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Human Physique and Sexual Attractiveness in Men and Women: A New Zealand–U.S. Comparative Study

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Abstract Men and women living in New Zealand and California completed five studies regarding human physique and sexual attractiveness. In Studies 1–3, women rated images of male stimuli and, in Studies 4–5, men rated female stimuli. In Study 1, women in both countries rated mesomorphic (muscular) and average male somatotypes as most attractive, followed by ectomorphic (slim) and endomorphic (heavily built) figures. In Study 2, amount and distribution of masculine trunk hair (chest and abdominal) was altered progressively in a series of front-posed male figures. In both countries, the image lacking any trunk hair was rated as the most attractive, with a steady decline in attractiveness as hirsutism became more pronounced. Study 3 assessed attractiveness of front-posed male figures that varied only in the length of the non-erect penis. Five lengths were presented: The smallest penile size was rated as less attractive than three intermediate sizes. The largest penile size was not the most attractive, but received higher scores than the unaltered and smallest penile size. In Study 4, men rated the attractiveness of back-posed female images varying in waist-to-hip ratio (WHR) (from 0.5 to 1.0). The 0.7 WHR figure was rated more attractive in New Zealand and the 0.6 WHR in California. Study 5 measured the attractiveness of female skin color; men expressed preferences for lighter skinned female figures in New Zealand and California. Results indicate very similar preferences for sexually dimorphic physical traits among men and women of European extraction, living in two culturally and geographically different environments.

Keywords Sexual attractiveness · Evolution · Masculine somatotype · Feminine waist-to-hip ratio · Penile length · Secondary sexual traits

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Introduction

Theory suggests that people may (either consciously or subliminally) use a variety of morphological features to assess the reproductive quality of potential mates (Barber, 1995; Symons, 1995; Thornhill & Gangestad, 1996). Female waist-to-hip ratio (WHR) is a reliable signal of female health and fecundity, with lower WHR being linked to triggering menarche (Lassek & Gaulin, 2007), maintaining regular ovulatory cycles (Singh, 2002) and efficient storage of the omega-3 fatty acids required for neural development of the fetus (Lassek & Gaulin, 2008). WHR is also a significant correlate of female attractiveness, with low WHRs being most attractive to men in North America, the UK, and Germany (Furnham, Tan, & McManus, 1997; Henss, 2000; Singh, 1993a, 1993b). Body Mass Index (BMI) is also significant in determining female attractiveness (Swami & Tovée, 2005a; Tovée, Maisey, Emery, & Cornellisen, 1999). Larger than average female breasts are attractive to men (Singh & Young, 1995), a trait which may relate to female reproductive potential, as women with lower WHRs and large breasts have higher fecundity (Jasienska, Ziomkiewicz, Ellison, Lipson, & Thune, 2004). Women with higher follicular phase levels of estradiol also have more attractive faces (Law-Smith et al., 2006).

If human beings have evolved cognitive mechanisms that assess visual cues of a potential mate's health and fecundity, then it is necessary to understand what similarities and variations exist between cultures. It has been suggested that a low female WHR is more attractive to men (e.g., WHR = 0.7: Singh, 2006); however, some studies do not support this claim. For example, among the Matsigenka of Peru, a WHR of 0.9 was most attractive (Yu & Shepard, 1998). In Bakossiland in rural Cameroon, a WHR of 0.8 was most attractive (Dixson, Dixson, Morgan, & Anderson, 2007b). In Tanzania, Wetsman and Marlowe (1999) found that a WHR of 0.9 was most attractive to Hadza men. However, in a more recent study, which presented images of women in which the buttocks were visible, Hadza men preferred a WHR of 0.6 (Marlowe, Apicella, & Reed, 2005). Clearly, further careful cross-cultural investigations are required to understand the relation between female WHR and sexual attractiveness.

Human beings are sexually dimorphic in skin tone (Robins, 1991). Female skin is often lighter than male skin (Darwin, 1871; Frost, 1988, 1994; van den Berghe & Frost, 1986). Natural selection may have been a primary determinant of lighter skin in women, as vitamin D synthesis is crucial during pregnancy and lactation (Jablonski & Chaplin, 2000). Sexual selection may maintain the degree of skin color dimorphism within populations through males being sexually attracted to females with lighter skin, a theory supported by ethnographic data showing that feminine beauty is ascribed to lighter skin tone (Aoki, 2002; van den Berghe & Frost, 1986). Recently, in a quantitative study of sexual preferences among university undergraduates in China, men showed a marked preference for images of females with lighter skin tones (Dixson, Dixson, Li, & Anderson, 2007a). Cross-cultural studies are limited, however, and the role of skin tone in female attractiveness requires further study.

Male physique can be classified according to somatotype (Sheldon, Stevens, & Tucker, 1970). Somatotyping is an anthropometric scaling method for defining physique in relation to muscularity and body fat, employing a three dimensional system which measures a person's mesomorphy (muscularity), endomorphy (fatness), and ectomorphy (leanness) (Carter & Heath, 1990; Sheldon, Dupertuis, & McDermott, 1954). *Homo sapiens* is sexually dimorphic in degree of mesomorphy. While male mesomorphy varies between populations, within populations men are typically more mesomorphic than women (Carter & Heath, 1990). Male somatotype is also a significant determinant of sexual attractiveness to women, with a mesomorphic muscular physique being highly attractive in the UK, Sri Lanka, and Cameroon (Dixson, Halliwell, East, Wignarajah, & Anderson, 2003; Dixson et al., 2007b).

Darwin viewed sexual selection as operating to enhance sexually attractive traits and recent studies of *Homo sapiens* have provided some supporting evidence. For example, taller men are more attractive as romantic partners to women (Hensley, 1994) and men who are taller than average within a population sire more offspring in the U.S., UK, and Poland (Mueller & Mazur, 2001; Nettle, 2001; Pawlowski, Dunbar, & Lipowicz, 2000). Thus, in Mueller and Mazur's (2001) study of military officers in the U.S., taller men were more likely to have a fourth child, whereas the median family size was three for the same study population.

Nonhuman primates develop capes of hair that depend upon circulating androgens (Dixson, 1998). In *Homo sapiens*, mature males display secondary sexual hair to varying degrees on the face, chest and trunk. It has been suggested that this characteristic may have been retained in males as a visual signal of sexual maturity (Pagel & Bodmer, 2003). Pronounced hirsutism has been found to be highly attractive in the UK (Dixson et al., 2003) but not in China (Dixson et al., 2007a). Since variation in the appeal of male body hair may exist between populations, more cross-cultural data are required to measure the importance of this trait.

Human male genitalia undergo considerable growth at puberty. First, the testicles enlarge, pubic hair grows, and the penis increases in length and girth (Tanner, 1978). Much speculation surrounds the role male genitalia may play in terms of attractiveness to potential partners (e.g., Miller, 2000) and there is some evidence for the importance of penile length and girth in women's judgments of male partner satisfaction (Stulhofer, 2006). Clearly, however, further cross-cultural studies are required to examine these questions.

The purpose of this study was to compare the preferences for morphological features and secondary sexual characteristics in people of European heritage, who have historically taken different migratory paths and currently inhabit geographically different settlements. Europeans began settling the North island of New Zealand in 1840 and Anglo-Americans colonized California following the Mexican war in 1848 (Beck & Williams, 1972; Kirch, 2000). Frequently, cross-cultural research has tested whether humans have evolved mechanisms for assessing mate quality by comparing the preferences of people from very distant cultures. However, in making cross-cultural comparisons of human mate selection, one valid approach is to compare people of European origin whose ancestors emigrated to geographically separate environments (on opposite sides of the Pacific Ocean). If humans have evolved psychological mechanisms for evaluating potential partners for health and fertility, then the same preferences should be present among people who share a common ancestry. To test this, we compared sexual attractiveness ratings for a variety of morphological traits by people of European origin who currently live in New Zealand and California (USA). In both countries, the subjects selected were of similar age (predominantly in their teens or 20s), mostly unmarried and of comparable educational level (university students).

Method

Participants

A total of 137 men (M age, 20.3 years) and 185 women (M age, 20.1 years) constituted the New Zealand sample and 85 men (M age, 20.7 years) and 81 women (M age, 20.3 years) constituted the U.S. sample. Less than 5% of the participants were married.

Procedure

Each questionnaire began with a cover sheet to collect demographic information from each participant, including sex, age, ethnicity, and marital status (married or single). All questionnaires were anonymous and participation was voluntary.

Images of males were produced by scanning photographs of front and back-posed males from Sheldon et al. (1954). In each case, images from the mid-range of three somatotypes (mesomorphic, ectomorphic, and endomorphic) were used, as well as a man of average somatotype. We did not modify these images to control for possible differences in fluctuating asymmetry. Images of women were the same as those used in previous studies (Dixson et al., 2007a, 2007b). Any asymmetries present in the original images of both sexes have been retained and it is possible that such differences might have affected attractiveness ratings to some degree. The scanned images of males and females were then manipulated using Photoshop 7.0 and standardized for height, posture, and for studies 1–4, color. Skin color was matched to a European Caucasian sample by scanning photographs from *Anatomy for the Artist* (Simblet, 2001) into the computer and matching skin color of the images to these photographs in Photoshop 7.0. Where front-posed images were used, faces were blacked out, as our studies did not concern facial stimuli.

Measures

For Studies 1–3, women used a 6-point Likert scale to score ratings of attractiveness where 0 = unattractive, 1 = only slightly attractive, 2 = mildly attractive, 3 = moderately attractive, 4 = very attractive and 5 = extremely attractive. In Studies 4–5, men chose the female image that they found most attractive for either a short-term or a long-term relationship.

Study 1 measured female preferences for back posed male images varying in somatotype (ectomorph, endomorph, mesomorph, and average). Images were presented in random order and women rated each image using the 6-point scale for sexual attractiveness.

Study 2 assessed female preferences for front-posed male images varying in degrees of hirsuteness on the trunk (chest and abdomen). Five images of a front-posed mesomorphic male were presented in random order and each image varied in degree of hirsuteness. Images of mesomorphic males were used because mesomorphy has been shown to be highly attractive to women (Dixson et al., 2003, 2007b). The distribution of chest and abdominal hair was altered in a step-wise fashion from none to pronounced hirsutism. Women rated each image using the 6-point scale for sexual attractiveness.

Study 3 examined female preferences for male images varying in length of the (non-erect) penis. Penis length was altered on five front-posed mesomorphic males (the same mesomorphic image used in Study 2). Each image was presented in random order and rated using the 6-point scale for sexual attractiveness. In one figure, the penis was the same size as the original photograph used to model the images in the computer. In the remaining four images, we altered penile lengths. Originally, we had intended to alter the four lengths to represent 80%, 120%, 130%, and 140% of their original size. However, measurements of the actual figures produced revealed images to be 78%, 122%, 133%, and 143% of the original size.

Study 4 measured male preferences for a replicated female image varying only in WHR; the WHR range was: 0.5, 0.6, 0.7, 0.8, 0.9, and 1.0. The images were arranged in random order on the same sheet of the questionnaire. Participants were asked to choose only the image they found most sexually attractive. On a subsequent page, the same range of WHRs was shown, this time asking males to choose the image they found most sexually attractive for a long-term relationship.

Study 5 assessed male preferences for female images varying in skin color. Five color variations of the same back-posed female figure (WHR 0.8) were used in this study. Skin tone was altered (using Photoshop 7.0) in a step-wise fashion (by 10 units of brightness and 15 units of contrast) to create two images that were darker and two images that were lighter than the original. The images were placed in random order on a single page and men were asked to select only the image they found most sexually attractive.

Statistical Analysis

In Studies 1–3, a two-way mixed model analysis of variance (ANOVA), with culture as the between-subjects factor and stimulus as the within-subjects factor, was used evaluate the attractiveness ratings. In Studies 4–5, the responses of men in both cultures were compared using a likelihood ratio (*G*-square) test with culture crossed with stimulus. If differences in male preferences across cultures occurred, the table was partitioned according to Agresti (2002) in order to carry out pair-wise comparisons.

Study 1: Female Preferences for Back-Posed Male Images Varying in Somatotype

Figure 1 shows the mean attractiveness ratings as a function of nationality and body type. A 2 (Nationality) × 4 (Somatotype) ANOVA revealed a significant main effect for Somatotype, $F(3, 795) = 532.49$, $p < .0001$, but there was no significant Nationality main effect or a significant Somatotype × Nationality interaction. Post-hoc Scheffé tests showed that the male images depicting mesomorphic and average somatotype were rated as significantly more attractive than the ectomorphic and endomorphic somatotypes (all ps $< .001$). The mesomorphic image was rated as the most attractive but not more so than the average somatotype.

Study 2: Female Preferences for Male Images Varying in Hirsuteness

Figure 2 shows the mean attractiveness ratings as a function of nationality and body type. A 2 (Nationality) × 5 (Hirsutism) ANOVA revealed a significant main effect for hirsutism, $F(4, 1060) = 175.09$, $p < .0001$, but there was no significant Nationality main effect or a Nationality × Hirsutism interaction. Post-hoc Scheffé tests showed that the most attractive image was the male figure lacking any chest or trunk hair and main effects were due to steady declines in attractiveness ratings as images became more hirsute (Fig. 3).

Study 3: Penile Size and Attractiveness

A 2 (Nationality) × 5 (Penile size) ANOVA revealed significant main effects for Penile size, $F(4, 1060) = 218.06$, $p < .0001$ and a significant Nationality × Penile size interaction $F(4, 1060) = 21.74$, $p < .0001$. Post-hoc Scheffé tests showed significant interactions of the repeated measure were due to higher attractiveness scores in California for the images depicting penile lengths 122%, 133%, and 144%, which were rated as significantly more attractive than penile lengths of 78% and 100% ($p < .0001$ for each paired comparison). In New Zealand Scheffé tests showed that penile lengths of 122% and 133% were more attractive than the 78%, 100% or 144% images ($p < .0001$ in each case).

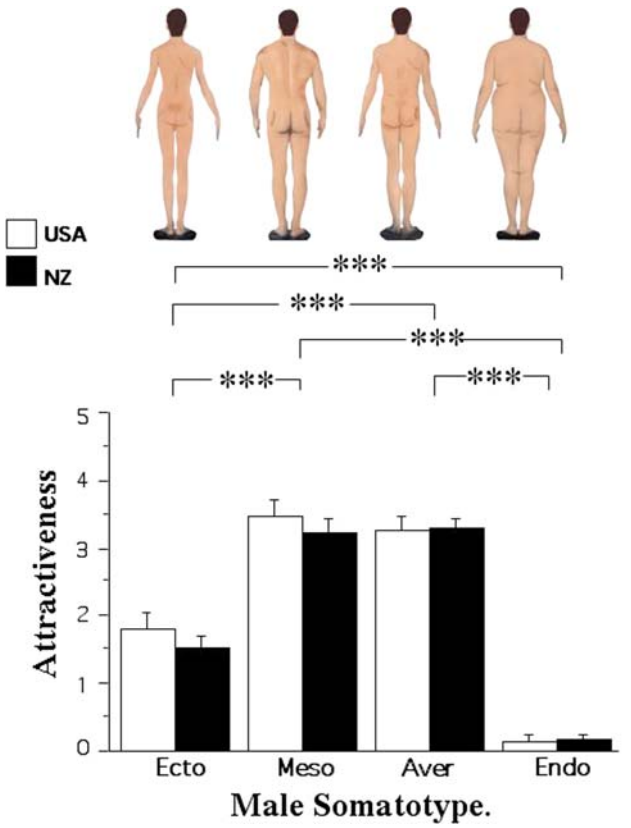

Fig. 1 Women's mean ratings (+SEM) for sexual attractiveness of back-posed male figures of four different somatotypes: ENDO = endomorphic; ECTO = ectomorphic; MESO = mesomorphic; AVER = average body build. ***$p < .001$

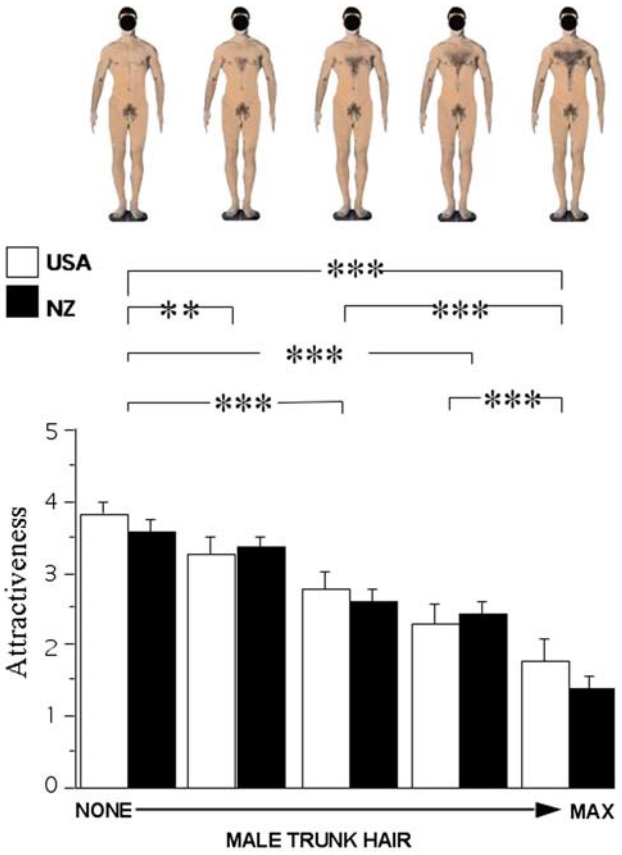

Fig. 2 Women's mean ratings (+SEM) for attractiveness of front-posed male figures which vary only in hirsuteness of the trunk (chest and abdomen). None = no trunk hair; Max = pronounced hirsuteness. **$p < .01$; ***$p < .001$

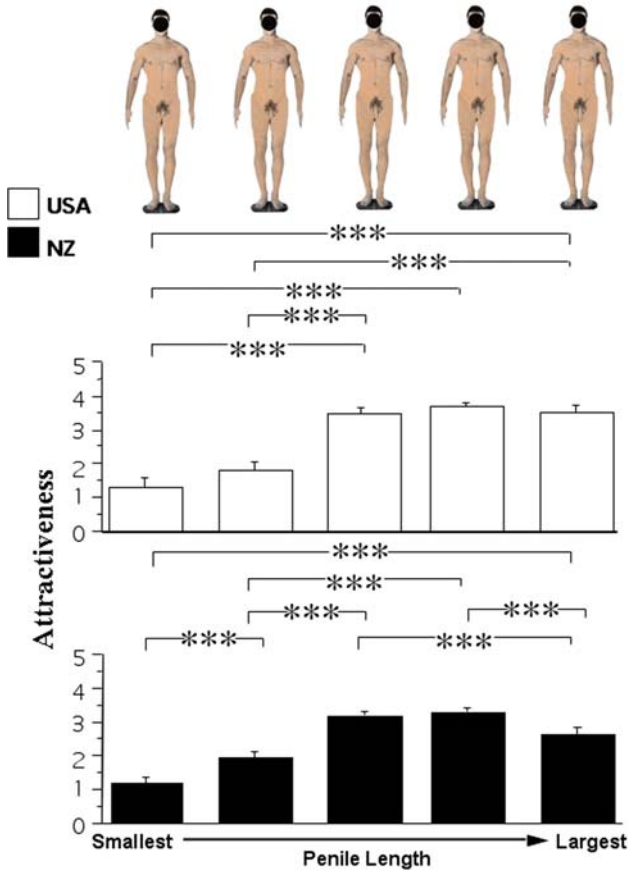

Fig. 3 Women's preferences for images of male figures varying only in length of the (non-erect) penis. Images are in order of increasing size. Data are means (+SEM) ***$p < .001$

Study 4: Men's Ratings of Female Waist-to-Hip Ratios

Due to the absence of selections of the 0.9 and 1.0 WHRs, a 2 (Nationality) × 4 (Waist-to-hip ratio) G^2 test was conducted. The results revealed a significant association between culture and preference for WHR ($G^2 = 26.60$, $df = 3$, $p < .0001$; Table 1a). To uncover where the differences in preferences occurred, the table was partitioned in order to carry out pair-wise comparisons. When comparing selections for a WHR of 0.7–0.8 there was no significant association ($G^2 = 0.019$, $df = 1$, $p = .891$). When comparing a WHR of 0.6 to WHRs of 0.7 and 0.8 there was a significant association between stimuli and culture ($G^2 = 8.69$, $df = 1$, $p = .003$), with men from the USA preferring a lower WHR of 0.6 compared to men from New Zealand who preferred WHRs of 0.7 and 0.8. When comparing male preferences for a WHR of 0.5 to preferences for WHRs 0.6, 0.7 and 0.8 there was a significant association between culture and stimuli ($G^2 = 17.83$, $df = 1$, $p < .0001$). Men from the USA gave higher selections for a 0.5 WHR when compared to men from New Zealand. In general, men from the USA preferred lower WHRs of 0.5 and 0.6 compared to men from New Zealand who preferred WHRs of 0.7 and 0.8.

Table 1 Male preferences for female waist-to-hip ratio (WHR) for attractiveness (A) and long-term relationship (B)

WHR		Culture		Total
		NZ	U.S.	
A.				
0.5	Count	1	13	14
	% Within culture	8%	15.3%	6.8%
0.6	Count	45	43	88
	% Within culture	37.5%	50.6%	42.9%
0.7	Count	47	18	65
	% Within culture	39.2%	21.2%	31.7%
0.8	Count	27	11	38
	% Within culture	22.5%	12.9%	18.5%
B.				
0.5	Count	1	10	11
	% Within culture	8%	11.8%	5.4%
0.6	Count	30	42	72
	% Within culture	25%	49.4%	35.1%
0.7	Count	51	21	72
	% Within culture	42.5%	24.7%	35.1%
0.8	Count	38	12	50
	% Within culture	31.7%	14.1%	24.4%

Men in both cultures were then asked to select the WHR they found most attractive for a long-term relationship. Due to the absence of selections of the 0.9 and 1.0 WHRs, a 2 (Nationality) × 4 (Waist-to-hip ratio) G^2 test was conducted. Table 1 also shows the results of this test, which showed a significant association between WHR preferences and culture ($G^2 = 31.65$, $df = 3$, $p < .0001$). When comparing selections for a WHR of 0.7–0.8 there was no significant association ($G^2 = 0.403$, $df = 1$, $p = .526$). When comparing a WHR of 0.6 to WHRs of 0.7 and 0.8 there was a significant association between stimuli and culture ($G^2 = 18.63$, $df = 1$, $p < .0001$), with men from the USA preferring a lower WHR of 0.6 compared to men from New Zealand who preferred WHRs of 0.7 and 0.8. When comparing male preferences for a WHR of 0.5 to preferences for WHRs 0.6, 0.7 and 0.8, there was a significant association ($G^2 = 12.60$, $df = 1$, $p < .0001$) with men from the USA gave higher selections for a 0.5 WHR when compared to men from New Zealand. In general, men from the USA preferred lower WHRs of 0.5 and 0.6 compared to men from New Zealand who preferred WHRs of 0.7 and 0.8.

Study 5: Men's Ratings of Female Skin Color

Table 2 shows the results of a 2 (Nationality) × 5 (Skin color) G^2 test, which revealed a significant association between

Table 2 Male preferences for female skin tone

Skin tone		Culture		Total
		NZ	U.S.	
Lightest	Count	20	8	28
	% Within culture	16.7%	9.4%	13.7%
Lightest	Count	37	47	84
	% Within culture	30.8%	55.3%	41%
Average	Count	50	26	76
	% Within culture	41.7%	30.6%	37.1%
Darker	Count	10	2	12
	% Within culture	8.3%	2.4%	5.9%
Darkest	Count	3	2	5
	% Within culture	2.5%	2.4%	2.4%

selection and culture ($G^2 = 14.24$, $df = 4$, $p = .007$). When comparing male preferences for the darker and darkest skin tones there was no significant association ($G^2 = 1.00$, $df = 1$, $p = .31$). This trend continued when comparing male preferences between average skin tone and the two darker skin tones ($G^2 = 0.758$, $df = 1$, $p = .38$). When comparing male preferences for the image one degree lighter than average with average and darker skin tones, there was a significant association ($G^2 = 10.16$, $df = 1$, $p < .0001$) with men from the USA preferring the lighter skin tone. No significant association was found when comparing the lightest skin tone to the lighter, average and darker skin tones ($G^2 = 2.30$, $df = 3$, $p = .129$).

Discussion

The study populations examined here comprised mostly young women and men who were attending universities in New Zealand and California. Despite the limitations of the sample, the results obtained provide some useful insights concerning visual cues and human sexual attractiveness.

The female preferences for male somatotypes reported here confirm the findings of previous studies conducted in the UK, Sri Lanka, and Cameroon (Dixson et al., 2003, 2007b). A muscular (mesomorphic) male somatotype was rated as most attractive by women, followed by an average physique. Indeed, in New Zealand and California, ratings for these somatotypes did not differ statistically. In China, by contrast, an average physique was rated as more attractive than a mesomorphic physique (Dixson et al., 2007a). Therefore, while broad shoulders, narrow waistline, high shoulder-to-hip ratio, and defined musculature are clearly important traits influencing female assessments of male physical attractiveness (Hughes & Gallup, 2003; Lynch & Zellner, 1999; Swami & Tovée, 2005b), it is not the case that muscularity is necessarily paramount to female ratings of male somatotypes. In both New Zealand and California, women rated heavily built (endomorphic) masculine images as least attractive, the same result as obtained in the UK, Sri Lanka, Cameroon, and China.

Somatotyping is useful in assessments of physical fitness, including strength, coordination, and endurance. Mesomorphic males are more successful in physical fitness tests, while ecto-mesomorphs perform best at distance running and endo-mesomorphs excel at strength-testing sports (e.g., weight lifting). Endomorphic males exhibit the lowest levels of performance in all these areas (Carter & Heath, 1990). Mesomorphy is also associated with better cardiac function, especially when compared to men who have an endomorphic constitution (Katzmarzyk, Malina, Song, & Bouchard, 1998). During human evolution, natural selection may have favored masculine traits underlying strength and endurance running as well as intellectual traits which are important for hunting and foraging. These factors may have influenced men's ability to succeed in the hunter-gatherer societies from which modern humans evolved (Bramble & Lieberman, 2004; Buss, 2003; Marlowe, 2004). An average body build may be better adapted for endurance running, while muscularity may signal ability to protect a potential mate and to succeed in inter-male competition (Buss, 2003). Although the ecological factors which selected for such masculine traits are not as important in contemporary industrialized societies, sexual selection during human evolution may explain deep-seated female preferences for certain masculine somatotypes.

Compared to many non-human primates, adult human males exhibit relatively well developed secondary sexual traits (e.g., facial and body hair), such as occur in polygynous species (Dixson, Dixson, & Anderson, 2005). Pagel and Bodmer (2003) have suggested that natural selection favored the evolution of hairlessness in *Homo sapiens*, as an adaptation to reduce ecto-parasite loads, but that hair was retained in certain areas of the body due, in part, to effects of sexual selection. Initial studies, conducted in the UK, showed that masculine trunk (chest and abdominal) hair was rated as highly attractive by women (Dixson et al., 2003). However, the current study, involving people of European descent living in New Zealand and California, produced the opposite result. Images of men lacking trunk hair were rated as most attractive, with a progressive decline in scores as hirsutism increased. Similar results were obtained in China (Dixson et al., 2007a), while in Cameroon hirsutism had little effect on women's ratings of male attractiveness (Dixson et al., 2007b). Currently, there is little support for the hypothesis that sexual selection may have influenced the evolution of masculine trunk hair via female mate choice. Cross-cultural studies should continue to examine this question and to collect data from women in older age groups. There is some evidence that younger males in the U.S. are more likely to practice hair removal from the body. Thus, a study of 118 male undergraduate students at the University of South

Florida found that 64% of men were practicing depilation (Boroughs, Cafri, & Thompson, 2005). Although the occurrence of depilation was not measured in the current study, it may have influenced our results given the younger ages of most participants.

In its flaccid state, the human penis is displayed more prominently than is typical of the non-human primates, as it protrudes from the body, it is surrounded by pubic hair, and is more readily visible due to men's upright (bipedal) gait. It has been suggested that penile traits may have been influenced by sexual selection during human evolution (Potts & Short, 1999; Short, 1980), although little attempt has been made to test this hypothesis. In the current studies, women in New Zealand and California rated images of the same male as more, or less, attractive depending upon variation in length of the (non-erect) penis. Although numerical ratings were somewhat higher in the U.S. sample, women in both countries gave the highest ratings to images in which the penis had been lengthened moderately (by 22% and 33%) but rated extremes of penile length (78% and 143% of normal) as less attractive. It may be that such preferences reflect female judgments of what is healthy and normal in a male, while the smallest, and the greatest, penile lengths may be perceived as aesthetically abnormal. Penile width was not altered in these studies, although there is some evidence that both the width and length of the penis influences women's partner satisfaction (Stulhofer, 2006). The results from New Zealand and the U.S. were similar to those obtained in Cameroon and China (Dixson et al., 2007a, 2007b). The (still limited) cross-cultural evidence indicates that penile size has some significance in women's judgments of male attractiveness.

Skin color varies consistently between human populations, so that natural selection may have favored reduction in dark (melanic) skin pigmentation in more northerly latitudes, due to low UV exposure and constraints upon vitamin D metabolism (Jablonski, 2006; Jablonski & Chaplin, 2000). Sexual dimorphism in skin tone has been reported in a number of ethnic groups, with women typically having a lighter skin tone than men (Darwin, 1871; Frost, 1988, 1994). Skin condition may be a visual cue to female health and reproductive condition, as lightening of skin color occurs with the onset of physical maturity (Tanner, 1978). Pregnancy and lactation may bring about localized changes in skin pigmentation, which persist as women age (Symons, 1995). In the current study, men rated images with lighter skin tones as most attractive, especially so in the Californian sample. In New Zealand, men rated the female images of average skin color as most attractive, followed by the image which was lightened by 10 units of brightness and 15 units of contrast. This latter image was the most attractive to California men. Male preference for lighter female skin tones was also significant in studies conducted in China (Dixson et al., 2007a). Hence, our results lend support to the hypothesis that the evolution of lighter skin coloration in women may have been influenced by sexual selection (Darwin, 1871; van den Berghe & Frost, 1986).

It is possible, although it remains to be determined, that skin color may interact with hair color to influence male perceptions of female attractiveness. Thus, women with blond hair and tanned skin may appear darker than a brunette with the same skin tone. Further research is required to examine this question. Furthermore, subtle changes in female skin tone may occur during menstrual cycles (Roberts et al., 2004) and women's complexions may reflect differences in estrogenic effects upon cues which influence attractiveness (Fink, Grammer, & Matts, 2006; Law-Smith et al., 2006). Further cross-cultural studies to measure the effects of female skin tone upon attractiveness and the relevance of naturally occurring sex differences in skin coloration would be valuable.

Female WHR was an important determinant of male preferences in both New Zealand and California. The female image depicting a WHR of 0.6 was most attractive to men in California, both for attractiveness ratings and when considering a long-term relationship. A WHR of 0.6 and 0.7 received significantly higher scores for attractiveness in New Zealand. However, when a long-term relationship was considered, men no longer preferred a female WHR of 0.6; instead, more participants chose the images with WHRs of 0.7 and 0.8. This suggests that men may alter their mate preferences when considering long-term relationships, as is thought to be the case for some other female traits (Buss & Schmidt, 1993).

Research using line drawings has been criticized for not representing significantly realistic images of human physique, and for confounding possible effects of WHR and BMI upon female attractiveness (Tovée & Cornelissen, 2001). These are valid criticisms. The results reported here are consistent with Singh's (1993a) theory that female WHR may act as a first pass filter in men's judgments of female attractiveness, as WHR provides a reliable cue to reproductive health and fecundity (Singh, 2002, 2006). However, the images we used in studies conducted in New Zealand, the U.S., and elsewhere do not allow a distinction to be made between the relative importance of female WHR and BMI in men's judgments of attractiveness, as the two variables are positively correlated. What is clear, however, is that despite living in different cultural and physical environments, young men and women in New Zealand and California exhibit consistent and very similar preferences for sexually dimorphic traits important for mate choice.

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