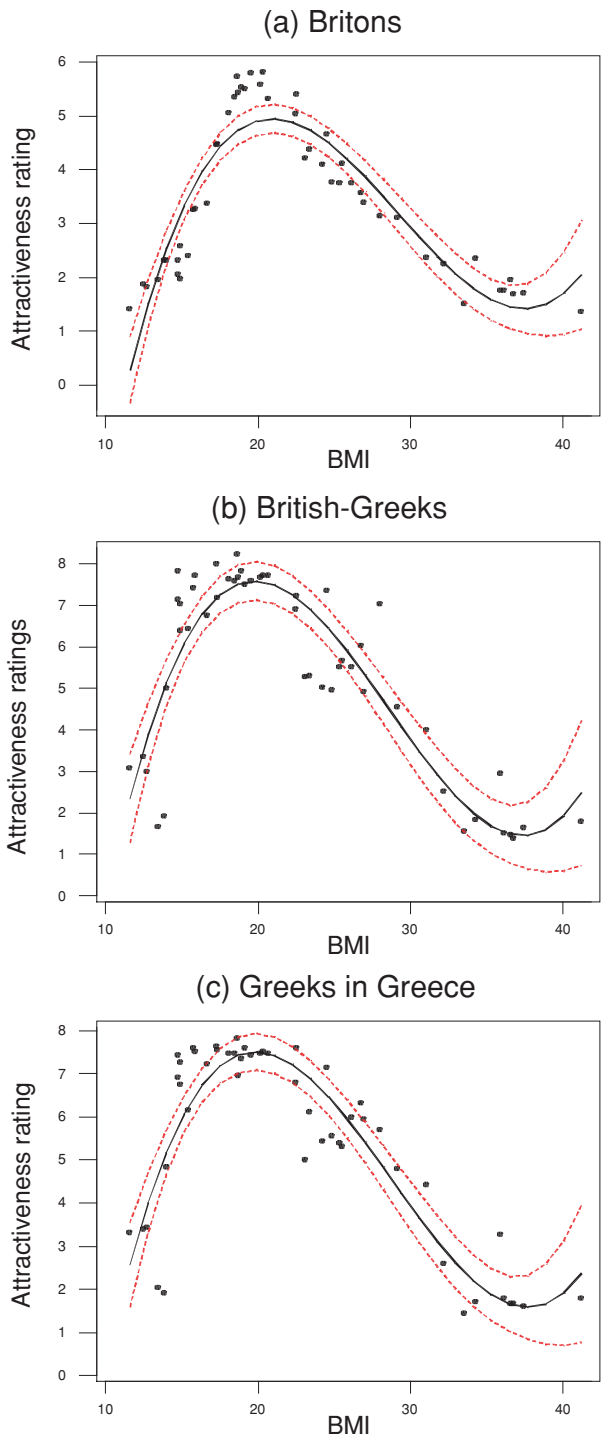

Fig. 1. Plots of attractiveness as functions of BMI. Each point represents the 50 attractiveness judgments made by participants. Regression lines (solid lines) and their 95% confidence levels (dotted lines) are superimposed.

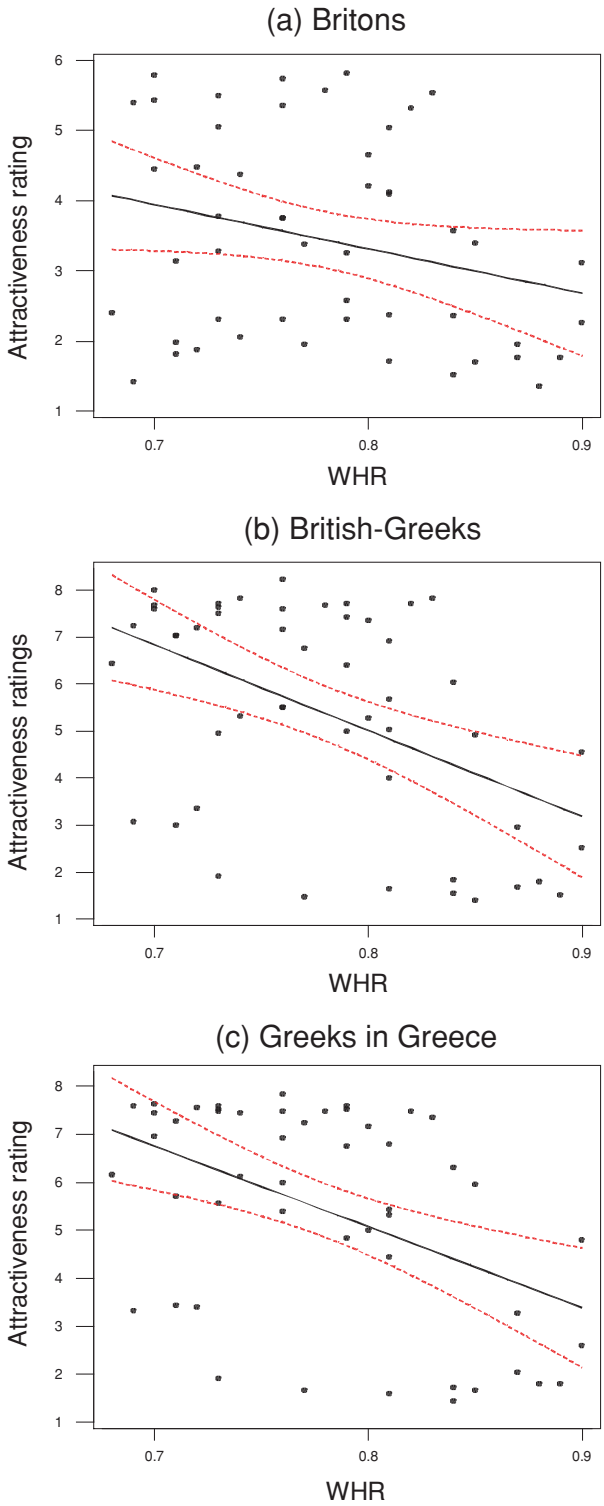

Fig. 2. Plots of attractiveness as functions of WHR. Each point represents the 50 attractiveness judgments made by participants. Regression lines (solid lines) and their 95% confidence levels (dotted lines) are superimposed.

Table I. Total Variance Explained by BMI and WHR and Peak Attractiveness

Group	Variance		Peak attractiveness
	BMI	WHR	
British	73.3	7.1	20.97
British-Greek	70.3	23.3	19.66
Greek	71.7	22.0	19.89

determinant of bodily attractiveness than WHR. However, the high variance explained by WHR for both Greek groups is at odds with previous findings and requires explanation.

To see whether the images that the different samples found most attractive had different BMIs, third-order polynomials for BMI were fitted to the attractiveness ratings made by all participants in each group, which allows the BMI at peak attractiveness to be calculated for each participant (final column in Table I). There were overall significant differences between the ratings made by participants from the different groups, $F(2, 99) = 10.87$, $p < .001$. To see where these differences lay, a post hoc Tukey HSD was carried out on the data. The results showed that the British participants had a significantly different peak attractiveness from British-Greeks and Greek students, and that British-Greeks and Greeks in Greece were not significantly different each other.

The multiple regression suggests that the importance of WHR in attractiveness judgements differs between groups. Attractiveness and WHR is significantly correlated in the British-Greek, $r = .48$, $p < .001$, and Greek, $r = .47$, $p < .001$, groups, but not in the British group. The gradient of this relationship for the British is -6.34, for the British-Greeks it is -18.28, and for the Greeks it is -16.87. These suggest a much steeper gradient in the two Greek observer groups. A dummy regression (Tukey, 1977) showed that there is a significant difference between the gradients for the British and British-Greek groups ($p < .05$), but none of the other gradients are significantly different (although the difference between the British and Greek groups just failed to reach significance).

DISCUSSION

In the first part of the present study we looked at the significance of both BMI and WHR in explaining women's physical attractiveness. In general, the results are consistent with previous findings that show that BMI is the major factor in determining physical attractiveness, as all groups of participants showed a preference for slender figures. Regardless of the cultural setting, BMI was found to account for more than 70% of the variance in attractiveness ratings (with a preference for figures with a BMI of about 19–21 kg/m^2 in all three groups), whereas WHR accounted for less than 24% in the Greek groups and less than 6% in the British group. This suggests that the importance attributed to WHR in previous studies is an artefact of co-varying WHR with apparent BMI. When both BMI and WHR are known for images of real women, their effects can be estimated separately, and BMI emerges as the most important factor (Tovée et al., 1999).

These effects cannot simply be explained by the photographs not adequately capturing shape cues. When pictures of men are used in the same format, and rated by male and female observers in the same experimental protocol, attractiveness is determined by shape cues (specifically upper body shape), rather than by BMI (Maisey, Vale, Cornelissen, & Tovée, 1999). This demonstrates that shape cues are salient in this format. It is also not the case that the relative ranges of BMI and WHR values in these studies are unequal, as when Tovée et al. (2002) used images of female bodies where the range of BMI values was strictly controlled, WHR still failed to emerge as a strong determinant for attractiveness.

It is possible to explain the preference for relatively slender figures among both Britons and Greeks with recourse to both evolutionary psychological and sociocultural explanations (although the two need not be mutually exclusive). For example, there are clear advantages to using BMI as a basis for mate selection, as BMI provides a reliable cue to women's health (Manson et al., 1995; Willet et al., 1995) and reproductive potential (Frisch, 1988; Lake et al., 1997; Reid & Van Vugt, 1987; Wang, Davies, & Norman, 2000). Fertility, pregnancy, and lactation are supported by body fat store accumulation stimulated by oestrogen at puberty (Frisch, 1987), and fat reserves buffer effects of arduous work and negative protein-energy balance on women's reproductive function (Bentley, Harrigan, & Ellison, 1998; Janienska & Ellison, 1998). Furthermore, WHR may be limited in its utility: there is a considerable overlap in the WHRs of populations of normal women and anorexic patients (Tovée et al., 1997). The latter group are amenorrhoeic, and so a woman with an effective fertility of zero can have the same WHR as a woman with normal fertility.

Sociocultural and feminist theorists, on the other hand, have emphasised the learning of preferences for body sizes in social and cultural contexts (e.g., Katzman & Lee, 1997; Nasser, Katzman, & Gordon, 2001; Smolak & Levine, 1996). Typically, the results of research within the Euro-American cultural sphere show that prejudice and discrimination against heavyweight people flourishes and remains largely legal and culturally approved (Crandall, 1994). Parental and peer influences have been implicated in the development of ideas concerning what constitutes an 'ideal' woman's image (e.g., Gordon, 2000), but most researchers believe that the mass media play a more significant role in influencing preferences for thin female figures in Western societies by exhibiting underweight female models (e.g., Bryant & Zhilman, 2002; Harrison, 1997; Heinberg & Thompson, 1995; Polivy & Herman, 1985; Posavac, Posavac, & Posavac, 1998).

Research on Miss America contestants and *Playboy* centrefolds, for example, has shown that the ideal became increasingly thinner over a 20-year period between 1959 and 1978, while women actually became 4% heavier (Garner, Garfinkel, Schwartz, & Thompson, 1980). A follow-up study showed that this trend continued between 1979 and 1988: Miss America contestants continued to become thinner, and *Playboy* centrefolds fell into a plateau of very low BMIs (Wiseman, Gray, Mosimann, & Ahrens, 1992). Others have examined body satisfaction and eating disorder symptamology as correlates of use of mass media (e.g., Abramson & Valene, 1991; Baker, Sivyer, & Towell, 1998; Cash, Cash, & Butters, 1983; Posavac, Posavac, & Weigel, 2001), the idea being that the mass media promulgate a slender ideal that elicits negative affect. Thus, the preference for relatively slender ideals in industrialised settings in the current study may be traced back to the emphasis on a slim physique and negative stereotyping of obese figures (Becker & Hamburg, 1996).

Although thin figures are typically regarded as "ideal" in mainstream, Western cultures, cross-ethnic and cross-cultural research reveals different perceptions of attractiveness and healthy body sizes (Miller & Pumariega, 2001; Powers, 1980; Swami & Tovée, 2005). In most traditional, non-Western settings, body fat is believed to be an indicator of wealth and prosperity (McGarvey, 1991), and obesity is a symbol of economic success, femininity, and sexual capacity (Ghannam, 1997; Nasser, 1988; Rudovsky, 1974). In less-affluent societies, there is often a positive relationship between increased socioeconomic status and body weight. Only high-status individuals would have been able to put on body weight, which would explain why the majority of the world's cultures had or have ideals of feminine beauty that include plumpness (Anderson, Crawford, Nadeau, & Lindgberg, 1992; Brown & Konner, 1987; Ford & Beach, 1952), as it would have been advantageous for women to be able to store excess food as fat in times of surplus.

This sociocultural explanation appears to be corroborated by the second major finding of our study, which is that Greeks (in both Britain and Greece) are more reliant on the WHR as a cue for women's attractiveness than Britons are. One possible explanation is that preferences for body shape vary across cultures. Typically, past research within Western cultures supports the finding that shape cues are not a salient factor in women's physical attractiveness—the "ideal" female body, as depicted by fashion models, has become thinner and less curvaceous over time (Morris, Cooper, & Cooper, 1989; Silverstein, Perdue, Peterson, & Kelly, 1986). By contrast, researchers have noted the strong influence of body shape on attractiveness ratings in a number of African countries (Furnham & Baguma, 1994; Marlowe & Wetsman, 2001; Wetsman & Marlowe, 1999), the South Pacific (Craig, Swinburn, Matenga-Smith, Matangi, & Vaughn, 1996; McGarvey, 1991; Wilkinson, Ben-Tovin, & Walker, 1994), and South America (Yu & Shepard, 1998). These studies typically show a preference for higher over lower WHRs. However, the Greek participants in the present study showed a preference for low WHRs, which supports the extant findings with line drawings in a number of modern, urbanised settings. Furnham et al. (2002), for example, found a monotonic negative relationship between WHR and perceived attractiveness among Greeks and Britons.

An alternative explanation for the findings of the present study may therefore be based on the gender roles occupied by men and women in different cultural settings. Gender roles are clearly related to a variety of behaviours and attitudes, including eating disorders and satisfaction with body shape (Parsons, 1980; Williams, 1979). There is evidence that gender role is correlated with perceptions of bodies of the other sex (Maier & Lavrakas, 1984). For instance, Wiggins, Wiggins, and Conger (1968) found that men who were very masculine according to the traditional sense (that is, had a high need for independence and dated frequently) showed a greater preference

for large-breasted female bodies than did other men. Beck, Ward-Hull, and McLear (1976) showed that women who preferred a large bust had interest patterns that could be considered traditionally feminine. Further, Lavrakas (1975) reported that women who adopted a traditionally feminine gender role had a greater preference for masculine male physique (a tapering V-shape) than did less traditional women. Taken together, these studies suggest that individuals who adopt traditional gender roles tend to have preferences for body shapes that are defined as attractive in the traditional sense, namely hour-glass shapes for women and muscular V-shapes for men. In contrast, individuals who adopt liberated gender roles have less stereotyped preferences (Furnham & Greaves, 1994; Maier & Lavrakas, 1984).

Recently, Furnham and Nordling (1998) compared the perception of body shapes in two culturally distinct samples, namely Denmark (a richer, less gender role stereotyped European country) and Portugal (a poorer, more gender role stereotyped European country), and found that Portuguese participants displayed a stronger preference for traditional, 'curvaceous' women and V-shaped male body shapes than did Danish participants. By contrast, Danish participants showed a stronger preference for the "angular" shapes (with small hips) for both men and women. The possibility could not be ruled out, therefore, that WHR has a greater influence on the attractiveness ratings of Greeks than Britons because Greeks inhabit a culture where gender roles are more strongly differentiated. One recent study (Apparala, Reifman, & Munsch, 2003) showed that Greeks, in comparison with people of other European nationalities, score low on egalitarianism and gender empowerment scales (see also Hofstede, 1980). In such a situation, the more liberal gender roles afforded to British women may allow them to strive for more angular body shapes, which would lead others to perceive them as having qualities associated with such a shape (e.g., greater personal control; Furnham & Greaves, 1994). This is in accordance with the notion of a correlation between a thin, angular body shape and high status employment (Silverstein et al., 1986). Furthermore, men would probably follow this preference change from a traditional shape to a more angular body shape, because such a shape does not have much direct influence on the power balance between men and women in a more liberated culture. By contrast, in more traditional cultures, such as the Greek culture, men may show a preference for "traditional" body shapes as a means of exerting some influence over the power balance that exists between men and women.

A view that distances itself from strict Darwinian reasoning need not lead to what evolutionary psychologists like to parody as the "Standard Social Sciences Model" (Tooby & Cosmides, 1992), that is, the idea that brains are blank slates developing with infinite plasticity in response to environmental variation. Rather, a model that explains the interplay between individual preferences for attractive body weights and cultural experience will recognise that cultures are anything but coherent wholes. Nevertheless, in many cultures, we may identify a set of ideas and values that is foundational (Shore, 1996) and that is expressed pervasively in many aspects of social life. This may include ideas and values that give attention to sexual relationships, such as those that arise from divisions of labour and gender inequality within society (e.g., Eagly & Wood, 1999; Ehrenberg, 1989; Sanday, 1981). Sometimes known as social structural theory, the latter locates the psychology of mate selection within the contrasting social positions of women and men. In most socioeconomically developed societies, women have less power and status than men and control fewer resources. Mate choice strategies must, therefore, reflect people's effort to maximise these utilities in environments in which these utilities are constrained by gender roles as well as by more specific expectations associated with marital roles (e.g., Eagly & Wood, 1999; Johannesen-Schmidt & Eagly, 2002).

Furthermore, sociocultural and evolutionary arguments need not be mutually exclusive. With regard to the present findings, for example, it is possible that different preferences between populations may reflect conditional strategies, thus generating facultative adaptive responses to varying environmental, cultural, or ethnic conditions. This may involve evaluating the information afforded by female bodies (cues to health and fertility) with regard to life history and cultural contexts. For example, Greek men and women have one of the highest rates of obesity in Europe (Mamalakis & Kafatos, 1996), and it is widely acknowledged that relative risk of mortality is accelerated considerably at higher BMI values (Manson et al., 1995). In this case, the greater prevalence of obesity among Greeks than among Britons may lead to a stronger preference for cues that indicate optimal health and fertility, such as a slimmer, more curvaceous body. Thus, Pawłowski and Dunbar (2001) have shown that the WHR is a better

predictor of neonatal weight (a key factor in determining infant survival, and hence the mother's fitness) in women who weigh over 54 kg, but BMI is the better predictor in lower weight women. The relatively lower rates of obesity in Britain may lead to cues represented by body shape becoming less valuable and hence less important in mate choice. Nevertheless, this explanation would still require an evaluation of contemporary information about health and reproductive potential, and would necessitate a substantial modification of the orthodox evolutionary psychological position.

One limitation to this study is the reliance on Hofstede's MAS scores as an indicator of the level of gender role stereotyping in a particular country. In particular, Hofstede (1980) was careful to emphasise that his core values apply to national cultures and not to individuals. If two nations differ on a given value dimension, it would not be logical to infer that because two cultures differ, then any two members of those cultures must necessarily also differ in the same manner (Smith & Bond, 1998). This issue relates to the question of whether culture can ever legitimately be considered a cause of social behaviour (see Rohner, 1984). The definitions that we used for culture, social systems, and society rest upon analyses of the beliefs and actions of their members. Consequently, if we claim that culture can explain behaviour and then use variations in behaviours to define cultural differences, we are formulating a tautology, that is, we are saying that something may be explained by itself. However, if we claim that masculinity or some other specific value can explain some aspect of social behaviour, we are then on firmer ground (Smith & Bond, 1998). In the present study, therefore, we were able to extract what is regarded as the key element of a culture and propose that it can explain behavioural aspects of culture.

The relevance of cross-cultural studies lies mainly in testing the universality of evolutionary psychological theories. Recounts of the research on WHR have typically presented its adaptive benefit as an established conclusion. However, when one considers the methodological limitations of many studies in the field, in addition to extant cross-cultural differences in preferences, the evidence for a universal preference for low WHR seems weak. With data from such a limited number of populations in the present study, discriminating between possible explanations is problematic. Yet, future experiments with different populations could be designed to disambiguate these theories (see Swami & Tovée, 2005). In the meantime, the results of the present study suggest that mate choice criteria are not static and encourage "sobriety in the face of some of the near-zealous promotion of Darwinian theories by some of the prospective proponents" (Freese, 2000, p. 333). Although universals of attractiveness may exist, the intrusiveness of these is likely to depend on cultural and demographic conditions, which evolutionary psychological explanations would do well to incorporate.

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