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Female physical attractiveness in Britain and Malaysia: A cross-cultural study

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Abstract

Two purported cues to perceived female physical attractiveness are body mass index (BMI) and body shape as measured by the waist-to-hip ratio (WHR). This study examined the relative contribution of both cues in several culturally socio-economically distinct populations. Six hundred and eighty-two participants from Britain and Malaysia were asked to rate a set of images of real women with known BMI and WHR. The results showed that BMI is the primary determinant of female physical attractiveness, whereas WHR failed to emerge as a significant predictor. The results also showed that there were significant differences in preferences for physical attractiveness along a gradient of socio-economic development, with urban participants preferring images of women with significantly lower BMIs than their rural counterparts. The findings are discussed in terms of evolutionary psychological explanations of mate selection, and sociocultural theory, which emphasises the learning of preferences for body sizes in social and cultural contexts.

Keywords: Physical attractiveness; Waist-to-hip ratio; Body mass index

Introduction

Some investigators within the field of evolutionary psychology have argued for the existence of universally shared criteria of attractiveness, which are potent cues to a person's potential reproductive success (Buss, 1994, 1999; Buss & Schmitt, 1993; Kenrick, 1995; Symons, 1979, 1995). Within this paradigm, males and females are believed to select partners that will enhance their reproductive success, and there has been a concurrent emphasis on the attractiveness of salient morphological features. The latter are said to honestly signal that one individual is more 'desirable' than another (Buss, 1994, 1999). In women, two potentially critical cues are body shape and weight scaled for height, or the body mass index (BMI).

For shape in women, research has focused on the ratio of the width of the waist to the width of the hips (the waist-to-hip ratio, or WHR). A low WHR (i.e. a curvaceous body) is suggested to correspond to the optimal fat distribution for high fertility (Wass,

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Waldenstrom, Rossner, & Hellberg, 1997; Zaadstra et al., 1993), and so this shape should be highly attractive. This suggestion is supported by studies that have asked subjects to rate for attractiveness a set of line-drawn figures of women's bodies (Furnham, Tan, & McManus, 1997; Singh, 1993a, 1993b, 1994a, 1994b, 1995). WHR in these figures is varied by altering the torso width around the waist, but this not only alters the WHR, but also the apparent BMI. As the value of the WHR rises, so does that of the apparent BMI, and so it is not possible to say whether changes in attractiveness ratings are made on the basis of WHR or BMI, or both (Tovée & Cornelissen, 1999; Tovée, Maisey, Emery, & Cornelissen, 1999). This problem is also found in studies using edited photographic images of women, where their WHR has been artificially altered by thickening or narrowing their torsos (e.g. Henss, 2000). Altering the torso width also altered apparent body mass, and so once again, the WHR and BMI were co-varied.

When digital photographs of real women are used, BMI seems to be the most important predictor to judgements of attractiveness, with WHR serving as one of a number of secondary cues to attractiveness (e.g. Puhl & Boland, 2001; Tovée & Cornelissen, 2001; Tovée, Hancock, Mahmoodi, Singleton, & Cornelissen, 2002; Tovée, Reinhardt, Emery, & Cornelissen, 1998; Tovée et al., 1999). It is not simply that this paradigm is insensitive to shape cues, as when women are asked to rate male images in the same format and under the same experimental conditions, the primary determinant of male attractiveness is upper body shape—specifically waist-to-chest ratio (Tovée et al., 1999). The finding that BMI may be the primary determinant of female attractiveness is consistent with the fact that successful female fashion and glamour models all fall within a narrow BMI range (Tovée, Mason, Emery, McCluskey, & Cohen-Tovée, 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). So a mate choice strategy based on BMI also favours reproductive success.

If judgements of attractiveness are an innate preference, then it might be suggested that these preferences should be consistent across cultures. While many studies using observers from industrialised societies show similarities in their preferences (Connally, Slaughter, & Mealy, submitted for publication; Furnham, McClelland, & Omer, 2003; Furnham, Moutafi, & Baguma, 2002; Furnham et al., 1997; Henss, 2000; Markey, Tinsley, Ericksen, Ozer, & Markey, 2002; Singh, 2000, 2001, 2002; Singh & Henss, submitted for publication; Singh & Luis, 1995; Singh & Young, 1995; Streeter & McBurney, 2003), other cross-cultural studies (particularly those which 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. Craig, Swinburn, Matenga-Smith, Matangi, & Vaughn, 1996; Furnham & Alibhai, 1983; Furnham & Baguma, 1994; Furnham et al., 2002; Marlowe & Wetsman, 2001; Wetsman & Marlowe, 1999; Wilkinson, Ben-Tovin, & Walker, 1994; Yu & Shepard, 1998, 1999). However, these differences are not necessarily inconsistent with an evolutionary explanation, as it might be argued that they represent adaptations to local environmental conditions, rather than arising through different cultures (Sugiyama, 2004; Tovée & Cornelissen, 1991, 2001). To clarify this ambiguity, it is necessary to explore the attractiveness preferences from groups of observers from same racial group, but who have grown up and live in different cultural surroundings.

Malaysia has experienced rapid, if unequal, socio-economic transformation in recent decades, and furnishes a natural laboratory in which to examine preferences for physical attractiveness. In different parts of Malaysia, people live in industrialised, semi-industrialised and rural environments, and this allows us to explore the effect of industrialisation on standards of female attractiveness. As we also tested observer groups of racial origin from the same environment (Malay, Chinese and Indian in Kuala Lumpur), we can also explore whether there are differences based on race when socio-economic environment remains constant.

Methods

Participants

The participants of this study were recruited from two countries, Britain and Malaysia, there being five

groups reflecting a gradient of socio-economic development from industrialised (Britain and Kuala Lumpur), semi-industrialised (Kota Kinabalu) and rural (Kota Kinabalu outskirts). The first group consisted of a convenience sample of 100 university students—equally divided between the sexes—who were born and raised in urban Britain. The second group consisted of 100 Malaysian-born participants (50 female, 50 male) who have been residents in Britain for at least 2 years. All of the participants in this group were ethnic Malay or Chinese from West Malaysia (mainly from urban areas like Kuala Lumpur and Penang), and were recruited from Malaysian student associations in Britain and the Malaysian embassy in London.

Kuala Lumpur is the largest city in Malaysia, with a population of about 2 million, and is situated on the west coast of the Malaysian peninsula. As the capital city of Malaysia and an independent federal territory, Kuala Lumpur has grown into a modern metropolis and is the powerhouse of the Malaysian economy, where much of the country's workforce and industry resides. In 2000, it had a GDP per capita of about US$ 8000 and a low unemployment rate (2.6%; Government of Malaysia, 2001). Compared with East Malaysia, which is about 50% rural, Kuala Lumpur is a modern city that has witnessed a noticeable rise in clinical eating disorders (e.g. Hsien-Jin, 2000). Ethnic Chinese constitute the predominant group in Kuala Lumpur, although the city also has a large Malay population and substantial ethnic Indian minority. We recruited three groups of 100 participants each—equally divided between male and female—from each of these three ethnic groups.

The fourth group consisted of 100 participants—again equally divided between the sexes—recruited from the small city of Kota Kinabalu, in the state of Sabah located in East Malaysia (part of the island of Borneo). Sabah is one of Malaysia's least developed states, with a GDP per capita of about US$ 2400 and a high unemployment rate at 5.6%. In 1999, the average monthly household income for Sabah was RM 1905 (about US$ 500), the lowest in Malaysia (Government of Malaysia, 2001). Its capital, Kota Kinabalu has a population of some 300,000 people, with large Malay and ethnic Chinese populations as well as 32 other indigenous groups like the Kadazan-Dusun and Bajau. Kota Kinabalu was destroyed almost completely during the Second World War, and only developed into a relatively modern city in the 1990s (it only received city status in February 2000). It is today a small but growing municipality with most modern conveniences, and is also an important tourism centre in the region.

The fifth group consisted of 82 participants, 39 female and 42 male, gathered from rural villages about 50 km outside Kota Kinabalu. Most participants were smallholding paddy farmers (and their families), depending on the crop for their livelihood. A small number were also involved in fruit and vegetable farming, or worked as temporary labourers in nearby towns like Kota Belud, Kiulu and Papar. Although Sabah has witnessed increasing urbanisation in recent years (including the dispersal of urban development and new highway construction through rural areas), the area around Kota Kinabalu has retained its essentially rural character. All villages in the area of study had a permanent supply of electricity and water, though sources of mass media were often restricted to communal televisions (regulated state channels) and print matter (local newspapers). Participants were made up of Bajaus, Kadazan-Dusuns and Malays, with primary and some secondary education. The age ranges and means of the different groups are summarised in Table 1. There were no significant differences in the mean ages of the different groups (one-way ANOVA, $F_{(6,681)} = 0.909$, $p > 0.05$).

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 in front view. Images were then frame-grabbed and stored as 24-bit images (see Tovée et al., 2002, for an example). The use of high-resolution photographic images is more realistic than the line-drawings used to date, but it should be noted that a two-dimensional image may not capture all the visual cues available from a three-dimensional image seen from the same viewing point (DeSoto & Kopp, 2003). However, a recent study which compared the ratings of two-dimensional photographs with ratings of movie clips of the same bodies rotated through 360° found no differences (Smith, Cornelis-

Table 1
Age ranges, means and standard deviations

Group	Age range	Mean	Standard deviation
British			
Male	19–44	24.66	6.10
Female	18–51	24.86	7.80
British–Malaysian			
Male	22–48	25.58	5.61
Female	20–54	25.74	7.14
Kuala Lumpur (Malay)			
Male	18–49	25.82	6.18
Female	18–54	25.40	7.21
Kuala Lumpur (Chinese)			
Male	19–52	24.92	7.17
Female	19–51	24.72	6.50
Kuala Lumpur (Indian)			
Male	19–54	26.08	7.16
Female	18–47	24.26	5.63
Kota Kinabalu			
Male	19–54	26.28	8.32
Female	19–39	25.38	6.69
Rural			
Male	19–57	27.02	9.61
Female	19–52	26.67	8.23

sen, & Tovée, submitted for publication), suggesting 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 subject's 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), normal (18.5–24.9 kg/m^2), overweight (25.0–29.9 kg/m^2) and obese (over 30 kg/m^2). The women in this study varied in WHR from 0.68 and 0.98, with the ranges of BMI and WHR values representing the widest range available in the researchers' library. 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.

For this experiment, the images of women were printed on sheets of A4 paper, so that each image covered the entire page. This was done so as to facilitate replication of the study in all locations. Participants were presented with a booklet to record their ratings, where the first page consisted of brief instructions and a worked example of a rating, and where the final page requested participants' demographic details (age, gender, ethnicity, weight and height). Other pages in the booklet provided a nine-point horizontal 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. Although differing from previous studies, the Likert scale was used to facilitate replication of this experiment among non-Westernised samples that may not have the same numeral representation as Western samples.

Procedure

All participants were tested individually, with the only difference in procedure between the different settings being the language used. While the questionnaire was in English for both groups in Britain, instructions were translated into Malay for the Malaysian samples. A back translation of the instructions by an independent translator certified the validity of the questionnaire across conditions. Within the image set, individual images were presented in a randomised order, and subjects were presented with the entire set twice. In the first run through, participants were asked to verbally state 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 for each participant.

Results

Gender differences

To explore whether there were differences between the two genders in our observer groups, we carried out

a Spearman Rank correlation. We found very high correlations between the male and female observers in each group, suggesting they were ranking the images in the same way (the British group, $r = 0.935$, $p < 0.001$; the British–Malaysian group, $r = 0.910$, $p < 0.001$; the Kuala Lumpur (Malay) group, $r = 0.964$, $p < 0.001$; the Kuala Lumpur (Chinese) group, $r = 0.99$, $p < 0.001$; the Kuala Lumpur (Indian) group, $r = 0.99$, $p < 0.001$; the Kota Kinabalu group, $r = 0.969$, $p < 0.001$; the rural group, $r = 0.956$, $p < 0.001$). This result is consistent with the correlations between attractiveness ratings by male and female observers found in previous studies (e.g. Tovée & Cornelissen, 2001; Tovée et al., 2002). We therefore calculated intra-class reliabilities for the male and female observer groups separately and together, and then tested for intra-class variation.

Intra-class reliability measures show a very high degree of agreement between the observers' ratings. Using Winer's intra-class reliability for k means, we found a high degree of agreement in all the observer groups: the value for attractiveness ratings by the British Caucasian males was 0.97 and for females it was 0.97; the value for the British–Malaysian males was 0.97 and for females it was 0.97; the value for the Kuala Lumpur Malays was 0.97 for males and 0.98 for females; for the Kuala Lumpur Chinese, 0.97 for males and 0.98 for females; for the Kuala Lumpur Indians, it was 0.97 for males and 0.98 for females; the value for the Kota Kinabalu males was 0.99 and for females it was 0.99; and the value for the rural males was 0.99 and for females it was 0.99. This suggests that the reliability was very high and consistent across both gender groups. Amalgamating the male and female observers does not significantly change the intra-class reliability measures (the British group, 0.99; the British–Malaysian group, 0.98; the Kuala Lumpur Malaysian group, 0.99; the Kuala Lumpur Chinese group, 0.99; the Kuala Lumpur Indian group, 0.99; the Kota Kinabalu group, 0.99; the rural group, 0.99). We therefore amalgamated the results of the male and female observers in our further analyses.

Both the Kota Kinabalu and rural groups show the same high intra-class reliabilities that the other groups do, despite being more ethnically diverse. To further explore this, we calculated Cronbach's α for these two groups. Again in both cases, the intra-class reliability was very high (for the Kota Kinabalu group it was 0.996, and for the rural group it was 0.996). Thus, both sets of intra-class reliability measure suggest that all the observers with each of the two groups are rating the images in the same way, and that there no subgroups within each of the observer groups.

Multiple regression results

A multiple polynomial regression was used to model the contributions of BMI and WHR to the attractiveness ratings. Fig. 1 shows plots of attractiveness ratings as a function of BMI for the two British groups, all the Kuala Lumpur groups and the East Malaysian groups, respectively, with all sets being significantly explained by BMI ($p < 0.001$ 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 either side of the peak of the curve reduces the attractiveness rating. Fig. 2 shows the corresponding relationship between attractiveness and WHR. In contrast to previous studies that have found weak effects of WHR, only two of the seven groups showed a significant correlation between attractiveness ratings and WHR (British–Malaysians and Kuala Lumpur Malays, $p < 0.05$).

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 little justification in the psychological literature for fitting a more complex function. The model, run separately for the different groups, was:

$$\text{Model}: \quad y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e$$

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

The total variance explained by this model for the relationship between BMI and attractiveness ratings (between 76.9 and 84.1%) is shown in Table 2, and is dramatically different from the effect sizes for the relationship between WHR and attractiveness ratings (between 1.6 and 8.9%). Although the latter relationship was non-significant in most cases, it is noticeable

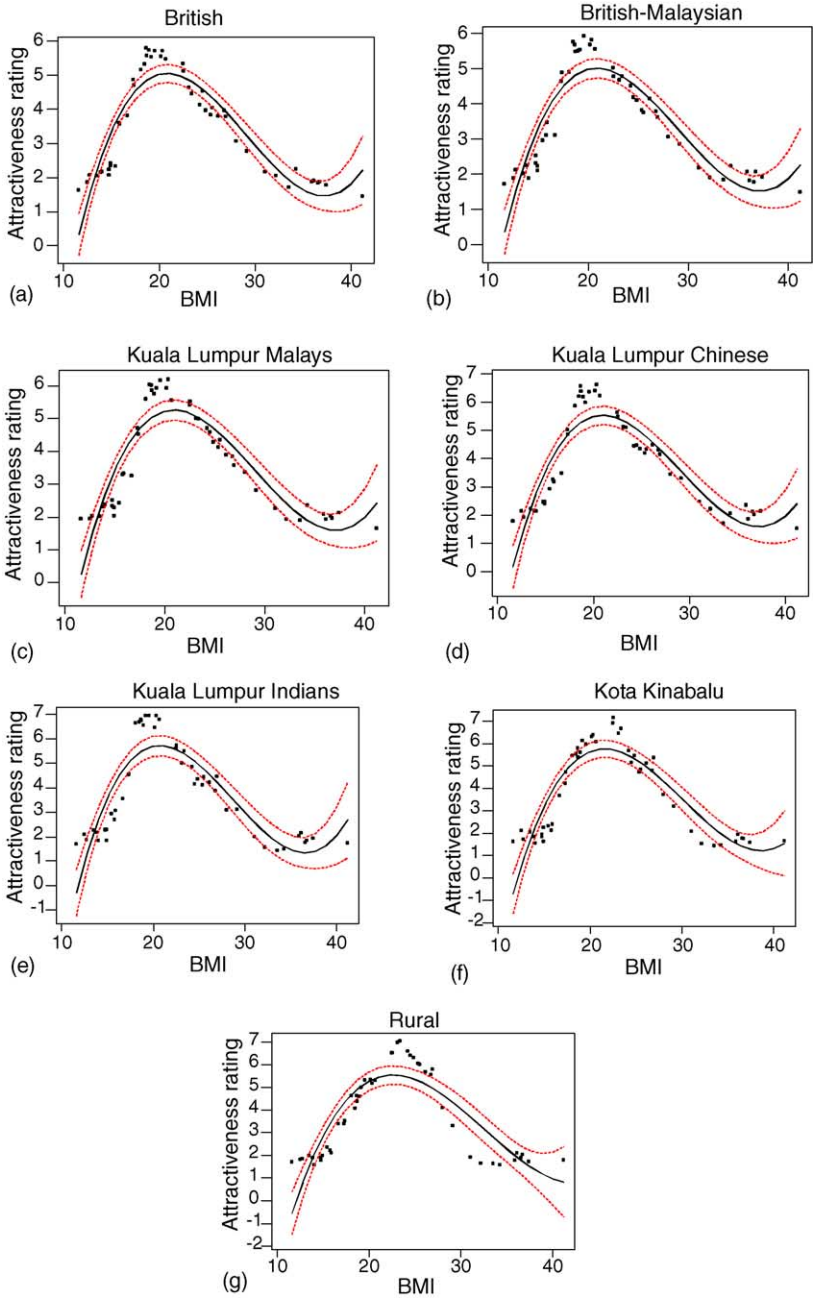

Fig. 1. Plots of attractiveness as functions of BMI. Each point represents the 50 attractiveness judgements made by participants. Regression lines (solid lines) and their 95% confidence levels (dotted lines) are superimposed.

that BMI accounted for approximately 12 times more variance than WHR, suggesting that BMI is a considerably stronger determinant of bodily attractiveness than WHR.

Between-group differences

Although the shape of the attractiveness versus BMI function is very similar across all the groups, it is

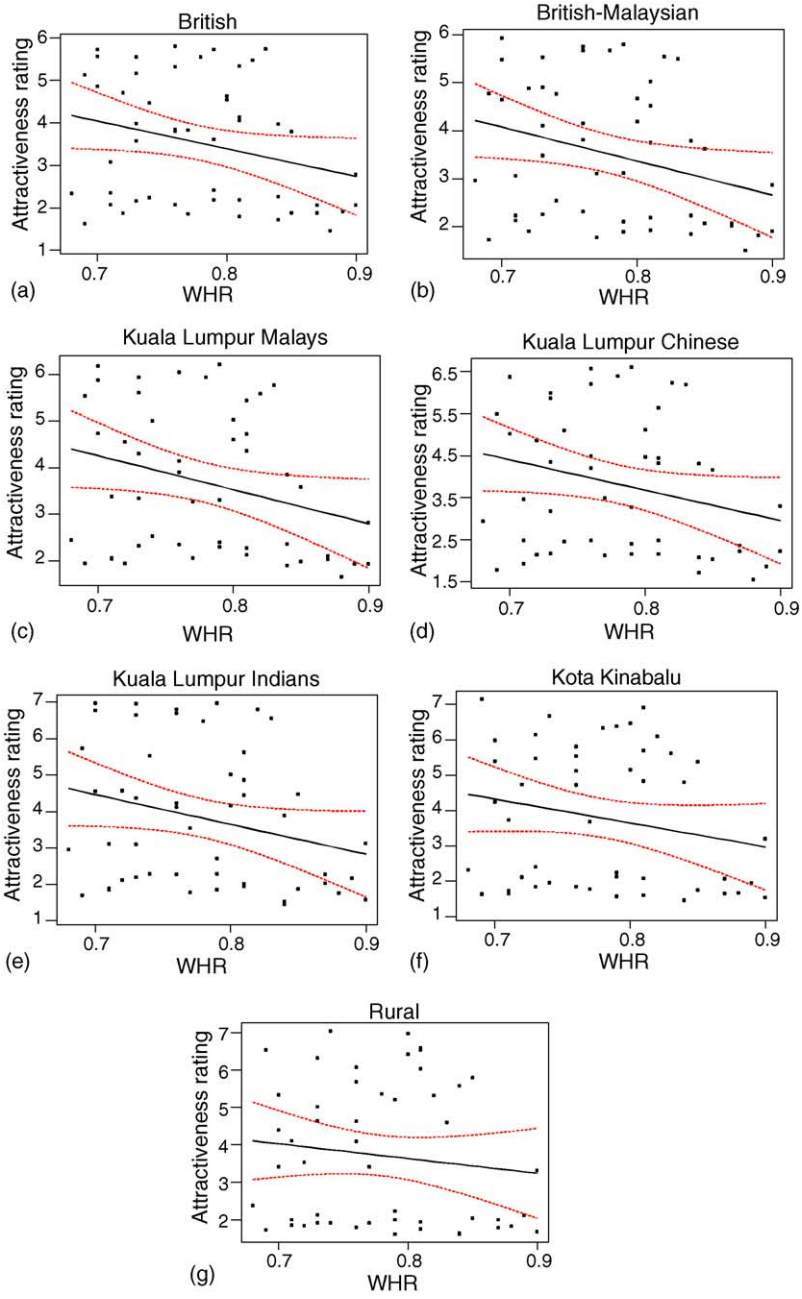

Fig. 2. Plots of attractiveness as functions of WHR. Each point represents the 50 attractiveness judgements made by participants. Regression lines (solid lines) and their 95% confidence levels (dotted lines) are superimposed.

possible the function may have been shifted in some groups (i.e. the peak or 'ideal' BMI value may differ across the groups). To explore this possibility, third-order polynomials for BMI were fitted to the attractiveness ratings made by all participants in each group, allowing the BMI at peak attractiveness to be calculated for each participant. The peak BMI for each group is shown in Table 2.

Table 2
The importance of BMI and WHR in determining attractiveness judgements, as well as peak BMI for attractiveness ratings and WHR gradients

Group	Variance accounted for by BMI (%)	Variance accounted for by WHR (%)	Most preferred or 'peak' BMI for attractiveness	WHR gradient
British	84.1	7.4	20.85	−6.54
British–Malaysian	82.3	8.9	21.25	−7.07
Kuala Lumpur (Malays)	80.8	8.2	20.93	−7.29
Kuala Lumpur (Chinese)	81.2	7.1	21.09	−7.23
Kuala Lumpur (Indian)	77.0	6.9	20.79	−8.18
Kota Kinabalu	81.1	4.5	21.57	−6.75
Rural	76.9	1.6	22.78	−3.95

The peak BMI values seemed to be higher from the Kota Kinabalu and the rural observers. There were overall significant differences between the ratings made by participants from the different groups (one-way ANOVA, $F_{(6,675)} = 29.06$, $p < 0.001$). To see where these differences lay, a post hoc Tukey HSD was carried out on the data. The peak BMI values from the Kota Kinabalu group were significantly different from the British, Kuala Lumpur Malay and Indian observers and from the rural observers ($p < 0.05$). The results also showed that the peak BMI of the rural group was significantly different from all the other groups ($p < 0.05$).

The gradient of the relationship between averaged attractiveness ratings and WHR for each group, seem similar in the urban groups (see Table 2). However, the gradient seems to differ in the rural group. To explore whether this difference was statistically significant, we carried out a series of standard dummy regressions (Tukey, 1977). There were no significant differences between any of the urban groups. However, the rural group is significantly different from all the other groups ($p < 0.001$).

Discussion

The first part of this study is consistent with previous findings showing that BMI is the primary factor in determining physical attractiveness. Regardless of the cultural setting, BMI was found to account for more than 75% of the variance in attractiveness ratings, whereas WHR failed to emerge as a strong predictor. This suggests that the importance attributed to WHR in previous studies using line-drawings 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, rated by male and female observers in the same experimental protocol, attractiveness is determined by shape cues (specifically upper body shape), rather than BMI (Maisey et al., 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.

These findings suggest that one simply does not need to be very sensitive to shape cues. Tovée et al. (2002) have argued that the linkage of WHR with fertility is far weaker than that of BMI and fertility, and this may be one reason why WHR is a poor predictor of attractiveness. For example, 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. Past research supports the finding that shape cues are not a salient factor in female physical attractiveness—the 'ideal' female body in Western society, as depicted by fashion models, has become thinner and less curvaceous over time (Morris, Cooper, & Cooper, 1989; Silverstein, Perdue, Peterson, & Kelly, 1986). An alternative explanation is that there exists a 'hierarchy of cues' used in partner selection. Features such as

WHR may be used to discriminate broad categories, such as male from female or pregnant from non-pregnant. Discriminating within the category of potential partners, one may use such cues as BMI, and then other cues such as the proportions of the body to discriminate between women of very similar BMI.

In the second part of the study, we found that there was no difference in the attractiveness judgements between observers in industrialised societies. There was no difference between the ideal BMI values for the Malaysian and British observers in Britain and the Malay, Chinese and Indian observers in Kuala Lumpur. However, observers from industrialised societies tended to prefer a lower BMI than the observers from the semi-industrialised society. In turn, all these groups preferred a significantly lower BMI than the rural group. It is possible that these differences arise from differences in the ethnic origin of the Kota Kinabalu and rural groups. In these groups, Malays were the largest single grouping, but observers from other ethnic groups were included. However, two pieces of evidence suggest that this was not the case.

Firstly, there was no difference between the three ethnic groups drawn from Kuala Lumpur—although, there is some evidence that there should be differences if the ideal BMI were based on the optimal BMI for health and fitness in these groups. Secondly, the intra-class reliability measures show that the observers in Kota Kinabalu and rural groups are rating in a very homogeneous way. If there were systematic differences in the way any subgroup of observers rated the images, this would be reflected in low intra-class reliability values, which is not the case. Instead, there does seem to be a tendency towards a preference for higher BMI values in less industrialised environments. In the case of the rural group, this is combined with a reduced preference for a more curvaceous body shape (i.e. changing body has less of an effect on attractiveness in the rural group, and a less curvaceous shape is regarded as relatively more attractive in the rural group than in the other observer groups). This is consistent with a number of studies using line-drawings with observers from non-industrialised societies that have suggested that heavier and less curvaceous figures may be more preferred (Marlowe & Wetsman, 2001; Wetsman & Marlowe, 1999; Yu & Shepard, 1998).

Tovée and Cornelissen (1999, 2001) have suggested that differences in preferences for body weight in different cultures may be based on different optimal BMI for different racial groups and environments. Epidemiological evidence has suggested that different ethnic populations may have differing levels of risk for negative health consequences with changing BMI (Kopelman, 2000; McKeigue, Shah, & Marmot, 1991; Shetty & James, 1994; Stevens et al., 1992; Wang et al., 1994), the authors suggest that there may be a different optimal BMI for health and longevity in different racial groups. As a consequence, there will be a preferred optimal BMI for each group, which will balance environmental and health factors, but this optimal BMI may differ between groups and environments.

However, the results from the Malay, Chinese and Indian groups from Kuala Lumpur suggest that this may not be correct. A number of studies have argued that ethnic Malays, Chinese and Indians in South East Asia have different optimal BMIs for risk factors for morbidity and mortality (Deurenberg, Deurenberg-Yap, & Guricci, 2002; Deurenberg-Yap, Schmidt, Van Staveren, & Deurenberg, 2000). For the same, age, gender and BMI, Indians have a higher body fat percentage than Malays, who in turn have a higher body fat percentage than Chinese. One meta-analysis found a distinct difference in the body fat percentages of Indonesians (of Malay ancestry) and ethnic Chinese (Deurenberg, Yap, & Van Staveren, 1998; see also Guricci, Hartyiyanti, Hautvast, & Deurenberg, 1998). This would suggest that ethnic Malays, Chinese and Indians in Malaysia should have different preferences for body weight, but this was not the case. Malays, Chinese and Indians in Kuala Lumpur all had a similar preference for figures with a BMI of about 20–21 kg/m^2.

One possible resolution to this problem is based on sociocultural theory, which emphasises the learning of preferences for body sizes in social and cultural contexts (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' female image (e.g. Gordon,

2000), but most researchers believe that the mass media plays 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). 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 American women actually became 4% heavier (Garner, Garfinkel, Schwartz, & Thompson, 1980; see also Freese & Meland, 2002; Voracek & Fisher, 2002). A follow-up study found that this trend continued between 1979 and 1988: Miss America contestants continued to become thinner, whereas *Playboy* centrefolds fell into a plateau of very low BMIs (Wiseman, Gray, Mosimann, & Ahrens, 1992). Others have examined body satisfaction and eating disorder symptoms as correlates of using 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 promulgates 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).

While thin figures are typically regarded as 'ideal' in mainstream, Western culture, cross-ethnic and cross-cultural research reveals differing perceptions of attractiveness and healthy body sizes (Miller & Pumariega, 2001; Powers, 1980). In most traditional, non-Western settings, body fat is believed to be an indicator of wealth and prosperity (McGarvey, 1991), with obesity as 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 socio-economic 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, & Lindberg, 1992; Brown & Konner, 1987), as it would have been advantageous for women to be able to store excess food as fat in times of surplus.

While the preferred BMI of the rural sample in this study was only modestly larger than in the urban samples (though this was statistically significant), studies in other rural settings using the same procedures have found much larger differences (Swami, Tovée, Furnham, & Mangalparsad, submitted for publication). This difference may be due to different levels of urbanisation: while the sample in this study retained an essentially rural character, recent advances have nevertheless meant the encroachment of urban development into rural life (e.g. the construction of highways through rural areas). Nevertheless, the gradient of peak attractiveness across the different sites in this study, in addition to evidence from other rural contexts, lends credence to the view that physical attractiveness may be linked less to ethnicity than modernity or socio-economic status. This hypothesis is supported by a recent study (Lee & Lee, 2000) that examined disordered eating among female students in three Chinese communities that lay on a gradient of socio-economic development in China. Their results indicated that, compared to students in Hunan (a rural province in southeast–central China), and to a lesser extent students in Shenzhen (a modernised region in mainland China), students from Hong Kong (a modern city) were slimmer, but desired a lower BMI, reported more body dissatisfaction and scored higher on fat-concern and dieting scales.

It could therefore be argued that in Malaysia, as in China, economic liberalisation has encouraged the deregulation of mass media, which projects a powerful image that 'rigidly equates success with a young, slender and, glamorously adorned woman' (Lee & Lee, 2000, p. 324). For Nasser (1994, 1997), the transcultural nature of body image disturbance is evidence of the globalisation of fat-phobia due to the emergence of a culturally shrunken world by a virtue of mass communication technology. Studies conducted in less developed countries show an increasing influence of Western culture infused through technology, which have been shown to engender a desire on the part of adolescents, particularly women, to be thin (Wang, Popkin, & Thai, 1998).

Of course, it would be wrong to attribute preferences of physical attractiveness to 'Westernisation' alone. Rather, the intensification of preferences for slim physiques is embedded in a 'gendered

complex of hegemonic forces that accompany global economic change' (Lee & Lee, 2000, p. 324). Rapid industrialisation and urbanisation have meant unparalleled changes in Malaysian women's condition, with regards to education, employment opportunities, mate choice, birth control and legal rights (Ariffin & Abdullah, 1997; Othman, 2001). These changes have created conflicting demands on young women to strive simultaneously for career accomplishment while maintaining their physical attractiveness (Malson, 1998). Along with increasing affluence, there has also been an increase in the prevalence of obesity in Malaysia (Ismail et al., 2002) that legitimises the pursuit of thinness and a fear of fatness.

Because the benefits of growth in Malaysia have been very unevenly distributed, the social roles of urban and rural women can be very different. Depending on where they are born and reside, women in Malaysia may lead very different lives and experience their bodies quite differently. For young urban women who enjoy education, career development and mate choice, slimness is emblematic of attractiveness and competence in both social and work-related domains (Lee, 1996, 1998). By contrast, the relative absence of gendered social constraints in rural Malaysia and Kota Kinabalu may help explain the preferences for larger BMIs among men and women there. Rural women's lives are still under substantial patriarchal influence, and in this rural context, bodily fullness may symbolize family fertility and wealth.

The limitations of this paper include the fact that the stimuli employed were photographs and not real women, although recent studies suggest that photographs can actually be a quite good representation of the visual information in a three-dimensional figure (Smith et al., submitted for publication). Theoretically, future research should also concentrate on the relative contribution of the face (a variable not tested in the present study) and the body in judging female attractiveness. That is, further studies are required to be carried out where both face and figure are taken into account as variables of physical attractiveness. A further point regarding the present study is the possible confusion between judgements that participants were asked to make between the priming question (couched in terms of beauty) and the Likert scales in which participants were asked to make judgements according to physical attractiveness. Although this did not seem to be a major problem with the current study, future research should ensure a constancy of methodology to eliminate possible confounds.

These limitations notwithstanding, the present study has implications for the treatment and prevention of eating disorders in societies that are experiencing rapid modernisation. In general, it appears that preferred body sizes can decrease markedly with increasing exposure to contemporary notions of slimness and economic modernity, and reduce even further in industrial settings as socio-economic status increases (Goldblatt, Moore, & Stunkard, 1965). Inasmuch as the rapid modernisation that has occurred in Malaysia fosters risk factors for slim bodily ideals and disordered eating, it can be predicted that fat-concern, dieting and ultimately eating disorders will become increasingly common experiences for Malaysian women.

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