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Original Article

Pathogen disgust sensitivity and resource scarcity are associated with mate preference for different waist-to-hip ratios, shoulder-to-hip ratios, and body mass index

Anthony J. Lee [a,*], Robert C. Brooks [b], Katrina J. Potter [a], Brendan P. Zietsch [a,c]

[a] School of Psychology, University of Queensland, St. Lucia 4072, Brisbane, Queensland, Australia
[b] Evoltionary and Ecology Research Centre, University of New South Wales, 2052, Sydney, New South Wales, Australia
[c] Genetic Epidemiology Laboratory, QIMR Berghofer Medical Research Institute, Herston 4006, Brisbane, Queensland, Australia

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ABSTRACT

Environmental factors, such as pathogen prevalence and resource scarcity, are thought to influence mate preferences for traits related to health and resource provisioning potential. Specific body dimensions, such as women's waist-to-hip-ratio (WHR), men's shoulder-to-hip ratio (SHR), and body mass index (BMI) have also been theorised to be associated with health benefits, or ability to deal with resource scarcity. Here, we test across two studies using different study designs whether the effects of pathogen disgust sensitivity and socioeconomic status (SES; a negative proxy for resource scarcity) on mate preferences extend to men's WHR preferences, women's SHR preferences, and both sex's BMI preferences. Study 1 found that pathogen disgust significantly negatively influenced men's WHR preference in female bodies, while SES was significantly negatively associated with women's SHR and BMI preferences in male bodies. Study 2 found that pathogen disgust negatively predicted men's WHR preference, and positively predicted women's SHR preference, while SES negatively predicted men's WHR preference. Our findings support the notion that body shapes are used as cues to health and likelihood of resource provision, and may help explain inconsistencies in the literature regarding variation in body shapes preferences.

1. Introduction

Mate choice is one of the most important predictors of evolutionary fitness (i.e., an individual's contribution to the gene pool in the following generations). However, not all potential partners confer the same benefits and costs, and the importance of these benefits and costs varies depending on the circumstance. Therefore, it is evolutionarily beneficial to have a mechanism where individuals can perceive environmental factors and adjust their mate preferences towards partners that would be the most beneficial given the circumstances. Environmental factors, such as pathogen prevalence and resource scarcity, have been proposed to influence mate preferences for a variety of traits that are thought to be associated with health or resource provisioning potential, including physical attractiveness (Gangestad & Buss, 1993; Lee et al., 2013; Young, Sacco, & Hugenberg, 2011) sexual dimorphism (i.e., the masculinity of men and the femininity of women; DeBruine, Jones, Crawford, Welling, & Little, 2010; Jones, Fincher, Little, & DeBruine, 2013; Little, Cohen, Jones, & Belsky, 2007; Little, DeBruine, & Jones, 2011), and good parental traits (Lee & Zietsch, 2011; Lee et al., 2013).

Previous research (such as those cited above) has focused on preferences for broad, explicit traits, for example, self-reported preferences for 'physical attractiveness' (Gangestad & Buss, 1993), or specific facial cues (which are thought to convey cues of mate quality; DeBruine, Jones, Crawford, et al., 2010; Little et al., 2011), but recent work suggests that these effects may generalise to more specific cues, such as voices and body shapes (Jones et al., 2013). Much like with faces, the dimensions of an individual's body may be used as a cue to their suitability as a potential mate (Gaullup & Frederick, 2010). Jones et al. (2013) found that in women higher pathogen disgust was associated with preference for bodies rated as more masculine, though it is unclear what specific body indices affected masculinity ratings. Here, we investigate whether sensitivity to environmental factors, such as pathogen prevalence and resource scarcity, can influence preferences for specific body indices previously purported to be important in mate choice, namely women's waist-to-hip ratios (WHRs), men's shoulder-to-hip ratios (SHRs), and body mass index (BMI).

1.1. Waist-to-hip ratio

WHR is the circumference of the waist measured at its narrowest point, divided by the circumference of the hips measured at their widest point. WHR is highly sexually dimorphic, with women typically having a lower WHR than men. Traditionally, WHR has been used as a measure of female body shape as it represents the relative distribution of body fat on the body, which is indicative of hormonal levels in the body. A

* Corresponding author.
E-mail address: anthony.lee@uqconnect.edu.au (A.J. Lee).

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lower WHR indicates greater levels of circulating oestrogen, which stimulates fat deposits around the thighs and buttocks, while higher WHR is associated with higher levels of testosterone, which encourages fat deposits in the abdomen (DeRidder et al., 1990; Elbers, Asscheman, Seidell, Megens, & Gooren, 1997; Furnham, Tan, & McManus, 1997).

WHR has been found to influence ratings of attractiveness, with initial studies finding men preferred line-drawings of women with lower WHR (Singh, 1993; Singh & Young, 1995). Studies have since shown that this is a robust effect, with this preference also found in photographs (Henss, 2000; Tovee & Cornelissen, 2001), as well as videos of women's bodies (Smith, Cornelissen, & Tovee, 2007). Low WHRs are preferred even with minimal visual exposure (Schutzwohl, 2006), or no visual input at all (Karremans, Frankenhuis, & Arons, 2010), and have also been found using non self-report data, such as brain activity (Platek & Singh, 2010) and eye gaze patterns (Dural, Cetinkaya, & Guelbetekin, 2008). This preference remains even when controlling for correlates of WHR, such as BMI (Platek & Singh, 2010; Singh & Randall, 2007). Also in support of the notion that low WHR is more attractive, women with low WHR report having more interest from the opposite sex, and more sexual opportunities (Hughes & Gallup, 2003).

While most research in this area focuses on WHR, it remains controversial whether the ratio itself conveys any special information. Recent studies suggest that WHR actually explains less variation in attractiveness than mere waist circumference (Brooks, Shelly, Jordan, & Dixson, 2015). Other research suggests that other body measures better explain attractiveness than WHR (Brooks, Shelly, Fan, Zhai, & Chau, 2010), or that the influence of WHR is mainly accounted for by confounds with BMI (Tovee, Maisey, Emery, & Cornelissen, 1999), which we discuss in more detail below.

Men may use waist size or WHR as a cue to a number of evolutionarily beneficial traits. First, low WHR may be a cue of good health, since lower WHR predicts better health outcomes including lower risk of chronic diseases and premature death (Singh, 1993; Singh & Singh, 2006). Lower WHR may also be a cue of higher fertility, with low WHR women reporting less difficulty in conceiving (Jasienska, Ziomkiewicz, Ellison, Lipson, & Thune, 2004; Kaye, Folsom, Prineas, Potter, & Gapstur, 1990), more regular menstrual cycles (van Hooff et al., 2000), and more likelihood of success in artificial insemination and in vitro fertilisation (Wass, Waldenstrom, Rossner, & Hellberg, 1997; Zaadstra et al., 1993). Offspring of women with a lower WHR may also benefit indirectly, as low WHRs predict better infant health (Pawlowski & Dunbar, 2005), and better cognitive ability (Lassek & Gaulin, 2008). Due to any number of these potential benefits, it is likely to be advantageous for men to mate with a woman with a low WHR, and thus find lower WHRs more attractive.

Despite these potential benefits, preferences across history and cultures have varied considerably, contradicting the notion that men have evolved a consistent preference for an optimum WHR. While the majority of studies have been conducted with participants from modern Western societies, participants from non-Western backgrounds have shown a preference for higher WHR compared to Western participants (Sugiyama, 2004; Swami, Jones, Einon, & Furnham, 2009; Tovee, Swami, Furnham, & Mangalparsad, 2006; Wetsman & Marlowe, 1999; Yu & Shepard, 1998). Historical evidence also shows that WHR preferences change across time, with higher WHR more preferred in the past compared to contemporary preferences (Lamb, Jackson, Cassiday, & Priest, 1993; Swami, Gray, & Furnham, 2007). This may suggest that there are costs associated with choosing a partner with a low WHR, or that women with higher WHR may confer other benefits that are more advantageous in non-Western cultures.

Indeed, a potential explanation for this discrepancy could lie in a trade-off men face when choosing a partner. While women with narrow waists or a low WHR may confer indirect or direct health benefits, women with larger waists or a higher WHR may be better equipped to compete for resources and deal with food scarcity (Cashdan, 2008). Higher exposure to testosterone, which results in deposition of fat around the waist, is associated in women with traits beneficial in acquiring resources, such as being more aggressive (Dabbs & Hargrove, 1997; Harris, Rushton, Hampson, & Jackson, 1996) and being more likely to express competitive feelings (Cashdan, 2003), and, in Western cultures, may lead to being more career oriented (Udry, Morris, & Kovenock, 1995).

As a result, men could face a trade-off when choosing a mate between a low WHR indicative of genetic health, compared to one with a higher WHR who is better equipped for competing and acquiring resources. We could therefore predict that this trade-off is influenced by environmental factors in evolutionarily beneficial ways, such that when pathogen prevalence is salient men prefer a smaller WHR (as this is associated with increased health), and when resource scarcity is salient a larger WHR (associated with ability to acquire resources) is preferred.

1.2. Shoulder-to-hip ratio

SHR refers to the relative size of the shoulders compared to the hips. Similar to WHR, SHR is a cue of hormonal levels in the body, as the development of a higher SHR is dependent on exposure to high levels of testosterone, which stimulates both the development of upper body muscle (Bhasin, 2003), and structural growth in the shoulders (Kasperk et al., 1997). While not as widely studied as WHR, women have been found to show a preference for wedge shaped bodies (high SHR) as more attractive (Dijkstra & Buunk, 2001). Consistent with this notion, men with a high SHR report greater interest from women as well as more sexual opportunities (Hughes & Gallup, 2003).

Similar to low WHR women, high SHR men may convey many evolutionary benefits to women who prefer them. First, a higher SHR is a sexually dimorphic trait, and some evidence suggests that greater masculinity in men may be associated with health benefits (Gangestad, Merriman, & Thompson, 2010; Rhodes, Chan, Zebrowitz, & Simmons, 2003; Thornhill & Gangestad, 2006). Because of their putative association with good health, male masculinity may be more highly valued by women in environments of high pathogen prevalence. Consistent with this, individuals in countries with greater pathogen prevalence report greater preference for more masculine male faces (DeBruine, Jones, Crawford, et al., 2010; Penton-Voak, Jacobson, & Trivers, 2004). Also, women primed with pathogen-related cues had a greater preference for masculine traits and facial features (Lee & Zietsch, 2011; Little et al., 2011), and women with greater pathogen disgust sensitivity have also been shown to have greater preference for facial masculinity (DeBruine, Jones, Tybur, Lieberman, & Griskevicius, 2010; but see Lee et al., 2013). While more research has focused on preference for masculinity in faces, pathogen avoidance has also been shown to influence women's preference for voices and bodies perceived as masculine (Jones et al., 2013). Assuming there is a similar link between SHR and health, women could benefit directly by choosing a higher SHR partner, either through avoidance of pathogen transmission or having a partner who is less likely to succumb to disease, or indirectly through producing offspring that would inherit these health benefits (Frederick & Haselton, 2007; Tybur & Gangestad, 2011), though this latter point is contentious (Lee et al., 2014; Scott, Clark, Boothroyd, & Penton-Voak, 2013).

Despite the potential health benefits, some studies have found only a weak, or inconclusive preference for masculine traits (Komori, Kawamura, & Ishihara, 2009; Said & Todorov, 2011; Scott, Pound, Stephen, Clark, & Penton-Voak, 2010; Thornhill & Gangestad, 2006), while others find an overall preference for femininity (Boothroyd, Jones, Burt, & Perrett, 2007; Perrett et al., 1998). This would suggest that there is a cost in choosing a masculine male as a mate (Frederick & Haselton, 2007). Indeed, masculine men are less likely to be sexually faithful, tend to prefer short-term relationships (Boothroyd, Jones, Burt, DeBruine, & Perrett, 2008), and are rated as more dominant (Watkins, DeBruine, Little, Feinberg, & Jones, 2012). As a result, women may face a trade-off between choosing a masculine male with good health, versus a feminine male with good parental quality.