Thinner bodies are preferred in China compared to Britain but are not seen as healthier

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Abstract

Differences in preferences for body size between cultures are well documented. A well known explanation is that differences are a result of psychological adaptation to local environments. Since the optimal body size (often measured as Body Mass Index/BMI, weight divided by squared height kg/m^2) for health differs between areas, the attractiveness and health judgements should also be different. Until now, no study has directly tested whether the difference in attractiveness perception is accompanied by a difference in health perception. In the current study, we compared the attractiveness and health judgements of male and female bodies varying in BMI and muscularity between British and Chinese participants. Since the health risks are greater for Chinese than British individuals with increasing BMI, one may expect Chinese participants to perceive a lower BMI as more attractive and healthier than British participants. Analyses showed that, although the Chinese participants preferred thinner partners compared to their British counterparts, there was no difference in the health judgements made by Chinese and British participants. Moreover, the male and female bodies that were seen as most attractive were thinner than those perceived as most healthy by Chinese participants. These findings challenge the adaptation account that people adjust their mate preferences to match what is most healthy in local environments.

Keywords: attractiveness, health, adaptation, China, Britain, BMI

1. Introduction

It is often argued in the field of Evolutionary Psychology that the perception of attractiveness reflects psychological adaptations for identifying healthy potential mates (Buss & Schmitt, 1993; Symons, 1979). Accordingly, indicators that signal health should be seen as attractive.

BMI as a determinant of women's attractiveness

In women, one parameter that has received considerable attention is Body Mass Index (BMI, weight divided by squared height kg/m^2). Abundant evidence has shown that BMI is a major determinant of female physical attractiveness, accounting for about 80% of the variance in attractiveness judgements of female bodies (Tovée & Cornelissen, 1999, 2001; Andrews et al., 2017). In addition, the vital role of BMI in female physical attractiveness has been observed across different cultures including but not limited to the UK, Greece, Russia, Malaysia and Japan (Aghekyan et al., 2012; Swami, Antonakopoulos et al., 2006; Swami, Caprario, et al., 2006; Swami et al., 2010; Swami & Tovée, 2005). This is true of body silhouettes (Furnham et al., 2002), single view photographs of real bodies (Boothroyd et al., 2016; Stephen & Perera, 2014), or multiple views images of real bodies (Smith et al., 2007). Complementing this, Cornelissen et al. (2009) found that the observer's eye movements during judgement of women's physical attractiveness tracks the fixation patterns for BMI judgement. These findings suggest that BMI is indeed an indicator to attractiveness in women.

BMI as an indicator of health

Numerous studies have shown that women with a BMI of 18–20 are seen as most attractive in Western countries (Swami, Neto et al., 2007; Tovée et al., 2012). This finding appears to be concordant with the claim that low BMI is preferred because it indicates better health. The basis of BMI being a health indicator is that overweight status and obesity are argued to be the primary causes of morbidity and mortality in the modern world (Aune et al., 2016; Global Burden of Disease 2015 Obesity Collaborators, 2017; Khan et al., 2018).

Furthermore, studies of female physical attractiveness in non-Western populations have provided additional support for the claim that the perception of attractiveness reflects psychological adaptations for identifying healthy potential mates. For instance, observers from rural or non-industrialized areas such as Zimbabwe (Swami et al., 2012), South Africa (Tovée et al., 2006) and Nicaragua (Boothroyd et al., 2016) show preferences for substantially higher BMIs in female bodies (BMI ≥ 25) compared to Western populations. One explanation for the BMI preference difference is that attractiveness perception is a psychological adaptation to local environments (Tovée et al., 2006; Swami, 2015). Since a low BMI in less developed areas is an indicator to poor health due to parasitic infection, AIDS or other diseases (Clark et al., 1999; Kotler & Grunfeld, 1995; Mvo, 1999), it is likely that plumpness is preferred because it signals better health in that environment (Tovée et al., 2006; Swami, 2015). Indeed, Tovée et al. (2006) presented evidence that individuals moving from South Africa to Britain adapted or adjusted their perceptions of attractiveness in a way that was consistent with health-BMI relations in the two environments. These individuals demonstrated lower BMI preferences after living in the British environment. Hence, Tovée et al. (2006) argue in favour of the adaptation hypothesis.

Along similar lines, there is considerable evidence linking low maternal BMI to infant mortality in developing countries. Low maternal BMI is strongly associated with low infant birth weight in developing countries (Mahumud et al., 2017; He et al., 2018). In turn, low birth weight is associated with higher infant mortality (Vilanova et al., 2019). In these countries, the adaptation hypothesis suggests that it would be adaptive for men to prefer women with normal BMI to women low BMI. By analogy, if high BMI is associated with greater risk to health in one population, then we speculate that it is adaptive for individuals in that population to prefer lower BMI compared to individuals from a population with lesser health risks from high BMI.

These lines of reasoning suggest that the variation in preferences for female body weight is likely to reflect local health conditions. In other words, attractiveness perception might be subject to developmental calibration based on the local relationship of BMI and health (Tovée et al., 2006). In well-nourished Western populations a preference for thinness maybe observed because a high BMI indicates worse health (e.g., Ringbäck et al., 2008). In comparison, plumpness is preferred in forager or subsistence groups because a high BMI is associated with better health (e.g., Clark, et al. 1999; Hochberg et al., 2011). If the link between health and BMI determines attractiveness, in populations where a high BMI poses even greater health risks than for Western countries, a preference will be evident for a lower BMI than that preferred by Westerners.

Different relationships between BMI and health

According to the classification of BMI by WHO, BMI < 18.50 is classified as underweight, the healthy BMI range is 18.50−24.99, 25 < BMI < 29.99 is classified as overweight and BMI >30 is classified as obese. At a given raised BMI, Asians are at higher risk of getting cardiovascular diseases than their White counterparts (Shai et al., 2006; Wen et al., 2009; World Health Organization Expert Consultation (WHO) 2004). It was suggested that the cut-off points of being overweight (BMI = 23 versus 25 for Chinese and White individuals,

respectively) and obesity (BMI = 27.5 versus 30 for Chinese and White individuals, respectively) should be lower for Asian Chinese populations compared to Western populations (He et al., 2015; WHO, 2004).

In line with this, some studies have shown that women with a lower BMI are indeed preferred by Japanese individuals (18.43; Swami, Caprario et al., 2006) and Malaysian Chinese individuals (17.29; Stephen & Perera, 2014) compared with their counterparts in Europe (BMI around 18~20; Swami, Neto et al., 2007; Tovée et al., 2012). The authors suggest that it might be because the optimal BMI for health is lower for Japanese and Malaysian Chinese people compared to Western populations. Thus, the preference for greater thinness reported in these Asian populations might be the result of adaptation to health in the local environments. Nonetheless, these studies did not test whether Asian populations (from Japan or Malaysia) perceive a lower BMI as healthier than Western populations. Hence, it remains unclear whether it is the increased health risk associated with higher BMIs that affects the perception of attractiveness. In light of this, studies comparing attractiveness and health perceptions between Western and Asian populations using the same stimuli are required to clarify the ambiguity.

While the relationship between health and BMI may underlie cultural differences in body shape preferences, health is not the only explanation for population differences. Obesity appears to be more prevalent in some ethnic groups despite control for differences in socio-economic background (Yuker & Allison, 2019). For example, obesity is reported to be higher in Black than White women (Sobal, 1991; Ogden, 2009; Hales, 2020). Some studies have also suggested less-negative stereotypes of obesity among some Black American (Hebl & Heatherton, 1998) and Hispanic groups (e.g., Jackson & McGill, 1996; Olvera et al., 2013) compared to White Americans. A recent study indicates implicit negative stereotypes about obesity in both Black and White American women, although stronger ethnic identification in White women was associated with more negative stereotyping than in Black women (Hart, Sbrocco, & Carter, (2016). Given such cultural variation in high BMI and strength of stigmatization of high BMI, the relationship between ideal BMI and judgements of health and attraction may well differ between populations.

China as an ideal sample site for the research aim

To investigate whether the preference difference in BMI might reflect adaptation to health risks in local environments, we compared Asian Chinese and White British participants' attractiveness and health judgements of opposite-sex bodies. There are several reasons why China is chosen as a comparison group. First, China has gone through rapid economic development. The developed areas in China are comparable to the West in terms of modernization and industrialization, which means relatively similar levels of resource availability. Resource availability is important to the control because resources, especially food, negatively predicts body weight ideals (Ember et al., 2005; Reeve et al., 2016). Secondly, the similar levels of economic development imply homogeneity in media exposure. Numerous studies have demonstrated the crucial role that the media play in shaping body ideals (Jucker et al., 2017; Swami et al., 2010; Swami, 2015). Indeed, the introduction of television to populations is associated with a remarkable decrease in preference for heaviness in bodies (Boothroyd et al., 2019; Becker et al., 2002). Similar to Western populations, the influence of media on body image has been observed in Chinese adults and adolescents (Wang et al., 2020; Xu et al., 2010). It is noteworthy that Chinese young women ($N = 456$) reported feeling greater pressure from comparisons with, and preferences for, the physical appearance of celebrities from Chinese/Asian media compared to Western media (Jackson et al., 2016). Hence, media exposure is an important factor to consider in cross-cultural studies of body ideals.

The rapid economic development in China has been accompanied by an increase in obesity rates and the prevalence of cardiovascular diseases (Mi et al., 2015; Wang et al., 2007). Furthermore, Chinese people face higher risks of negative health outcomes at the same BMI compared to White people, as mentioned earlier (Shai et al., 2006; Wen et al., 2009; WHO, 2004). Taken together, these factors make China an ideal comparison group for Western countries. If the body size preference is the result of adaptation to local environments, one may expect Chinese participants to prefer a lower BMI compared to British participants. More importantly, a lower BMI should be seen as healthier by Chinese compared to British participants.

1.1 The current study

The current study set out to test whether the different preferences for body physique reflect health risks in local environments. While studies of preferences for women's bodies have proliferated across cultures, less is known about whether the male ideal of Western society, namely muscularity, is desired universally. Few studies have investigated whether a muscular body physique in men is seen as attractive in Asian Chinese populations. Additionally, little is known about the link between attractiveness and perceived health in male bodies. Hence, the present study also included male bodies as stimuli to fill the knowledge gap.

We used 3D human body models to represent different body shapes of men and women. We recruited British and Chinese participants of the same age group to view the opposite-sex bodies and adjust their shapes to represent (i) what they find most attractive and (ii) what they find most healthy. Based on the foregoing literature review, we make the following predictions.

Prediction 1: A lower BMI and body fat will be seen as attractive by Chinese participants compared to British participants.
Prediction 2: A lower BMI and body fat will be seen as healthy by Chinese participants compared to British participants.
Prediction 3: The most attractive BMI and body fat will be consistent with the healthiest BMI and body fat in both Chinese and British participants.

2. Method

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

2.1 Participants

Two groups of participants were recruited from the UK and China. The first group comprised Chinese students, recruited from a University in China. This university is located in a developed city, Hangzhou, in China. The GDP increase in this city was 6.7% in 2018, ranking number 10 in all Chinese cities and areas (Hangzhou GOV, 2019). Advertisements containing the experiment link were posted on the University website discussion forum. Participants did the experiment online in their own time. Participants were paid ¥10 as a reward. Participation was restricted to heterosexual men and women, and Chinese ethnicity. Recruitment resulted in 99 females ($M_{age} \pm SD$ = 20.81 ± 2.16, range 18–26 years) and 96 males ($M_{age} \pm SD$ = 21.88 ± 2.55, range 18–31 years). A power analysis indicated that a sample size of 128 participants would be sufficient to obtain power of 80% for a medium effect size (η^2 = 0.06). Therefore, 64 participants in each group would be sufficient.

White British participants were initially recruited from Prolific. We pre-screened participants to be White ethnicity, resident in UK, heterosexual, and aged between 18 and 25. Participants received £2 as a reward. Since the valid responses from female participants were insufficient in number, we recruited another sample of female participants from the affiliated university in the UK. This study was administered as a practical experiment in an undergraduate course. Participation was voluntary. The module controller sent out the experiment link via email. Participants did the experiment online in their own time. After excluding those who did not meet the aforementioned criteria, these recruitments resulted in 99 White British women (including both Prolific users and students) ($M_{age} \pm SD$ = 20.84 ± 2.49, range 17–26 years) and 69 White British men ($M_{age} \pm SD$ = 21.75 ± 2.23, range 18–25 years).

2.2 Stimuli

We used interactive 3D human body models to test preferences of men and women for body size (measured as BMI) and muscularity (measured as Body Fat Percentage/Fat%, where a low body fat means high muscularity (Brierley et al., 2016)). One female and one male body stimulus were generated from a mobile app "BMI 3D PRO" (https://www.bmi3d.com/overview.html). The male and female body models (front view) were adjusted, covering a wide range of BMI (18–30 for the male and 16–28 for the female) in 1unit intervals with a constant height (185cm for male and 165cm for female). The bodies at each BMI level were then adjusted to represent different levels of Fat%. For the male model, the body was adjusted to represent a range of body fat from 12% to 22% with 1% increments. The female model was adjusted to cover a range of body fat from 22% to 32% with 1% increments. 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 × Fat%) for bodies at low BMI levels, images showing the highest Fat% of that BMI level were duplicated to make the matrix (see Tables S1 & S2 in Online Resource). This means that the matrix contained only a biologically plausible range of body shapes.

The head was cropped to remove confounding information (see Fig. 1 for the male body and Fig. 2 for the female body). The resulting bodies were ambiguous with respect to Asian Chinese or White British ethnicity. All images were resized to 540 × 680 pixels.

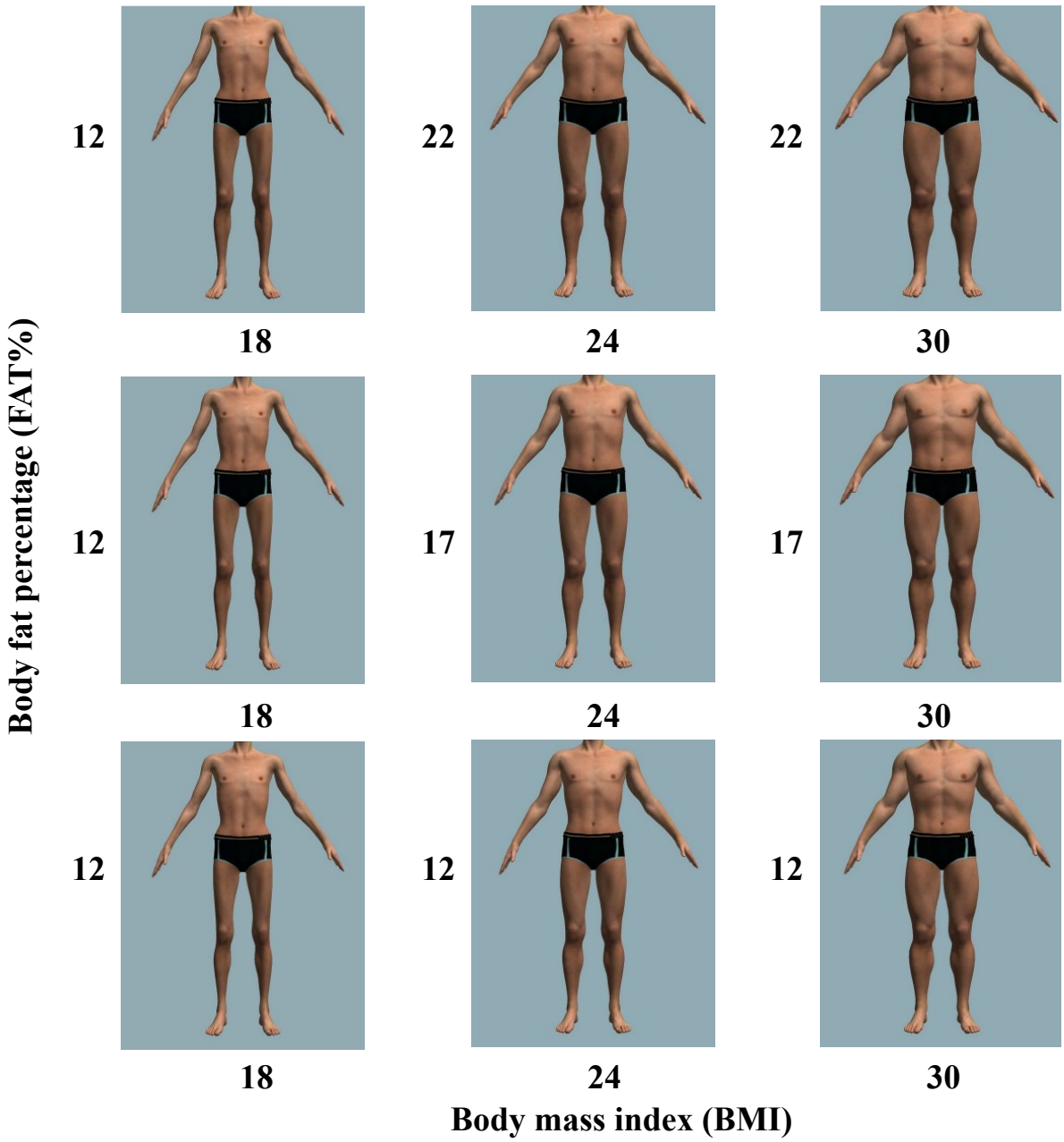

Fig. 1 The male bodies represent different levels of BMI and Fat%. This figure depicts the endpoints of the interactive male body images. Left to right depicts BMI increase; bottom to top depicts Fat%increase (bodies at low BMI levels show limited ranges of Fat%). Images were taken from a mobile app "BMI 3D Pro".

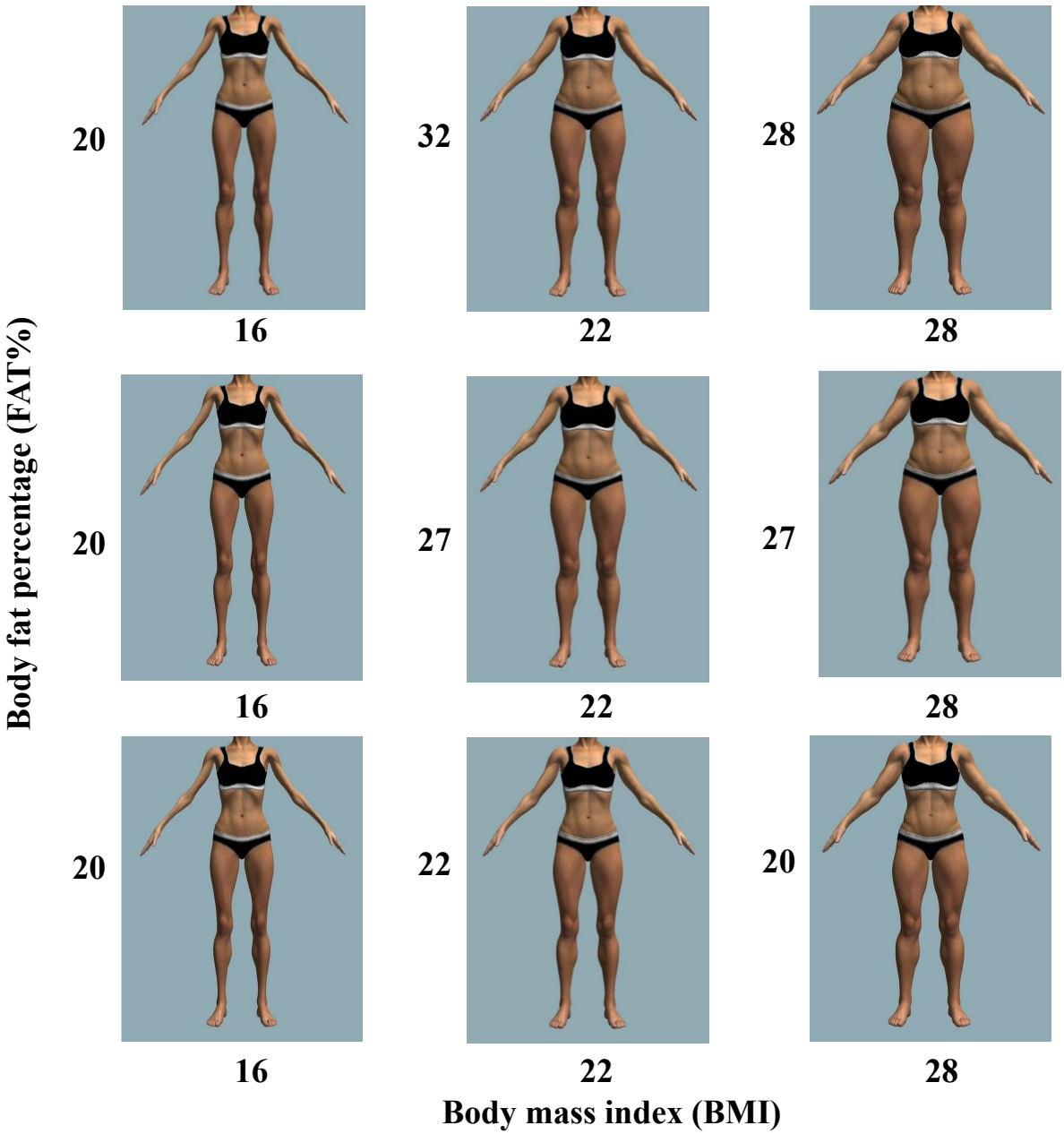

Fig. 2 The female bodies represent different levels of BMI and Fat%. This figure depicts the endpoints of the interactive female body images. Left to right depicts BMI increase; bottom to top depicts Fat% increase (bodies at low BMI levels show limited ranges of Fat%). Images were taken from a mobile app "BMI 3D Pro".

2.3 Procedure

Participants first completed a demographic questionnaire about age, sex, sexual orientation, residence and ethnicity, and then were asked to complete a body preference task. Since the aim of the present study concerns mate preferences, preference for the opposite-sex is most relevant to the research questions. Furthermore, previous studies have consistently shown that relationship context affects mating preferences (Lei et al., 2018; Little et al., 2011). Thus, we asked participants to judge the attractiveness of opposite-sex bodies as sexual short-term partners and long-term partners separately, to reduce the ambiguity with respect to relationship context or sexual strategy.

The male and female bodies were presented as interactive 2-dimensional matrices. Moving the mouse vertically adjusted the apparent BMI (13 levels), while moving horizontally adjusted the apparent body fat percentage (11 levels). The starting point of each body stimulus 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. First, the opposite-sex body images were displayed to be adjusted to

resemble the participant's preferences for short-term and long-term partners (in a random order). Then, participants were asked to make the opposite-sex body images look most healthy. This resulted in 3 trials for each participant (1 trial per task)[1]. There was no time limit for the participants to make adjustments. The next stimulus was shown only after participants had made changes and left-clicked to proceed.

After finishing the preference task, participants were asked to complete a questionnaire on a 5-point Likert Scale, which examined the media ideal internalization and whether Western or Asian media had a larger impact on their ideal partner bodies (see the questionnaire in Online Resource).

2.4 Statistical analysis

Data were analysed in SPSS 24.0. For each trial, the corresponding BMI and Fat% values of the body selected were saved. Considering the homogenous nature of the samples, data values above or below 3 standard deviations from the mean were removed (0.6%) to reduce errors caused by accidental operation of the mouse selection.

To test whether British and Chinese participants have different attractiveness preferences, 3-way analyses of variance (ANOVA) were run, with the relationship context (short-term/long-term) included as the within-subject variable, participant's gender and participant's ethnicity included as the between-subject variables, while preferences for BMI and Fat% were included as dependent variables and analysed separately. To test whether British and Chinese participants have different perceptions of health, 2-way ANOVAs were run with participant's gender and ethnicity included as between-subject variables and the health judgements of BMI and Fat% as dependent variables. A further 3-way ANOVA was run to test whether participants have different perceptions of the most attractive and healthiest opposite-sex bodies. Since the relationship context had no significant effect on preferences, the short-term and long-term preferences were averaged as an overall attractiveness judgement. Judgement type (attractiveness/health) was included as the within-subject variable, participant's gender and participant's ethnicity were included as the between-subject variables, while the chosen BMI and Fat% were analysed separately as dependent variables. Lastly, responses from the 5 media internalization questions (Questions 1–5) and the 3 media source questions (Questions 6–8) were averaged separately. One-sample t-tests were run to assess whether participants internalize media ideals and whether there was an ethnic bias in media influence. These compared question averages against no media influence or bias (a mean score of 3, which was the middle point of the 5-point Likert Scale)[2].

3. Results

Preferences for body size and muscularity

Regarding preferences for body size (BMI), results of 3-way ANOVA showed a non-significant main effect of the relationship context ($F(1,359) = 2.46$, $p = .117$, $\eta^2 = .007$), suggesting that participants did not have different preferences between short-term and long-term partners. A significant main effect of participant gender ($F(1,359) = 107.688$, $p < .001$, $\eta^2 = .231$) was found, with men choosing lower BMI ($M = 22.57$, $SD = 2.26$) for preferred partners while women chose higher BMI ($M = 25.30$, $SD = 2.58$) for preferred partners. Furthermore, there was a significant main effect of ethnicity ($F(1,359) = 15.19$, $p < .001$, $\eta^2 = .041$) with Chinese participants preferring significantly thinner partners ($M = 23.51$, $SD = 2.80$) than British participants ($M = 24.70$, $SD = 2.65$) (see Fig. 3). All interaction terms were non-significant ($ps \geq .169$).

Regarding preferences for body muscularity, results of 3-way ANOVA showed a significant main effect of participant gender ($F(1,348) = 2843.76$, $p < .001$, $\eta^2 = .891$), with men choosing a higher Fat% ($M = 23.72$, $SD = 1.55$) for preferred partners than women ($M = 14.64$, $SD = 1.60$). The main effects of the relationship context ($F(1,348) = 3.19$, $p = .075$, $\eta^2 = .009$) and participant's ethnicity ($F(1,348) = .15$, $p = .697$, $\eta^2 < .001$) were found to be non-significant, suggesting that British and Chinese participants have similar preferences for Fat%, which were independent of relationship contexts. All interaction terms were non-significant ($ps \geq .133$).

[1] We also asked participants to choose the body shape that reflected their own body and their ideal body, as well as their perceptions of opposite-sex preferences for short- and long-term partners. These data are not relevant to the current study.

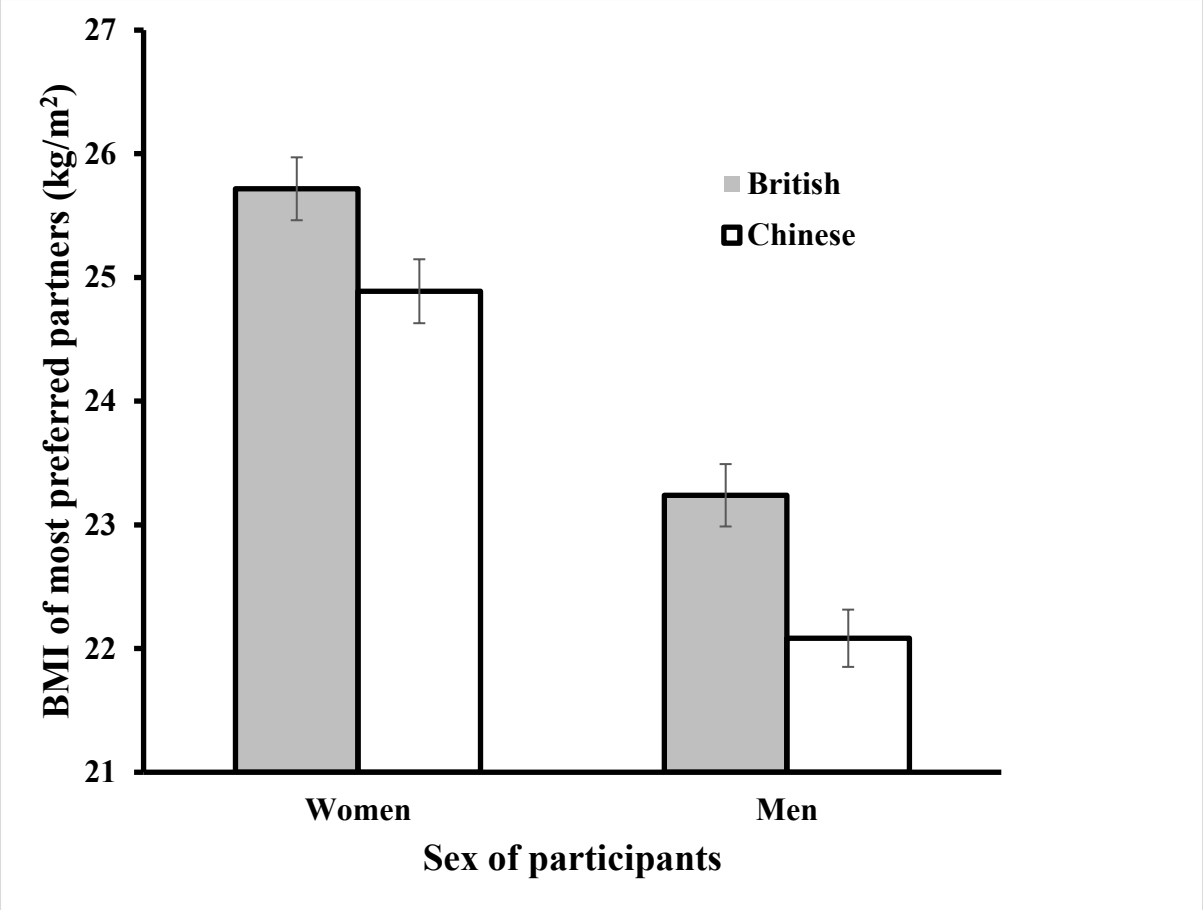

Fig. 3 Comparison of the BMI of most preferred partners between British and Chinese participants. Error bars represent the standard error of the mean.

Perceived healthiest body size and muscularity

Regarding the health judgement of body size, 2-way ANOVA showed that there was a significant main effect of participant gender ($F(1,356) = 74.49$, $p < .001$, $\eta^2 = .173$), with men choosing lower BMI (M =23.52, SD = 2.66) to optimize women's health and women choosing higher BMI (M = 25.95, SD = 2.59) to optimize men's health. No significant main effect of participant's ethnicity ($F(1,356) = .012$, $p = .912$, $\eta^2 < .001$) was found. The interaction between participant's gender and ethnicity was non-significant ($F(1,356) = .159$, $p = .691$, $\eta^2 < .001$) (see Fig. 4).

Regarding the health judgement of body muscularity, 2-way ANOVA showed that there was a significant main effect of participant gender ($F(1,356) = 2214.21$, $p < .001$, $\eta^2 = 861$), with men choosing higher Fat% (M = 24.15, SD = 1.77) to optimize women's health and women choosing lower Fat% (M = 14.79, SD = 1.93) to optimize men's health. No significant main effect of participant's ethnicity ($F(1,356) = .207$, $p = .649$, $\eta^2 = .001$) was found. The interaction between participant's gender and ethnicity was non-significant ($F(1,356) = 1.153$, $p = .284$, $\eta^2 = .003$).

[2] ~~all effects remained when age~~ was included as a covariate.

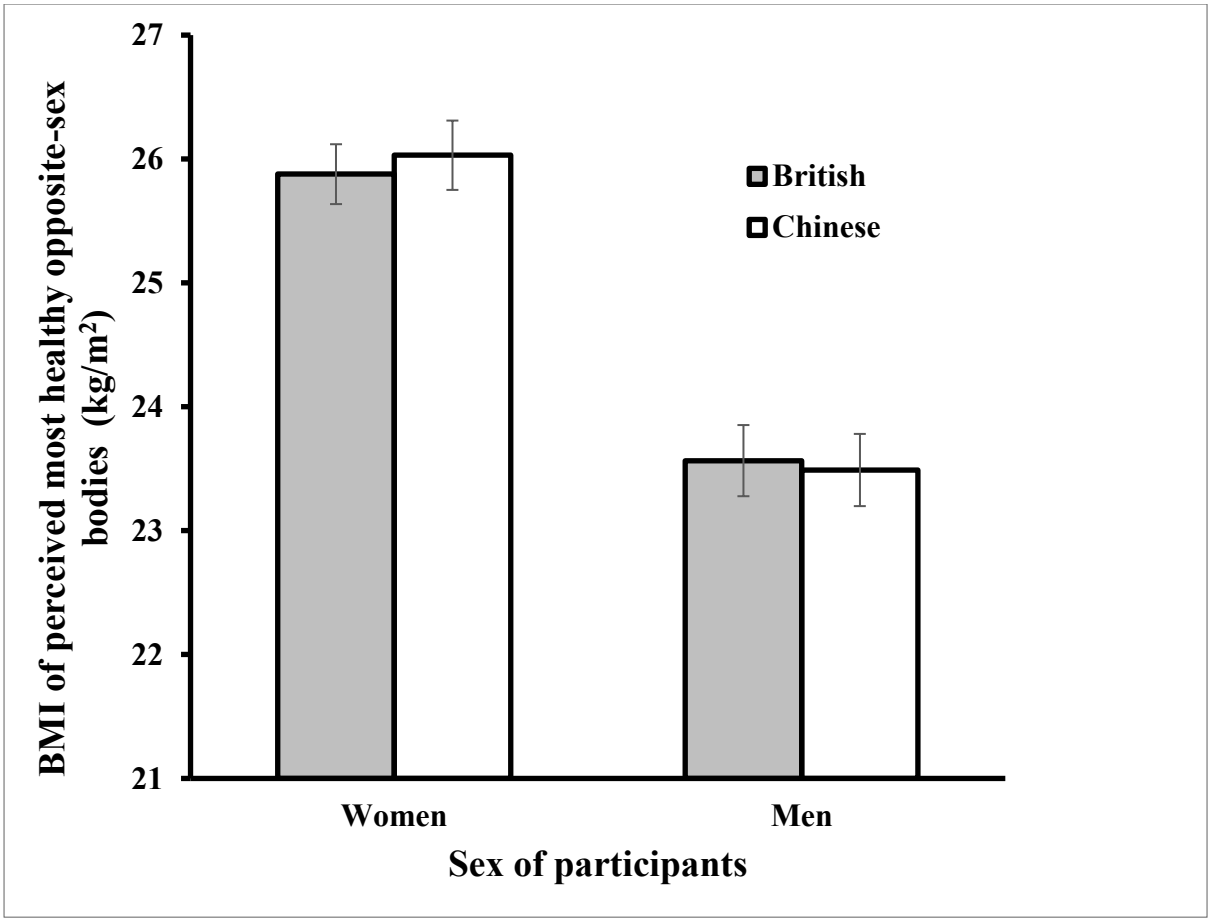

Fig. 4 Comparison of the BMI of the perceived most healthy opposite-sex bodies between British and Chinese participants. Error bars represent the standard error of the mean.

Comparisons of healthy and preferred opposite-sex bodies

For judgements of body size, results of 3-way ANOVA showed a significant main effect of participant gender ($F(1,358) = 119.38$, $p < .001$, $\eta^2 = .250$), with men choosing a lower BMI to optimize women's attractiveness and health compared to women's choices when optimizing men's attractiveness and health. In addition, there were significant main effects of judgement type ($F(1,358) = 32.50$, $p < .001$, $\eta^2 = .083$) and participant's ethnicity ($F(1,358) = 4.34$, $p = .038$, $\eta^2 = .012$). Furthermore, the interaction between judgement type and ethnicity was significant ($F(1,358) = 15.82$, $p < .001$, $\eta^2 = .042$). Pairwise comparisons showed that while British participants did not have significantly different perceptions of attractiveness and health ($t(166) = 1.18$, $p = 0.241$), Chinese participants chose lower BMI to optimize attractiveness compared to health ($t(194) = 6.81$, $p < 0.001$). Other interactions between main effects were non-significant ($ps \geq .379$).

For judgements of body muscularity, results of 3-way ANOVA showed a significant main effect of participant gender ($F(1,347) = 3600.91$, $p < .001$, $\eta^2 = .912$), with men choosing higher Fat% to optimize women's attractiveness and health compared to women's choices when optimizing men's attractiveness and health. There was a significant main effect of judgement type ($F(1,347) = 6.21$, $p = .013$, $\eta^2 = .018$), with a lower Fat% chosen to optimize attractiveness than health. The main effect of participant's ethnicity was not significant ($F(1,347) = .06$, $p = .815$, $\eta^2 < .001$), suggesting that British and Chinese participants have similar perceptions of the muscularity of the most attractive and healthy bodies. All other interactions were non-significant ($ps \geq .331$).

Media influence

One sample t-tests showed that the body ideals for British participants were influenced by media and there was a similar trend for Chinese participants (British participants: $M \pm SD = 3.36 \pm 1.03$, $t(153) = 4.39$, $p < .001$; Chinese participants: $M \pm SD = 3.10 \pm 0.76$, $t(180) = 1.93$, $p = .056$). Moreover, participants were influenced by their own culture's media more than media of the other culture (British participants: $M \pm SD =$

3.34 ± 1.03, $t(153) = 4.11$, $p < .001$; Chinese participants: $M \pm SD = 2.18 \pm 0.84$, $t(185) = -13.39$, $p < .001$; higher number represents more influence from Western media than Asian media).

4. Discussion

The current study set out to examine whether the different BMI preferences between cultures are due to psychological adaptations to health in local environments. We compared judgements of attractiveness and health of opposite-sex bodies in British and Chinese populations. Compared to British participants, both Chinese men and women prefer thinner partners regardless of relationship contexts. By contrast, no difference in judgements of the healthiest male and female BMI were found between the two populations sampled.

4.1 Challenge of the psychological adaptation account for variation in BMI preferences between cultures

The finding that a lower BMI in female bodies is perceived as more attractive in the Chinese population than the British population is consistent with some prior findings. Previous studies in Western populations reported that a BMI around 18~20 is most attractive in women (Crossley et al., 2012; Swami, Neto et al., 2007) whereas the most attractive female body has a BMI around 18 amongst Japanese (Swami, Caprario et al., 2006) and 17 amongst Malaysian Chinese populations (Stephen & Perera, 2014).

The difference in BMI preferences between the two ethnicities has been explained as an adaptation to the health in the local environments (Stephen & Perera, 2014; Swami, Caprario et al., 2006). As the optimal BMI for health is lower for Asian compared to White populations, our first prediction was that a Chinese sample should prefer a lower BMI in comparison to a British sample. Our results confirm this prediction.

Our second prediction from the adaptation to local health was that a lower BMI and body fat will be seen as most healthy by Chinese participants compared to British participants. This was not supported. In fact, the results from the current study suggest that the male and female body shapes that are seen as most healthy do not differ between British and Chinese samples. These findings challenge the proposal that individuals adjust their BMI preferences to reflect indicators to health in the local environment.

4.2 Discrepancy between attractiveness and health judgements

We found that young Chinese men and women have different perceptions of attractiveness and health: a low BMI is judged to be most attractive, but it is not perceived as the healthiest. A discrepancy between attractiveness and health judgement in females in terms of BMI has been reported before. Using face stimuli (Coetzee et al., 2011) and body stimuli (Brierley et al., 2016) in Western (Brierley et al., 2016) or Asian (Stephen & Perera, 2014) populations, there are multiple reports that the most attractive female figure is thinner than what is believed to be most healthy. Taken together, these findings point to the possibility that the specific BMI values that are preferred are not chosen because BMI is used as an indicator of health, at least in economically developed areas. Note that we are not claiming that health plays no role in attractiveness judgements; we suggest that the difference in BMI preference found between different countries might not be due solely to the psychological adaptations to health in the local environments.

4.3 Media as an alternative explanation for different BMI preferences between cultures

Since the different health risks associated with a given BMI could not account for the differences in BMI preferences between Chinese and British samples, this raises the question of why Chinese participants prefer thinner partners than British participants. It is more likely that sociocultural factors such as internalization of values portrayed in the media play an increasingly important role in the perception of physical attractiveness in economically developed areas. There is a pervasive effect of media exposure on body ideals (Grabe et al., 2008; Slater & Tiggemann, 2014, 2015). In a large cross-cultural study, researchers found that a general Western media exposure (including television, movies, magazines and music videos) predicts preference for thin female bodies in men and thin ideal body size in women (Swami et al., 2010). Although a thin female ideal is prevalent in most developed areas, the degree of thinness promoted may vary between cultures. It is not surprising that Chinese people are influenced by Asian media more than by Western media (Jackson et al., 2016, and data presented here). If women and men portrayed in Chinese media are thinner than those portrayed in Western media, it could result in Chinese people preferring thinner partners than their European counterparts. By the same token, though a male body ideal is characterized by high muscularity (Boyd & Murnen, 2017; Pope et al., 2000), whether muscularity is portrayed as bulky (high BMI and low fat) or lean (low BMI and low fat) could well differ between cultures. Future studies should explore the differences of male and female models portrayed in Western and Chinese media to provide better understanding of the different preferences across cultures.

In fact, there are several reasons to speculate that bodies portrayed in the media may be thinner in China than in the West. By analysing the weight of Miss Hong Kong between 1975 and 2000, researchers found that Miss Hong Kong Pageant winners have always been thinner than average women in Hong Kong (Leung et al., 2001). The authors argued that thinness in women has long been held as a beauty standard in women. Evidence for the thin female ideal can be traced back to as early as the Chun Qiu period (722–481 B.C.), in which fasting to attain slim bodies was documented. In addition, depictions of beautiful women in ancient

literature and paintings also suggest that thinness was culturally expected in women in China for a long time except in the Tang dynasty (Leung et al., 2001).

4.4 Implications for evolutionary psychology

It has been widely asserted that the difference in preferences for BMI between cultures is due to the variation in health risks associated with increased BMI (Swami, Caprario et al., 2006; Stephen & Perera, 2014; Tovée & Cornelissen, 2001). Yet, no study has directly tested whether the attractiveness differences are accompanied by differences in health judgements. We show, for the first time, that attractiveness judgement can vary, while health judgement does not. Our findings suggest that adaptation to health indicators in the local environment does not account for the different BMI preferences between different populations very well, at least in the studied populations. Hence, one should be careful in explaining cultural differences in preferences for body physique as an adaptation to health in local environments.

4.5 Limitations and future directions

We note that Asians have lower body fat compared to Europeans given the same BMI (Deurenberg et al., 2002), which means the human models employed in the current study may not adequately represent the body compositions of both Asian and British populations. Unfortunately, there is limited information about the sample sources of the models in the BMI 3D program. We acknowledge that this is a limitation of the present study. Future studies using different stimuli are encouraged. For example, full-length photographs of men and women (Andrews et al., 2017) would be ideal to reflect body shape variations in real life.

Another limitation of the current study is that it employed participants of a relatively young age group. As noted earlier, the attractiveness perception of young individuals is likely to be influenced by media, which may not reflect conditions in the environment of evolutionary adaptiveness. Tests of subjects whose attractiveness perceptions are less likely to be affected by media would be desirable for the research question. For example, one may expect older adults and people from rural area with less access to media to have an attractiveness perception closer to an ancestral perspective than the perspective of young adults in industrialized societies. One study comparing young and older adults' preferences for BMI did find that older adults show a preference for higher BMI compared to young adults (Han et al., 2021). This suggests that it is more likely that attractiveness perception is a closer match to health perception in older adults. Nonetheless, the media influence explanation remains speculative. Future studies are encouraged to employ non-WEIRD (western, educated, industrialised, rich and democratic) populations (Henrich et al., 2010; Kanazawa, 2020).

The differences in BMI preferences between Chinese and British samples could be also explained reflect different degrees of internationalization of sociocultural attitudes towards appearance. It may be that Chinese participants have a greater exposure media or have internalized media messages more than British participants. Additionally, it is possible that the stigmatization of high BMI differs across the samples. These possibilities can only be resolved with further studies.

4.6 Conclusions

In conclusion, the present work showed clear evidence that Chinese participants prefer thinner partners than British participants, but the two populations do not have different perceptions of health in terms of body size. These findings directly challenge the hypothesis that preference for body size reflects a psychological adaptation to the different health risks associated with environments. We speculate that the difference in portrayals between Western and Chinese media might account for the preference difference.

Conflicts of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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