



Misperceptions of opposite-sex preferences for thinness and muscularity

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Thin and muscular have been characterized as ideals for women and men, respectively. Little research has investigated whether men and women have accurate perceptions of opposite-sex preferences of thinness and muscularity. Further, no study has explored whether opposite-sex perceptions of thinness and muscularity preferences differ for short-term and long-term relationships. The present study set out to address these questions. We used interactive 3D human models to represent bodies varying in size (body mass index/BMI weight scaled by height) and body composition. University-aged (18–31) White European heterosexual men and women were asked to choose their own and ideal body shape, the ideal body shape for a short- and a long-term partner, and the body shape they thought the opposite-sex would most like for short- and long-term partners. Women overestimated the thinness that men prefer in a partner and men overestimated the heaviness and muscularity that women prefer in a partner. These misperceptions were more exaggerated for short-term relationships than for long-term relationships. The results illustrate the importance of investigating misperceptions of opposite-sex preferences and raise the possibility that correcting misperceptions might have utility in reducing body dissatisfaction or eating disorders.

Body image is a prevalent concern in men and women in many areas of the world (Kelley, Neufeld, & Musher-Eizenman, 2010; Olivardia, Pope, Borowiecki, & Cohane, 2004; Runfola *et al.*, 2013). Body image concern is associated with diverse psychological problems including depression, low self-esteem and eating disorders (Olivardia *et al.*, 2004; Stice, 2002). The trend for a thin ideal is evident even in childhood (Brown & Slaughter, 2011; Truby & Paxton, 2002).

It is well documented that the ideal female figure is thin in Western countries (Swami, 2015), while leanness and muscularity have recently become an ideal for men in the West (Thompson & Cafri, 2007). As a result, a drive for thinness and low body fat is developed in women and men, respectively (Kelley *et al.*, 2010). Young women take part in unhealthy weight-loss behaviour like dieting, using laxatives, and self-induced vomiting to attain their ideal bodies (Wharton, Adams, & Hampl, 2008), which could damage health in the long run. On the other hand, men are more likely than women to engage in excessive exercise and to take anabolic steroids and protein supplements to build up muscles (Cafri, van den Berg, & Thompson, 2006; Linden, 2002). While exercise and increased muscle are

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generally associated with health and fitness, taking (non-medically prescribed) anabolic steroids increases mortality, morbidity, and infertility in men (Horwitz, Andersen, & Dalhoff, 2019; Mossman & Pacey, 2019).

Media exposure, peer comparison, and family pressure have been identified as factors contributing to body dissatisfaction (Smolak, 2009). An additional factor that might lead to body dissatisfaction is the misperception of opposite-sex preferences. Evolutionary psychologists propose that attractiveness is an important determinant of mate decisions (Li & Kenrick, 2006; Symons, 1979). Body size (represented as body mass index/BMI, which is weight scaled by squared height kg/m^2) has been identified as an important cue to attractiveness in women (Tovée, Maisey, Emery, & Cornelissen, 1999). Similarly, muscularity affects male attractiveness (Frederick & Haselton, 2007). Therefore, the perception of opposite-sex preferences for body size and body muscularity might have an impact on own body image. Body dissatisfaction might result from the discrepancy between one's own body and the perception of the body shape preferred by the opposite-sex. Indeed, one study has shown that women's misperception of men's preference for thinness is associated with eating disorders (Bergstrom, Neighbors, & Lewis, 2004). Specifically, the higher the discrepancy between women's estimate of men's preference for women's thinness and men's actual preference, the more unhealthy eating attitudes women report. Thus, it is important to examine the accuracy of men and women's perception of opposite-sex preferences.

Little research has explored whether the two sexes agree on what is an attractive female physique. Results of such work are not consistent, with some studies reporting that females tend to exaggerate the thinness that men desire (Bergstrom *et al.*, 2004; Grossbard, Neighbors, & Larimer, 2011) and other studies stating that men and women have a similar perception of the attractiveness of female body size (Coetzee, Re, Perrett, Tiddeman, & Xiao, 2011; Crossley, Cornelissen, & Tovée, 2012; Stephen & Perera, 2014). Similarly, the existence of sex differences in the perception of male body attractiveness remains unclear. Some studies report that men tend to exaggerate the muscularity that women prefer (Crossley *et al.*, 2012; Demarest & Allen, 2000; Grossbard *et al.*, 2011), while other studies indicate that both sexes share the same ideal (Bergstrom *et al.*, 2004).

Historically, studies examining sex differences of body attractiveness have focused on body size but it should be noted that there is an increasing trend for women to desire for themselves both a thin and a toned body physique rather than just a super skinny body (Kelley *et al.*, 2010). Hence, it is necessary to address both body size and body muscularity preferences in men and women.

Another important yet commonly ignored factor which might influence attractiveness judgements is the relationship context. Prior research has shown that women and men have different mating strategies for short-term and long-term relationships (Buss & Schmitt, 1993; Gangestad & Simpson, 2000). Specifically, physical attractiveness is highly valued by both sexes in short-term relationships (Li & Kenrick, 2006). As a result, whatever is seen as attractive might be exaggerated for short-term relationships. It follows that if there is any misperception of opposite-sex preference, it is more likely to occur in the context of short-term relationships. By asking for short-term and long-term preferences, we might be able to find that men and women have accurate perceptions of opposite-sex preferences for long-term relationships and misperceptions for short-term relationships.

Evolutionary psychologists propose that the perception of attractiveness reflects an adaptation for identifying healthy mates to increase the probability of passing good genes to the next generation (Gangestad & Simpson, 2000; Gangestad, Thornhill, & Garver-

Apgar, 2005). Based on this criterion, health judgements should in principle parallel attractiveness judgements. Indeed, the link between overweight status and health disorders (e.g. diabetes, cardiovascular disease) is well established (Gómez-Ambrosi *et al.*, 2011; Nicklas *et al.*, 2004). Likewise, muscularity is found to positively predict general health and fitness (Hönekopp, Rudolph, Beier, Liebert, & Müller, 2007; Johnson, de Ruiter, Kyvik, Murray, & Sørensen, 2015). One study, however, found that the most attractive female body was thinner (lower BMI) than the body perceived as most healthy (Stephen & Perera, 2014). More specifically, researchers found that this discrepancy for female bodies was driven by the preference for lower fat mass, as observers did not differ in the amount of muscle mass that was seen as most attractive and healthiest (Brierley, Brooks, Mond, Stevenson, & Stephen, 2016). By contrast, the most attractive and healthy male bodies were comprised of a similar fat mass and muscle mass (Brierley *et al.*, 2016). Nonetheless, studies of this kind are limited and the sample size in the study by Brierley *et al.* (2016) was relatively small (66 participants). Therefore, further examination with larger samples is needed to provide more evidence for the argument that attractiveness judgements reflect the adaptation for identifying healthy mates.

In the current study, we aimed to find out whether or not men and women have accurate perceptions of opposite-sex preferences of body size and body composition. If there is a discrepancy, we predict it is more likely to exist in judgements of short-term partners than long-term partners. Specifically, we predict women think men desire thinner and less fat female bodies than men actually do; conversely, men think women desire heavier and more muscular male bodies than women actually do. Additionally, we investigated whether people's preference for partners reflect their perception of healthiness. Findings from previous studies showed that female bodies perceived as most attractive are thinner than female bodies perceived as most healthy (Brierley *et al.*, 2016; Stephen & Perera, 2014). Therefore, we predict that what men find attractive in female bodies will be thinner than what men regard as healthy. Furthermore, we expect any attractiveness – health discrepancy to be more prevalent when judgements are made about short-term relationships rather than long-term relationships. By contrast, based on Brierley *et al.*'s (2016) findings, we predict that there will be no difference in the body size and body muscularity between the most preferred and the healthiest male bodies chosen by women.

Method

All work was approved by the Ethics Committee of the affiliated University (PS13176 and PS13092). All participants gave informed consent.

Participants

Participants were White Europeans recruited in the UK. The majority of participants were recruited online from Prolific including 75 males and 75 females. All participants received £2 as a reward. Pre-screening criteria were applied as following: age between 18 and 26 years old, heterosexual, White European ethnicity, and living in the UK. Another group of participants were undergraduates recruited from a University in UK. Participation was voluntary. The module controller sent out the experiment link via email. The class was predominantly made up of women and of those that volunteered there were insufficient men to warrant analysis. These recruitments resulted in 99 White European women

(including both Prolific users and students; $M_{\text{age}} \pm SD = 20.84 \pm 2.48$, range 17–26 years) and 70 White European men ($M_{\text{age}} \pm SD = 21.71 \pm 2.22$, range 18–25 years) after excluding those who did not meet the criteria aforementioned.

Stimuli

The stimuli consisted of male and female body models obtained from a mobile phone app ‘BMI 3D PRO’. One male and one female body models (front view) were adjusted covering a wide range of BMI in 1 unit intervals (18–30 for male and 16–28 for female). At each BMI level, the body models were then adjusted to represent different levels of Fat%. BMI 3D PRO does not allow simulation of body muscle independent of body fat but given the strong negative relation between fat and muscle, we refer to muscularity as 1-Fat %.¹ For the male stimuli, the body was adjusted to represent body fat percentages from 12% to 22% in 1 unit intervals. The female body was adjusted to cover body fat percentages from 22% to 32% with 1 unit intervals. It was impossible to adjust the bodies to represent a high body fat percentage for bodies with a low BMI level. In order to make a rectangular matrix of 13×11 body images (BMI \times Fat%) for body images at low BMI levels, images showing the highest Fat% of that BMI level were duplicated to make the matrix (see Tables S1 and S2 in Supporting Information). This means that the matrix contained only a biologically plausible range of body shapes.

The head was cropped to remove confounding information (see Figure 1 for male body and Figure 2 for female body). All images were resized to 540×680 pixels.

Procedure

Participants were first asked to complete a demographic questionnaire about age, sex, sexual orientation, residence, and ethnicity. The male and female bodies were presented as interactive 2D matrices. Moving the mouse vertically adjusted the apparent BMI (13 levels) while moving horizontally adjusted the apparent Fat% (11 levels). The image presented at the start of each trial was randomized. Participants were asked to adjust the body shape following the instruction shown above each image. Participants were not informed as to the nature of the body transformations. Participants were asked to complete 8 trials in which they were presented with an image of the same-sex body and were asked to adjust BMI and body fat percentage to reflect their own body shape (trial 1), their ideal body shape (trial 2), the body shape that a heterosexual opposite-sex individual would find most attractive for short-term (trial 3) and long-term (trial 4) relationships (trials 3 and 4 were presented in a random order). When presented with opposite-sex bodies, participants were asked to, again, adjust BMI and body fat percentage to reflect their own preferences in an opposite-sex body for short-term (trial 5) and long-term (trial 6) partners (trials 5 and 6 were presented in a random order). Further, participants were asked to make the female (trial 7) and male (trial 8) bodies look as healthy as possible. There was no time limit to make adjustments. The next stimulus was shown only after participants had made changes.

¹ In data sets used in two previous studies, we find that for men ($N = 101, 79$ respectively) the effect size relating impedance measured Fat% to muscle mass was 0.75–0.85, controlling for body weight (Lei et al., 2018; Perrett, Talamas, Cairns, & Henderson, 2020).

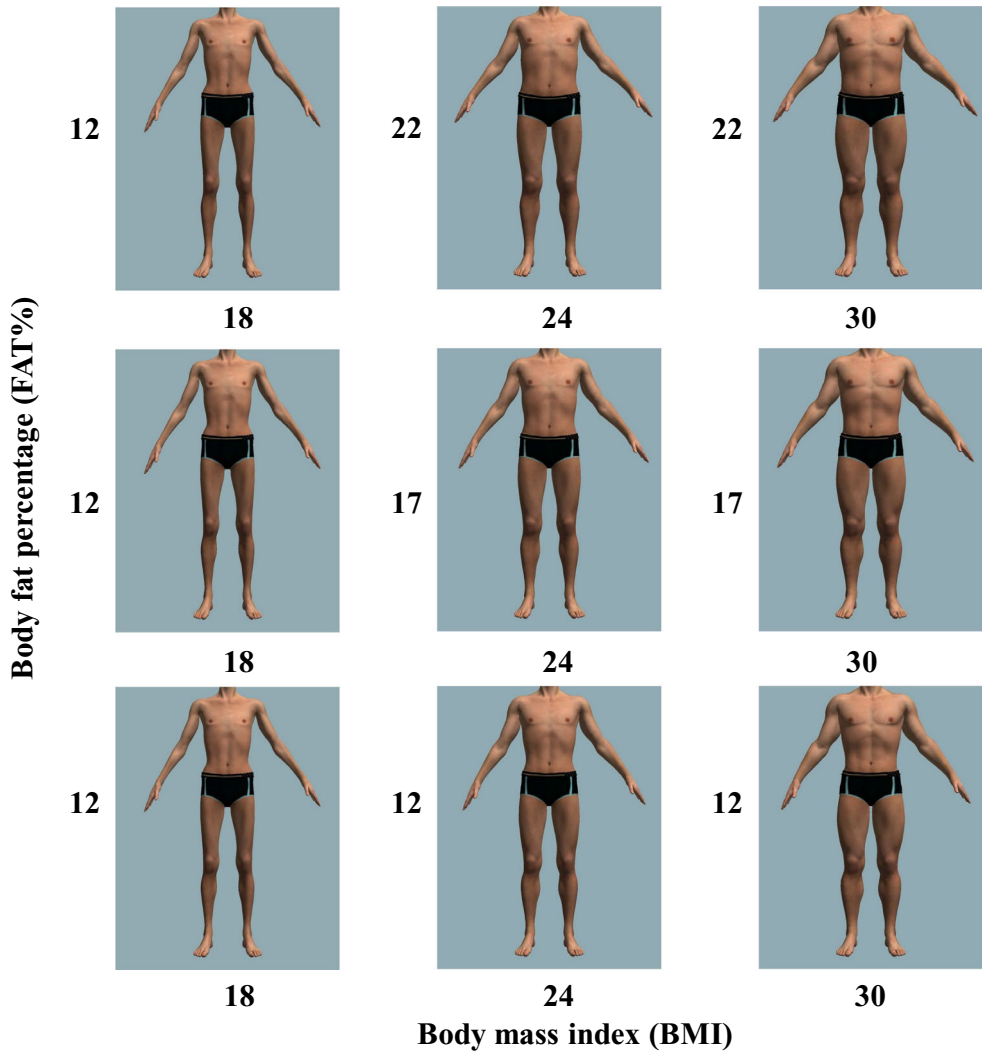


Figure 1. The male bodies represent different levels of BMI and Fat%. This figure depicts the end- and mid-points of the interactive male body images. Left to right depicts BMI increase; bottom to top depicts Fat% increase (bodies at low BMI levels show limited ranges of Fat%).

Statistical analysis

The BMI and Fat% values selected were saved for each trial. Data were analysed in SPSS 24.0. Data were first checked for distribution and outliers for male and female participants separately. Data values above or below 3 standard deviations from the mean were removed (0.2%). Results of Kolmogorov–Smirnov tests showed that all variables were not normally distributed. Nonetheless, a growing number of studies conclude that tests are robust to non-normality (Fagerland, 2012; Poncet, Courvoisier, Combescure, & Perneger, 2016; Sawilowsky & Blair, 1992; Skovlund & Fenstad, 2001). Considering the sample size was not small and data were not ordinal or ranked, parametric tests were used (note: non-parametric tests revealed same pattern of results).

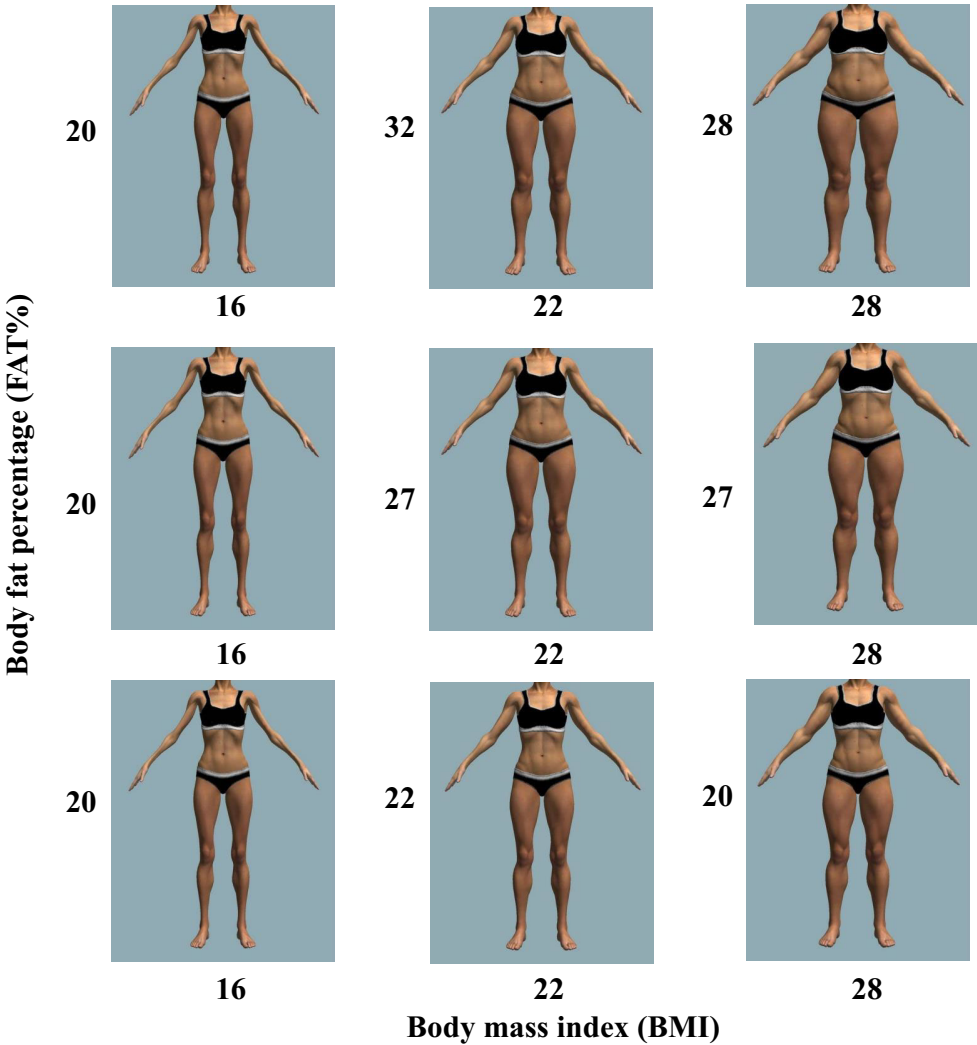


Figure 2. The female bodies represent different levels of BMI and Fat%. This figure depicts the end- and mid-points of the interactive female body images. Left to right depicts BMI increase; bottom to top depicts Fat% increase (but bodies at low BMI levels show limited ranges of Fat%).

Independent-samples tests were conducted comparing women’s and men’s preferences for body size and muscularity for short- and long-term relationships to test whether participants have accurate perceptions of opposite-sex desires. Paired-samples tests were conducted comparing participants’ ideal body shape and their own body shape to test whether there is discrepancy between the ideal and own body; any discrepancy was regarded as a proxy for body dissatisfaction. Paired-samples tests also compared the ideal and the healthiest body shape to test whether the ideal body shape is seen as most healthy. In addition, paired-samples tests were run comparing preferences and health judgements of opposite-sex bodies to test whether attractiveness reflects health perception. Furthermore, paired-samples tests were run comparing men’s and women’s short-term versus long-term preferences to test whether men and women have different preferences

Table 1. Misperception of opposite-sex body size (BMI) and body muscularity (Fat%) preferences

Preference	Judgement	Women's choice	Men's choice	t Value	p Value	d Value
BMI	Short-term male body	25.80	27.14	-2.685	.008	.40
	Long-term male body	25.64	26.78	-2.821	.005	.43
	Short-term female body	20.70	23.01	-5.805	<.001	.91
Fat%	Long-term female body	22.04	23.46	-3.663	<.001	.57
	Short-term male body	14.49	13.46	3.272	.001	.54
	Long-term male body	14.99	14.22	2.408	.017	.39
	Short-term female body	23.17	23.65	-1.884	.061	.31
	Long-term female body	24.09	23.80	1.047	.297	.16

Notes. Long-term = long-term relationship; short-term = short-term relationship.

for short- and long-term relationships. Paired-samples tests were also run comparing the perceptions of opposite-sex preferences for short- and long-term relationships to test whether perceptions of opposite-sex preferences are exaggerated for short-term compared to long-term relationships.

Additionally, linear regressions were conducted to test for the possible relationship of misperception of opposite-sex preferences to a proxy for body dissatisfaction. The discrepancy between the participant's choice of an ideal body shape and their choice of their own body shape was used as a proxy measure for body dissatisfaction. The discrepancies between participant's own and ideal BMI and Fat% were entered as dependent variables separately for men and women. Own BMI or Fat% was controlled for when predicting misperceptions of opposite-sex preferences. Since the misperceptions were expected to be exaggerated for short-term relationships compared to long-term relationships, misperception of preferences for short-term partners was used as the independent variable.

Results

Misperceptions of opposite-sex preferences

Table 1 shows the descriptive statistics for the BMI and Fat% that women and men preferred and what they thought the opposite-sex would prefer in terms of short- and long-term relationships (see Figure 3 for illustrations). Independent-samples test results (see Table 1 for details) showed that men overestimated the BMI and underestimated the Fat% that women prefer for both short- and long-term relationships, all $ps \leq .017$. Conversely, women underestimated the BMI that men prefer for short- and long-term relationships ($ps < .001$). The Fat% of female bodies chosen for long- and short-term relationships did not significantly differ between men and women.

Comparisons of own and ideal bodies

Table 2 presents the descriptive statistics for the BMI and Fat% of participants' perceptions of their own bodies and ideal bodies² (see Figure 4 for illustrations).

² An independent sample ($N = 51$ White women, $M_{age} \pm SD = 18.76 \pm 0.97$, range 17–22 years) showed the same results with the own and ideal bodies judgements counterbalanced. That is ideal BMI ($M = 21.61$, $SD = 2.29$) was significantly lower than own BMI ($M = 23.47$, $SD = 2.75$) ($t = -5.64$, $p < .001$); and ideal Fat% ($M = 23.90$, $SD = 1.76$) was significantly lower than own Fat% ($M = 25.33$, $SD = 2.43$) ($t = -4.226$, $p < .001$).

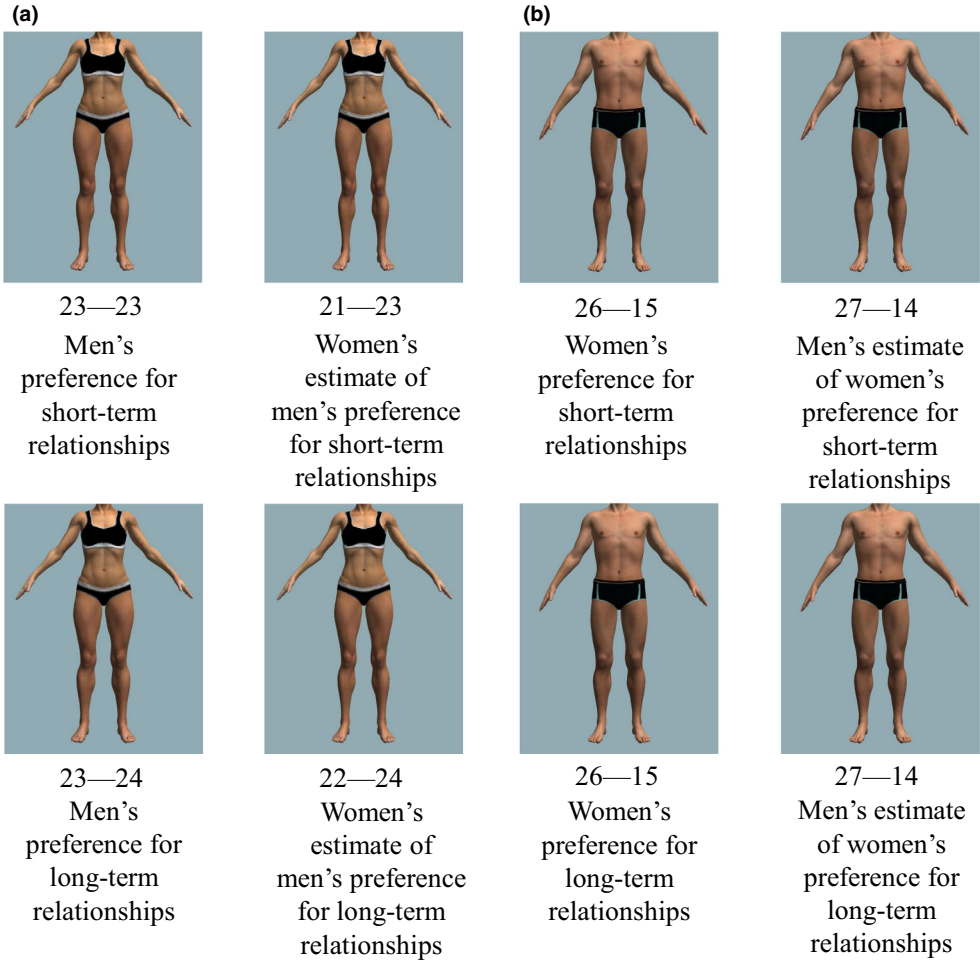


Figure 3. Body shape preferred for short- and long-term relationships. The first number represents BMI and the second number represents Fat%. Panel (A) shows the female bodies that men actually preferred (left column) and those that women think men preferred (right column) for short-term (top row) and long-term (bottom row) relationships. Panel (B) shows the male bodies that women actually preferred (left column) and those that men think women preferred (right column) for short-term (top row) and long-term (bottom row) relationships.

Table 2. Comparison of participants' own body and ideal body shapes

Preference	Sex	Own body	Ideal body	t Value	p Value	d Value
BMI	Women	22.92	21.27	5.873	<.001	.59
	Men	24.59	26.77	-5.114	<.001	.60
Fat%	Women	25.48	23.60	7.211	<.001	.72
	Men	14.97	13.54	3.942	<.001	.48

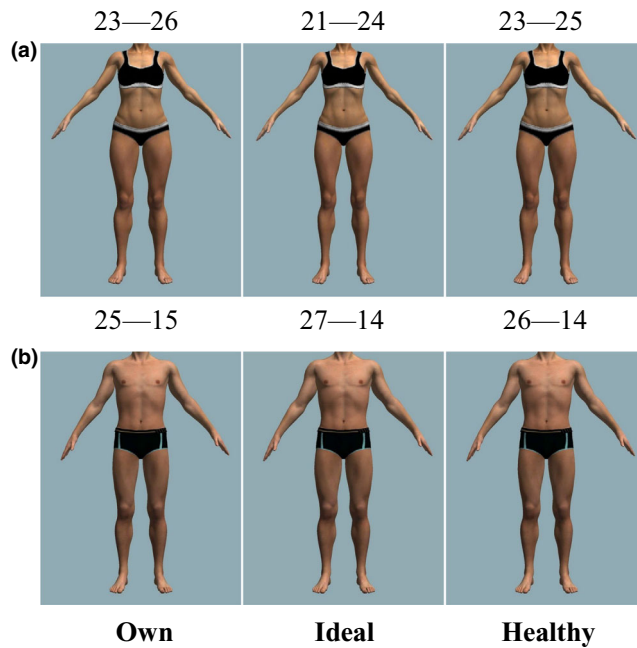


Figure 4. Participants' own bodies (left column), ideal bodies (middle column), and perceived healthiest bodies (right bodies) set by White European female (A) and male (B) participants. The first number represents BMI and the second number represents Fat%.

Paired-samples tests (see Table 2 for details) showed that the BMI and Fat% values of participants' own and ideal bodies are significantly different both in men and women ($ps < .001$). For women, own body BMI and Fat% were higher than their ideals. For men, own BMI was lower than the ideal and the Fat% of their own body was higher than their ideal.

Comparisons of ideal and healthy same-sex bodies

Table 3 presents the descriptive statistics for the BMI and Fat% of the ideal and healthiest bodies set by participants (see Figure 4 for illustrations). Paired-samples tests (see Table 3 for details) showed that the BMI and Fat% values of women's ideal bodies were significantly lower than the healthiest bodies ($ps < .001$). By contrast, men set a higher

Table 3. Comparison of participants' perceptions of ideal same-sex body shape and healthiest same-sex body shape

Preference	Sex	Ideal body	Healthy body	t Value	p Value	d Value
BMI	Women	21.27	23.07	-6.262	<.001	.63
	Men	26.90	26.03	2.625	.011	.32
Fat%	Women	23.60	24.45	-4.627	<.001	.46
	Men	13.54	13.62	-0.361	.719	.04

Table 4. Comparison of participants' perception of the healthiest body shape of opposite-sex and preference for the body shape of opposite-sex for long-term and short-term relationships

Preference	Sex of body	Sex of participants	Health	Term	Preference	t Value	p Value	d Value
BMI	Female	Men	23.57	Short-term	23.01	1.640	.106	.18
				Long-term	23.46	0.285	.776	.02
	Male	Women	25.88	Short-term	25.82	0.229	.819	.02
				Long-term	25.68	0.784	.435	.08
Fat%	Female	Men	23.97	Short-term	23.65	1.372	.175	.15
				Long-term	23.80	0.789	.433	.10
	Male	Women	14.84	Short-term	14.49	1.683	.096	.17
				Long-term	14.99	-0.701	.485	.07

BMI for the ideal than for the healthiest body ($p = .011$) but did not set different Fat% values for the ideal and the healthiest male bodies ($p = .719$).

Comparisons of healthy and preferred opposite-sex bodies

Table 4 presents the descriptive statistics for the BMI and Fat% that participants preferred in partners as well as the corresponding values for the healthiest body perceived for the opposite-sex. Paired-samples tests (see Table 5 for details) showed that men and women did not have significantly different judgements for what they preferred in partners and what they thought was healthy in opposite-sex bodies. This was true for partner preferences in both short-term and long-term relationships.

Comparisons of short- and long-term relationship preferences

Table 1 presents the descriptive statistics for men and women's preferences for body size and body muscularity as well as their perceptions of the opposite-sex preferences for short- and long-term relationships. Results of paired-samples tests (see Table 5 for details) showed that participants perceived the opposite-sex to have different preferences for short- and long-term relationships. Specifically, women perceived men as preferring lower BMI and Fat% for short-term than for long-term relationships ($ps < .001$), and men perceived women as preferring lower Fat% for short-term than long-term relationships ($p = .019$) but perceptions across sexes were aligned for men's BMI. In reality, both men and women did not show significantly different preferences for the opposite-sex body shape between short- and long-term relationships at all ($ps > .127$).

Table 5. Comparison of preferences for short-term and long-term relationships

Preference	Sex of body	Sex of participants	t Value	p Value	d Value
BMI	Female	Women	5.150	<.001	.41
		Men	-0.867	.389	.16
	Male	Women	-0.590	.556	.06
		Men	-0.867	.389	.010
Fat%	Female	Women	4.215	<.001	.42
		Men	0.100	.920	.07
	Male	Women	1.538	.127	.21
		Men	2.396	.019	.30

Table 6. Results of regression analyses of the effects of misperceptions of opposite-sex preferences on body dissatisfaction

Dependent variables	Independent variables	B	SE	p	CI	F	R ²
Women's own – ideal BMI	Own BMI	.449	.071	<.001	[0.308, 0.590]	26.232	.353
	Perceptions of men's BMI preference	–.349	.071	<.001	[–0.491, –0.207]		
Women's own – ideal FAT%	Own FAT%	.584	.056	<.001	[0.473, 0.695]	54.482	.532
	Perceptions of men's FAT preference	–.101	.092	.276	[–0.283, 0.082]		
Men's own – ideal BMI	Own BMI	–.433	.075	<.001	[–0.583, –0.284]	19.520	.372
	Perceptions of women's BMI preference	.238	.073	.002	[0.093, 0.383]		
Men's own – ideal FAT%	Own FAT%	.651	.074	<.001	[0.503, 0.799]	38.946	.541
	Perceptions of women's FAT% preference	–.049	.099	.618	[–0.246, 0.148]		

Effects of misperceptions of opposite-sex preferences on body dissatisfaction

Results (see Table 6 for details) indicated that body dissatisfaction was predicted by misperceptions of opposite-sex preferences both in men and women. Specifically, for women, the more they think that men prefer lower BMI for short-term partners, the more dissatisfied they are with their bodies. For men, the more they think that women prefer higher BMI for short-term partners, the more dissatisfied they are with their bodies. The results suggest that misperceptions of opposite-sex preferences for body shape do affect an individual's body image satisfaction. Perception of opposite-sex preferences for Fat% did not predict the discrepancy between own and ideal Fat%.

Discussion

One aim of the present study was to find out whether there are misperceptions of opposite-sex preferences for body size and body muscularity. Consistent with some prior studies (Bergstrom *et al.*, 2004; Grossbard *et al.*, 2011), the results showed that women misperceive and exaggerate the thinness that men prefer for both short-term and long-term partners. Likewise, we found that men tend to overemphasize the heaviness and muscularity of bodies that women prefer, in line with previous findings (Crossley *et al.*, 2012; Demarest & Allen, 2000; Grossbard *et al.*, 2011). Additionally, the current study extended previous findings by showing that the misperceptions were more exaggerated for judgements in short-term relationships than long-term relationships. A second aim was to compare the body shape perceived as most attractive with the shape perceived to be healthiest. We found that the most desirable body characteristics in a partner were seen as most healthy.

Misperceptions of opposite-sex desires

An alternative account of the misperception is that perception of opposite-sex desires is accurate but that own preferences are under-emphasized. For instance, women may accurately perceive men's preference for thinness, though men may under-report their preference for thinness for social desirability reasons. While possible, the data collected

here were anonymous so there was no need for participants to misrepresent their own preferences. Nonetheless, future studies could solicit opinions about body shape that men think other men find attractive.

The misperceptions of opposite-sex preferences might result from sexual selection pressure to increase own mate value. Since attractiveness plays an important role in mate decisions, attractive features should be detectable, and perception of those feature values regarded as optimal might be exaggerated by intrasexual competition. For example, muscular men are reported to have more total lifetime partners and short-term partners than less muscular men (Frederick & Haselton, 2007), suggesting that muscularity is desirable in women's mate decisions. Consequently, men might misperceive the extent to which women prefer muscularity. In other words, men might believe the more muscular they are, the better their chance of mating.

Frederick Fessler and Haselton (2005) provided an alternative explanation for the misperception based on differences in the ideals portrayed in magazines targeting men and women. Frederick Fessler and Haselton (2005) found that men portrayed in magazines targeted at male audiences are more muscular than men portrayed in magazines targeted at women. Since media exposure plays an important part in shaping body ideals (Smolak, 2009), the different body models presented to men and women might explain the discrepancy between what women want and what men think they want. Nevertheless, it is unknown whether the female body shapes portrayed in media targeted at men and women are different or not. Future studies should examine this issue to help define possible causes of misperception.

We note that our findings are not completely consistent with prior studies as some studies showed that both sexes have similar perceptions of attractiveness (Coetzee *et al.*, 2011; Crossley *et al.*, 2012; Stephen & Perera, 2014). The divergence in results might result from the different questions asked. Participants in the experiments of Coetzee *et al.* (2011) and Stephen and Perera (2014) were simply asked to rate attractiveness without reference to what the other sex would like. In contrast, participants in the current study were specifically asked to judge what heterosexual opposite-sex individuals would prefer for short- and long-term relationships. Collectively, these findings suggest that men and women have similar notions of the way in which an ideal male or female body differs from average but the extent to which that ideal differs from average gets exaggerated when considering opposite-sex preferences, particularly in a short-term relationship context.

Evolutionary psychologists argue that there are different mating strategies for different mating contexts. Physical attractiveness was found to be particularly important for both sexes when considering short-term relationships (Li & Kenrick, 2006). Therefore, standards of attractiveness should be higher when choosing short-term partners. In fact, many studies have revealed that women have a stronger preference for masculinity when considering short-term partners compared to long-term partners (Jones *et al.*, 2018; Lei, Holzleitner, & Perrett, 2016; Little, Jones, Penton-Voak, Burt, & Perrett, 2002; Penton-Voak *et al.*, 2003). Likewise, men prefer more feminine female faces when considering short-term partners compared to long-term partners (Little, Jones, Feinberg, & Perrett, 2014). Yet, in the current study, no differences in preferences for partner's body size and muscularity were found for short- and long-term relationships in either sex. Nevertheless, both men and women showed misperceptions of opposite-sex preferences. To be specific, women mistakenly believed that greater thinness and lower body fat was required by men for ideal attractiveness in a short-term partner and men believed more muscularity was desired by women for an ideal short-term partner. The misperceptions imply that people are aware of dual mating strategies and believe the opposite-sex has

higher beauty standards for short-term than for long-term relationships. Literature on men and women's short-term and long-term preferences for body size and body muscularity is limited; therefore, our findings warrant further investigation.

Health and attractiveness

Sexual selection theory proposes that attractive features signal health and should be perceived as healthy. We found that men and women chose similar opposite-sex body shapes to optimize health and attractiveness. Although these results are in line with sexual selection theories, they are run contrary to some previous reports. Malaysian men and women chose a lower BMI in female bodies for attractiveness than for health (Stephen & Perera, 2014). Likewise, Australian men and women are also reported to choose a lower BMI in female bodies for attractiveness than for health (Brierley *et al.*, 2016).

It should be noted that these studies combined the data from male and female participants, while the current study kept the data separate for each sex and focused only on judgements of the opposite-sex body shape. By analysing male and female results separately, Brierley *et al.* (2016) found that it was only women who chose a different weight for female body attractiveness and health. Men did not show a difference between these two judgements for female bodies, which is consistent with our findings. Thus, the discrepancy between the body shape of attractive and healthy females only arises in the minds of women.

Interestingly, although what men and women actually preferred in opposite-sex bodies was concordant with what *was* perceived as healthiest, when men and women think about what would be ideal for their own body, this differs from the body shape they know to be healthy for their sex. Specifically, women's notion of an ideal female body is thinner and lower in body fat compared to the body shape women perceived as healthiest. Conversely, men's notion of an ideal male body is heavier than the body shape men perceived as healthiest. Thus, it is salient then that men and women are aware that their ideal body does not reflect the healthiest state. These findings suggest that young adults place greater importance on being attractive than being healthy. Therefore, interventions for eating disorders or body dissatisfaction are unlikely to be effective if they focus on emphasizing the importance of possessing healthy bodies.

It has been revealed that women's misperceptions of men's preferences for thinness are positively associated with eating disorders and negative body attitudes (Bergstrom *et al.*, 2004). Similarly, the current study shows that men's and women's body dissatisfaction is associated with what they perceive the opposite-sex prefer. Therefore, correcting misperceptions of opposite-sex preferences might help to prevent and treat eating disorders or body dissatisfaction among young men and women. Moreover, the sample in the present study was mainly young adults at an age where they may be looking for partners. In other words, the perception of attractiveness in the opposite-sex might play an important role in shaping attitudes of body image and eating behaviour for this group. In the past few decades, media exposure has been the focus of body image studies. Our findings provide evidence to support further research on the impact that misperceptions of opposite-sex preferences have on body dissatisfaction.

Caveats

It is worth noting that although the BMI and Fat% of the own ideal and preferred partner bodies are within the healthy range, the values may not truly represent realistic human

figures. The body models used in the current study were generated through a mobile app. The extent to which the models accurately reflect the body weight and muscularity of real human bodies remains unclear. Compared with previous findings (Stephen & Perera, 2014; Tovée, Reinhardt, Emery, & Cornelissen, 1998), the ideal female body figure found in the current study is heavier in terms of BMI. For example, the associated BMI of the attractive female bodies or faces found in previous studies was as low as 17 (Stephen & Perera, 2014), and the highest was around 20 (Tovée *et al.*, 1998). The BMI of women's ideal body figure in the present study is around 21 and this figure is even higher for men's preference, which is around 22. Clearly, the ideal female body size is higher in the current study than in previous studies. By the same token, the ideal male body size might also be higher compared to previous work. The discrepancy of the most attractive BMI between the current and previous studies might be due to the different stimuli used. The 3D human body models used in the current study might appear thinner than 2D human body's photographs used in previous studies given the same BMI. In fact, one previous study has found that BMI of the most desirable 3D male faces is higher than that of the 2D male faces (Lei *et al.*, 2018). Future study comparing the accuracy of perception of weight from 2D and 3D images might provide more understanding.

Previously, studies examining preferences of body size mainly used line drawings or photographs of different individuals; few used controlled interactive photographs or model images. Even though some studies used real individual body images, body composition was not taken into consideration. Future studies exploring the body weight and shape that are attractive in men and women should use realistic photographs of human bodies and control for other body parameters that influence physical attractiveness like waist to hip ratio. Nonetheless, even though the absolute values of BMI and Fat% of the preferred male and female bodies may not truly represent the most attractive figures of men and women in real life, the aim of the present study was to compare preferences between the two sexes. Thus, the accuracy of the representations of human body models should not affect the misperceptions of opposite-sex preferences found here.

In addition, the current study used body fat percentage rather than muscle mass as the measurement of muscularity (Holzleitner & Perrett, 2016; Sturman, Stephen, Mond, Stevenson, & Brooks, 2017). We note that a low body fat percentage does not necessarily equate to a high muscularity, particularly when BMI is low (e.g. <20). Nevertheless, the results suggest that men's underestimation of the body fat percentage women desire accompanies the overestimation of heaviness (BMI ~ 27) that men believe women prefer. Hence, it is appropriate to conclude that men overestimate muscularity that women prefer. We hope that future studies will be able to use of muscle mass to measure preferences for male muscularity.

Conclusion

In conclusion, using models of human bodies with various levels of BMI and Fat%, the current study revealed that misperceptions of opposite-sex preferences exist in young men and women. In particular, women tend to overestimate the thinness of female bodies that men prefer, and men tend to overestimate the muscularity of male bodies that women prefer. Moreover, these misperceptions are more exaggerated for short-term relationships. Women mistakenly believe that men would like thinner women for short-term than for long-term relationships, while men misperceive that women would like more muscular men for short-term than for long-term relationships. Future research on body

image should evaluate the influence that misperceptions of opposite-sex preference have on body dissatisfaction and other body image related psychological problems.

Conflicts of interest

All authors declare no conflict of interest.

Author contributions

Xue Lei: Data curation; Formal analysis; Investigation; Methodology; Project administration; Software; Writing – original draft; Writing – review and editing. David Perrett: Supervision; Writing – review and editing.

Data availability statement

The data that support the findings of this study will be openly available in Mendeley Data at <http://dx.doi.org/10.17632/769zgnsm9w.1> following an embargo from 2020-08-09.

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Supporting Information

The following supporting information may be found in the online edition of the article:

Table S1. Matrix of the female stimuli (BMI – Fat%).

Table S2. Matrix of the male stimuli (BMI – Fat%).