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RESEARCH

Cross-Cultural Preferences for Women's Waist to Hip Ratio and Men's Shoulder to Hip Ratio: Data From Iran, Norway, Poland, and Russia

Farid Pazhoohi[1] · Reza Afhami[2] · Razieh Chegeni[3] · Dmitrii Dubrov[4] · Katarzyna Gałasińska[5] · Ray Garza[6] · Nasim Ghahraman Moharrampour[7] · Dmitry Grigoryev[4] · Marta Kowal[8] · Ståle Pallesen[9] · Gerit Pfuhl[10]

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Abstract

Objectives Body size and shape are sexually dimorphic in humans, with men being characterized with larger upper bodies, while women typically having broader pelvises. Such sexually dimorphic traits, quantified as shoulder to hip ratio (SHR) in men and waist to hip ratio (WHR) in women, serve as cues of an individual's genetic fitness, reproductive potential, health, and resource holding power, and, thereby, functioning as attractiveness cues to the opposite sex.

Methods In the current study, we investigated men's and women's preference for the opposite sex body shape (WHR in women and SHR in men) in samples from Iran, Norway, Poland, and Russia. Women rated their preference for men's SHR (1.20 to 1.50) and men rated their preference for women's WHR (0.55 – 0.85).

Results and Conclusion Our results showed that Iranian and Norwegian men preferred less feminine WHRs in women compared to Polish and Russian men. Moreover, Iranian women preferred less masculine SHRs in men than women from other countries. Altogether, the current research showed that there are variations in men's preferences for women's WHR and women's preferences for men's SHR among these countries.

Keywords Physical attractiveness · Cross-cultural preferences · Mate choice · SHR · WHR

Extended author information available on the last page of the article

Introduction

Humans have sexually dimorphic body sizes and shapes. Men and women evolved to exhibit different morphological traits, such as men being on average larger, taller, and having lower fat mass than women (Nettle, 2002; Ruff, 2002; Wells, 2007). Such sexually dimorphic traits can serve as direct and/or indirect cues to an individual's genetic fitness, health, and/or resource holding power, thereby being perceived as attractive to the members of the opposite sex (Apicella, 2014; Barber, 1995; Kordsmeyer et al., 2018). Additionally, WHR can serve as a cue to reproductive potential, such as a perceived age, pelvis size, and parity status, which may explain why men find WHR attractive in women (Bovet, 2019; Lassek & Gaulin, 2018). Women have broader pelvises and higher gluteofemoral fat distribution than men (Karastergiou et al., 2012; Kurki, 2011), while men possess larger upper bodies compared to women (Puts, 2010).

Waist to Hip Ratio (WHR)

Waist to hip ratio (WHR), the circumference of the waist relative to the hip, is often treated as an indicator of women's reproductive value (Butovskaya et al., 2017; Lassek & Gaulin, 2019), contributing to women's attractiveness. Women with lower WHRs (e.g., 0.70) are considered more attractive than women with higher WHRs (e.g., 0.90; Singh, 1993). WHR's contribution to women's attractiveness has been documented both at the behavioral (e.g., Dixson et al., 2011; Garza et al., 2016), and neural levels (Del Zotto & Pegna, 2017; Del Zotto et al., 2020; Pazhoohi et al., 2020a; Platek & Singh, 2010). WHR is one of the most visually captivating anthropometric parameters of a woman's body, as it is shown that individuals longer and more frequently fixate on this physical parameter than on other body parts (Dixson et al., 2010b, 2011; Garza et al., 2016). To assess the attractiveness of women, individuals are inclined to put more emphasis on the WHR than other body aspects (Bovet et al., 2016; Pazhoohi et al., 2017). For instance, men look longer and fixate more on women with lower WHRs compared to women with higher ratios (Dixson et al., 2010b). Also, compared to high WHRs (e.g., 0.90), lower ratios (e.g., 0.70) in women are more visually salient, are attended quicker, and identified more accurately (Cloud et al., 2022). Attractive WHRs have been shown to activate areas of the brain associated with reward processing, appetitive behaviors, and decision-making (Pazhoohi et al., 2020a; Platek & Singh, 2010).

Cross-Cultural Research on WHR

Although Singh (Singh, 1993; Singh et al., 2010) proposed and argued that a woman's WHR of 0.70 is the most preferred ratio cross-culturally, further research has challenged the universality of this assumption (Marlowe & Wetsman, 2001). Specifically, in a series of studies using participants from Hadza, Marlowe and colleagues showed that Hadza hunter-gatherer men prefer larger ratios, closer to 0.90 (Marlowe et al., 2005; Marlowe & Wetsman, 2001; Wetsman & Marlowe, 1999), and proposed

that preference for WHR varies across ecology (Marlowe & Wetsman, 2001). Similarly, a rural sample from Bakossiland, Cameroon, reported a WHR of 0.80 as the most attractive ratio (Dixson et al., 2007b), a WHR of 0.60 was considered the most attractive in China (Dixson et al., 2007a), whereas a WHR of 0.90 among Matsigenka (Yomybato) indigenous people of Peru was deemed as most attractive (Yu & Shepard, 1998). One possible explanation for these ecologically driven preferences is that in resource scarce environments, lower WHR may be associated with malnutrition and poor reproductive health (Ellison, 1990; Frisch, 1987), which may explain preferences for higher WHR in some environments. Additionally, as food becomes more readily available and rates of obesity increase, preferences seem to increase for women with lower WHR (Yu & Shepard, 1998). This is evident by the findings from the Matsigenka people from Shipetiari (Peru), which are a more westernized population and desire a stronger preference for women with lower WHR (Yu & Shepard, 1998). Taken together, cultural and ecological factors may contribute to variation in preferences for women's WHR as a function of availability of resources and prevalence of obesity.

As indicated above, the most attractive women's WHR to men might vary across different cultures. Except for one study on preference for WHR among Polish (Kościński, 2013) and one recent study among Iranians (Mirfazeli et al., 2021), no previous research has investigated men's and women's preference for opposite sex bodily shape and size, among Iranian, Norwegian, Polish, and Russian people. Kościński (2013) has reported that Polish men preferred a WHR of 0.70. In a study from Iran, a sample of male colleague students indicated WHR 0.80 as the most preferred for both short- and long-term relationships (Mirfazeli et al., 2021).

Shoulder to Hip Ratio (SHR)

In men, the upper-body strength is a sexually dimorphic trait and an indicator of physical attractiveness (Braun & Bryan, 2006; Dixson et al., 2014; Garza et al., 2017; Garza & Byrd-Craven, 2019; Furnham & Nordling, 1998; Horvath, 1981; Hönekopp et al., 2007; Pazhoohi et al., 2019, 2023a, b; Sell et al., 2017; Tovée et al., 1999). Men's upper body is quantified through the ratio of the circumference of the shoulders relative to that of the hips, known as the shoulder to hip ratio (SHR). Men with somatotypes that are mesomorphic are categorized as muscular with broad shoulders and less fat distribution in the abdomen (i.e., higher SHR), while endomorphic men are categorized as less muscular with more fat distribution (i.e., lower SHR) (Dixson et al., 2014). Women's preference for men's masculine upper body is attributed to the association of such body morphs with high quality genes (Sell et al., 2017), immunocompetence, as well as resource acquisition abilities (Dixson et al., 2014; Gallup & Frederick, 2010). A strong body type may reflect disease resistance and genetic quality given the energetic demands (i.e., dietary energy, testosterone) needed in displaying and maintaining muscularity (Lassek & Gaulin, 2009; Sell et al., 2017). Variations in SHR affect both early and late stages of visual processing, impacting posterior brain regions involved in perceiving body form and attractiveness, as well as frontal areas linked to judgment and decision-making (Pazhoohi et al., 2023a).

Cross-cultural Research on SHR

Similar to women's WHR, there are cross-cultural differences in preference for men's SHR. For example, women from a rural community in Cameroon, British, and Sri Lanka preferred a mesomorphic (muscular) somatotype compared to an average somatotype (Dixson et al., 2003, 2007b), while women from China rated an average masculine somatotype higher on attractiveness than a mesomorphic somatotype (Dixson et al., 2007a). Women from New Zealand and the U.S. rated both mesomorphic and average somatotypes as the most attractive (Dixson et al., 2010a). Women from Portugal rated an intermediate SHR as the most attractive compared to small and large SHRs (Pazhoohi et al., 2019). Hispanic women in the U.S. also found men with lower waist to chest ratios (i.e., higher SHR) more attractive (Garza et al., 2017; Garza & Byrd-Craven, 2019), in addition to demonstrating a preference for men with stronger body types (Garza et al., 2021).

Current Research

The current research reports an investigation on men's preference for women's WHR and women's preference for men's SHR in samples from four distant countries (Iran, Norway, Poland, and Russia). Considering the differences between these countries on a variety of environmental characteristics, such as historic and contemporary pathogen prevalence (Fincher et al., 2008), we expect differences in preferences for masculine/feminine body forms. As mentioned, limited research has investigated these countries in reference to women's preferences for SHR in men and men's preference for WHR in women. By examining the aforementioned countries, a comprehensive account on men's and women's preferences for anthropomorphic features in the opposite sex can provide us with an overview on how these preferences for physical traits vary across different countries, and whether cultural or ecological factors explain those differences. Therefore, in the current study we predicted that women would have a preference for men with higher SHR, as previous literature generally finds a stronger preference for men with intermediate to higher SHR compared to lower SHR (Pazhoohi et al., 2019; 2023b). For men's preferences regarding women's WHR, we predicted more cross-cultural variation, as men have shown preferences for lower (Dixson et al., 2010b; Singh, 1993) and higher WHRs in women (Marlowe & Wetsman, 2001; Yu & Sheppard, 1998) across populations. Moreover, we expect differences in preferences for WHR and SHR across these four cultures.

Method

Participants

A total of 1416 heterosexual individuals (1031 women and 385 men) from Iran ($N=481$), Norway ($N=283$), Poland ($N=372$), and Russia ($N=280$), with age ranging from 18 to 73 years ($M=29.37$, $SD=9.34$) participated. A total of 379 participants

(26.7%) reported being married, 12.6% reported dating, and an additional 21.5% reported being in a committed relationship, while 39.2% reported being single (see Table 1 for the detailed descriptive statistics).

Stimuli and Procedure

The participants were recruited online using surveys translated into Norwegian, Farsi, Polish, and Russian. Collaborators were instructed to recruit participants from varied sample pools, including different ages, genders, residents of both small and large cities, and individuals from community and university backgrounds, among others (see Supplementary Materials for more details). After providing consent to participate and responding to demographic questions, men were shown a female WHR body scale, whereas women were presented with a male SHR body scale (see Fig. 1). They were then asked to indicate: "Which male/female possesses the most attractive body?". Female stimuli were differing in their WHR, ranging from .55 to .85, incrementing in steps of .05. Male stimuli were differing in their SHR, ranging from 1.20 to 1.50, incrementing in steps of .05. Female and male stimuli were created by manipulating waist and shoulder regions, respectively, and keeping the hip size constant across the stimuli.

Results

Data Analysis

Data were analyzed using a Kruskal-Wallis test to examine men's preferences for women's WHR and women's preference's for men's SHR across 4 countries. This non-parametric testing method was used to account for participants' most frequent choice on which body type they considered the most attractive rather than making numerical ratings for each of the bodies. All significant models were followed up using a Dwass-Steel-Critchlow-Fligner pairwise comparisons. Additional analysis,

Table 1 Descriptive statistics (N, age, and relationship status) for male and female participants

	Female Participants					
Country	N	Age Mean (SD)	Relationship Status			
			Single	Dating	In a committed relationship	Married
Iran	317	30.63 (8.54)	121 (38.17%)	56 (17.67%)	25 (7.89%)	115 (36.28%)
Norway	201	27.20 (7.44)	70 (34.83%)	15 (7.46%)	67 (33.33%)	49 (24.38%)
Poland	317	28.83 (9.29)	87 (27.44%)	36 (11.36%)	117 (36.91%)	77 (24.29%)
Russia	196	30.98 (12.10)	79 (40.31%)	24 (12.24%)	35 (17.86%)	58 (29.59%)
	Male Participants					
Iran	164	31.66 (9.93)	85 (51.83%)	27 (16.46%)	8 (4.88%)	44 (26.83%)
Norway	82	27.85 (6.23)	36 (43.90%)	4 (4.88%)	27 (32.93%)	15 (18.29%)
Poland	55	29.42 (9.73)	23 (41.82%)	6 (10.91%)	20 (36.36%)	6 (10.91%)
Russia	84	25.05 (7.40)	52 (61.90%)	11 (13.10%)	6 (7.14%)	15 (17.86%)

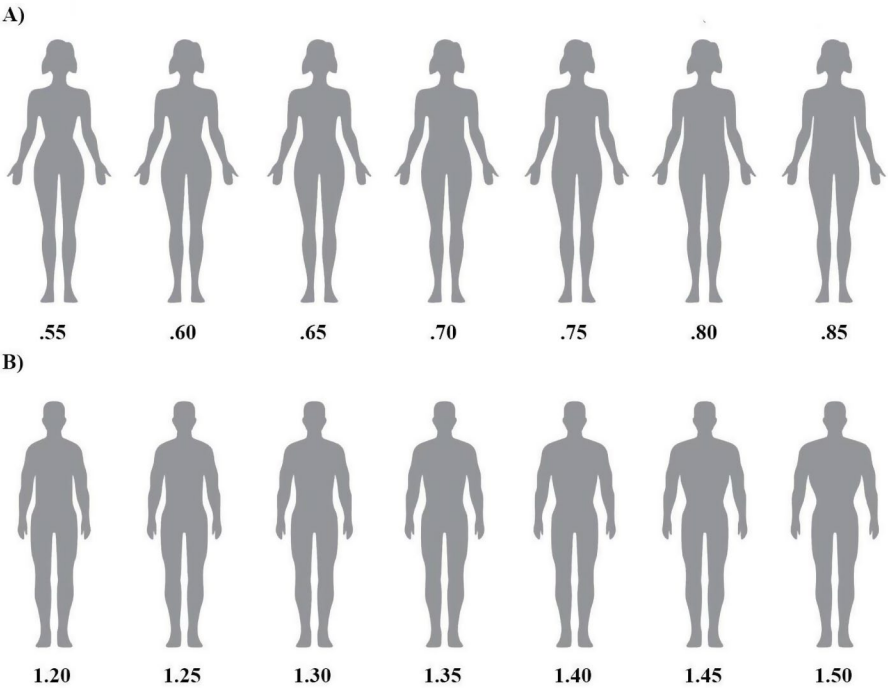

Fig. 1 **A** Female stimuli differing in WHR, and **B** male stimuli differing in SHR

incorporating age and relationship status as covariates, was carried out and found to have no significant impact on the primary findings (refer to the Supplementary Material file for details).

WHR

A Kruskal-Wallis test showed a significant difference in men's preferences for women's WHR between countries, $\chi^2(3)=43.51$, $p<.001$, $\varepsilon^2 = 0.11$. Dwass-Steel-Critchlow-Fligner pairwise comparisons provided evidence that Iranian men preferred higher WHRs in women than Polish ($W=6.84$, $p<.001$) and Russian men ($W=7.40$, $p<.001$). Similarly, Norwegian men preferred higher WHRs in women compared to Polish ($W=5.11$, $p=.002$) and Russian men ($W=5.19$, $p=.001$). No differences were found between Iranian and Norwegian men ($W=2.54$, $p=.276$), or Polish and Russian men in preference for women's WHR ($W = -0.50$, $p=.985$). Iranian men more frequently preferred WHR 0.70 (interquartile range; IQR: 0.10) while for Norwegian, Polish, and Russian men, the most frequently preferred WHRs were 0.65 (IQR: 0.05), 0.60 (IQR: 0.08), and 0.65 (IQR: 0.10), respectively (see Fig. 2 for bar plots and percentage of responses for each WHR by country).

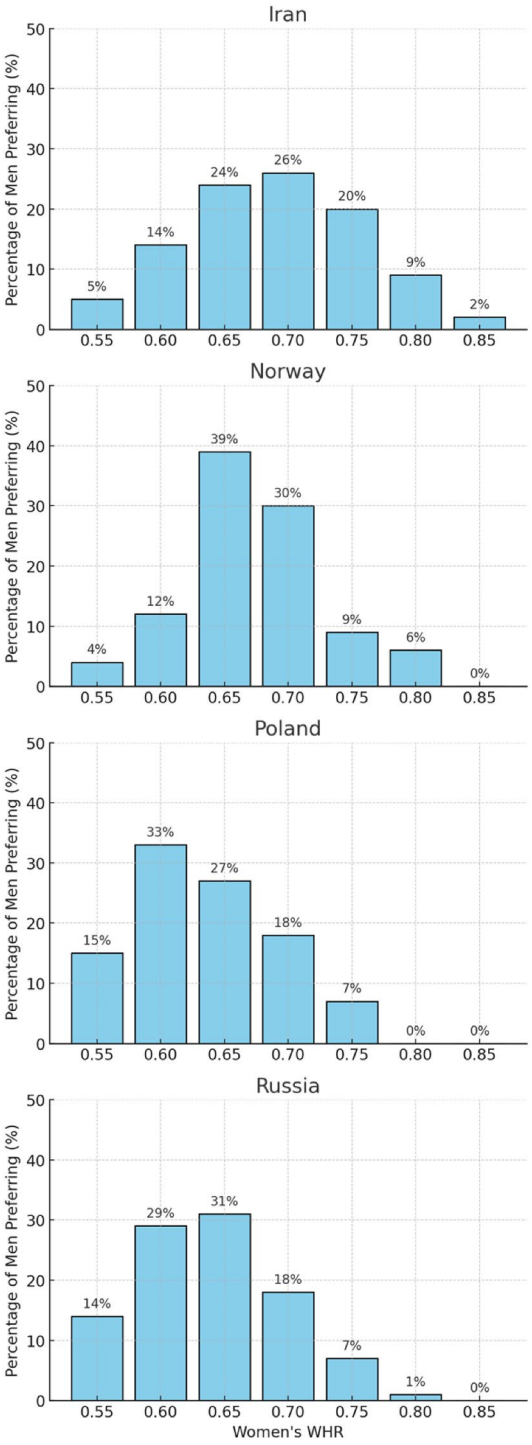

Fig. 2 Bar plots indicating the frequency of preferred WHR by country. The X-axis represents the variation in women's WHR, and the Y-axis represents the frequency preferred by country

SHR

A Kruskal-Wallis test showed a significant difference in women's preferences for men's SHR between countries, $\chi^2(3) = 72.70$, $p < .001$, $\varepsilon^2 = 0.06$. Dwass-Steel-Critchlow-Fligner pairwise comparisons provided evidence that Iranian women preferred lower SHRs for men than Norwegian ($W = -7.02$, $p < .001$), Polish ($W = -11.80$, $p < .001$), and Russian women ($W = -5.84$, $p < .001$). Polish women preferred higher SHRs in men compared to Russian women ($W = 4.47$, $p = .009$). No other differences were found ($ps > 0.284$). Iranian women more frequently preferred SHR 1.35 (IQR: 0.10) for men, while for Norwegian, Polish and Russian women, the most frequently preferred SHR was 1.40 (IQR: 0.05) (see Fig. 3 for bar plots and percentage of responses for each SHR by country).

Age

An Analysis of Variance (ANOVA) was conducted to compare the mean age of male participants across four countries: Iran, Norway, Poland, and Russia, revealing a significant difference, $F(3, 379) = 11.2$, $p < .001$. Post hoc comparisons using the Bonferroni adjustment indicated significant mean differences in age between several pairs of countries (see Table 1 for Means and SDs). Specifically, the mean age of participants from Iran was significantly higher than those from Norway ($p = .008$) and Russia ($p < .001$). Furthermore, the mean age of participants from Poland was significantly higher than those from Russia ($p = .025$). No other pairwise comparisons were statistically significant.

Another ANOVA comparing the mean age of female participants revealed a significant difference across countries, $F(3, 1025) = 7.72$, $p < .001$. Women from Iran were, on average, significantly older than those from Norway ($p < .001$). Additionally, the mean age of participants from Norway was significantly lower than those from Russia ($p < .001$). The comparisons between other countries were not significant.

Discussion

The current study investigated men and women's preference for an opposite sex body shape across four countries. In particular, men's preference for women's WHR and women's preference for men's SHR were investigated.

WHR

Results for WHR showed that Iranian and Norwegian men preferred higher WHRs in women compared to Polish and Russian men. The most frequent preferred WHRs for Iranian, Norwegian, Polish and Russian men were 0.70, 0.65, 0.60, and 0.65, respectively. This discrepancy in preference for WHR is in line with previous cross-cultural studies on WHR and the proposal that preference for WHR varies across ecologies (Marlowe & Wetsman, 2001).

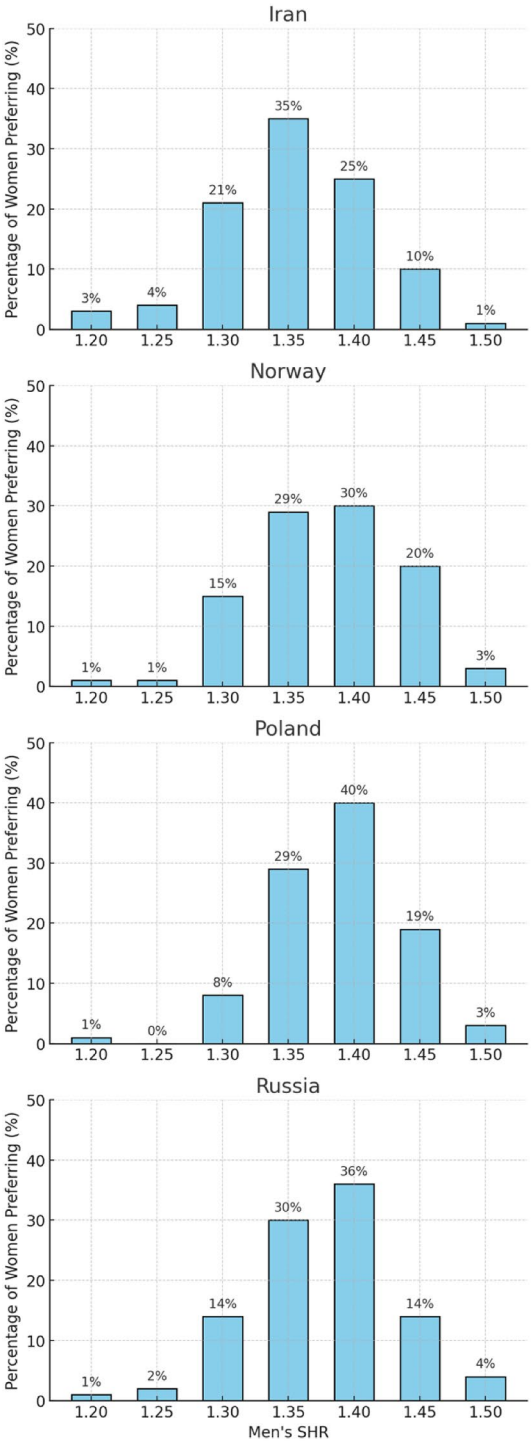

Fig. 3 Bar plots indicating the frequency of preferred SHR by country. The X-axis represents the variation in men's SHR, and the Y-axis represents the frequency preferred by country

Results of the current study for men's preference for WHR in Iran and Poland were slightly skewed toward lower ratios compared to previous reports from these two countries. Specifically, Kościński (2013) reported WHR of 0.70 as the most attractive for Polish men, while our study showed WHRs of 0.60 and 0.65 as the most frequently preferred ones. Similarly, Mirfazeli et al. (2021) reported WHR of 0.80 followed by 0.70 as the most frequent preferred ratios among Iranian men, while our results point to WHR of 0.70 followed by 0.65 as the most frequently preferred ones. While one could attribute the differences between our results and those of previous studies to differences in stimuli, the current study, using a unique set of stimuli across the four cultures, nevertheless, points to the existence of cross-cultural variations. In that respect the current study contributes to the existent literature, as the number of studies that have used a unique stimulus set to compare preference for men and women's body shapes is limited.

Moreover, results of the current study show a tendency for a supernormal version of women's WHR for men in these four countries. The anthropomorphic measurements show that the WHR of women is higher than what men of each of these cultures indicated as the most attractive ratio. Specifically, anthropomorphic studies report a WHR of 0.80, 0.80, 0.75, and 0.78 for Iranian, Norwegian, Polish, and Russian women (Butovskaya et al., 2017; Cashdan, 2008; Jasieńska et al., 2004; Lipowska et al., 2019; Pawłowski & Dunbar, 2005; Pokrywka et al., 2006; Svare et al., 2011), while our results showed that men from these countries preferred women with lower WHRs, with Iranian and Norwegian men preferring women with higher WHRs than Polish and Russian men. In line with this finding, recent research has argued that men perceive WHRs lower than 0.75 in women as supernormal stimuli, signaling higher reproductive potentials in women (Derenne et al., 2008; Pazhoohi et al., 2020b). Accordingly, there are adaptive reasons for men preferring WHRs lower in women than what are observed in their environments, as such lower-than-normal WHRs are shown to be rewarding both behaviorally (Derenne et al., 2008) and at the neural level (Pazhoohi et al., 2020a; Platek & Singh, 2010). Lower WHRs also serves as a cue to reproductive age, current pregnancy, and parity status, which could be important factors in men's mating preferences. Men's mating success is dependent upon his level of paternity certainty, and higher WHRs may signal that a woman is pregnant and potentially partnered with another mate, which would lower his reproductive success (Bovet, 2019).

SHR

As for the SHR, our results showed that Iranian women preferred less masculine men compared to Norwegian, Polish, and Russian women, with SHR of 1.35 followed by 1.40 were preferred more frequently by Iranian women, while for Norwegian, Polish, and Russian women 1.40 SHR followed by 1.35 were the most frequently preferred. Moreover, Polish women preferred higher SHRs in men than Russian women. The lack of consistency in our results also conforms with the existence of cultural differences in other cross-cultural research in women's preference for men's somatotype (Dixson et al., 2003, 2010a). Yet, the current study is the first to systematically test preference for men's upper bodies cross-culturally. In other words, the current study

used stimuli with manipulation of only one body measurement (shoulder size), while the previous studies evaluated the preference using somatotypes, where multiple variables were manipulated on bodies leading to potential confounds.

Ecological Differences

Cross-cultural research on face perception has shown that individuals' attractiveness ratings and mate preferences vary across cultures (Fiala et al., 2021; Marcinkowska et al., 2014, 2019). Marcinkowska et al. (2014) showed that men's preference for women's feminine faces is negatively associated with the health condition of countries, potentially due to preference for women with cues to resource holding power in harsher environments. Our results point to the preference for more masculine female body forms (i.e., higher WHRs) for Iranian and Norwegian men compared to those from Poland and Russia. However, we cannot attribute these differences to health condition or other socio-cultural disparity across these countries, as the indices for Iran (United Nations' 2021/2022 report of Human Development Index [HDI]: 0.78) and Norway (HDI: 0.96) are the most different of these four countries, yet the preferences for WHR are the most similar in these two distant cultures compared to Poland and Russia (HDIs: 0.88 and 0.82, respectively).

In an experimental study, Garza et al. (2021) asked women to rate attractiveness of men's upper bodies varying in masculinity. The researchers randomly assigned women to perceived harsh and safe ecological conditions and found that women from the harsh condition preferred relatively more masculine and stronger men. However, our finding that Iranian women, from a harsher ecological environment (Historical Pathogen Prevalence [HPP]: −0.17; Contemporary Pathogen Prevalence [CPP]: 33, Fincher et al., 2008), preferred lower SHRs in men compared to women from Norway (HPP: −0.80, CPP: 24), Poland (HPP: −0.80, CPP: 27), and Russia (HPP: −0.42, CPP: 28) contradicts with this previous finding, yet suggests mating context (i.e., short-term vs. long-term relationships) modulates preferences for men's physical features that are potential cues to direct and indirect benefits, such as genetic quality and resource holding power. Women demonstrate a stronger preference for men with higher shoulder to hip ratios when considering a short-term mating encounter (Braun & Bryan, 2006; Provost et al., 2006, 2008), suggesting that they prioritize physical features associated with indirect benefits (i.e., high-quality genes). However, recent research has shown that women may be more consistent in their mating preference regardless of mating context, while men have a stronger proclivity to prioritize preferences in short-and long-term mating (Mirfazeli et al., 2021). Considering mating context in preferences for SHR in men and WHR in women across countries provides a fruitful avenue for future research.

A strength of the current study is the cross-cultural comparisons of men and women's preferences in an underexplored region (i.e., Russia). One previous study did examine the association between WHR and reproductive potential in a West Siberian culture (i.e. traditional Ob Ugric people) (Butovskaya et al., 2017) but did not examine WHR in relation to mate preferences. Examining preferences across regions provides a more comprehensive understanding on whether anthropomorphic traits are universally preferred or moderated by culturally determined factors. Although

the current study did not investigate the cultural underpinnings of these preferences, we can conclude that men's preference for WHR and women's preference for SHR seem to vary across countries. One possible avenue for future research would be to investigate individual differences and underlying factors associated with these preferences, such as examining mating strategies, socioeconomic factors, and ecological harshness indices. Further, we relied on digitally created stimuli to isolate the individual metrics (i.e., WHR and SHR) in each sex, rather than using real images. Future cross-cultural research can benefit from comparing differences in digital stimuli with real images where WHR and SHR would be manipulated. Interactions with other anthropometric measurements, such as body mass index, should also be investigated.

There are some limitations that must be taken into consideration. One limitation is the lack of control over the ethnicity of the raters, which may have influenced the observed preferences for WHR and SHR. The potential impact of respondent ethnicity on the results, particularly in cross-cultural comparisons, warrants further consideration. Furthermore, differences across preferences may have been attributed to possible ecological factors, as some research has pointed to the role of resource scarcity (Garza et al., 2021), pathogen prevalence (Fincher et al., 2008; Lee & Zietsch, 2011), and income inequality (Brooks et al., 2011) on mate preferences. Considering ecological effects by using an experimental priming method or considering individual differences in ecological relevant measures (i.e., pathogen measures, SES) is a possible future direction. Although research has suggested that women's preferences for men's masculine features (i.e., facial masculinity) may be stronger during reproductive age, suggesting a possible role of age (Little et al., 2010), our sample consisted of reproductive age women, lending support to our findings. Further, a recent study showed that age has a minimal impact on overall preferences, including attractiveness (Botzet et al., 2023). In reference to men's age, Singh (1993) showed that both college aged and younger and older men showed similar preferences for women with lower WHR. To better account for control variables, such as age and partnership status, future studies may consider rating WHR and SHR across a scaled dependent variable instead of frequencies. Our additional analysis, which incorporated age and relationship status as covariates, found no significant effect on the primary findings. Nonetheless, as the samples were based on convenience sampling, the current cross-cultural differences should be replicated in nationally representative samples.

Conclusion

The current research investigated men's preference for women's WHR and women's preference for SHR across four different cultures of Iran, Norway, Poland, and Russia. Indeed, results indicated cross-country differences in preferences, where Iranian and Norwegian men preferred less feminine WHRs in women than their Polish and Russian counterparts, whereas Iranian women preferred less masculine SHRs in men than women from other countries. Moreover, our results suggest that men from these countries prefer a lower WHR in women compared to the average of women's actual WHR in their countries.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40750-024-00232-7.

Author Contributions F.P., conceptualization, data collection, formal analysis, writing—original draft preparation; R.A., R.C., D.D., K.G., N.G.M., D.G., M.K., S.P., G.P., data collection, writing—review and editing; R.A., Stimuli preparation; R.G., writing—review and editing.

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Data Availability Authors will share upon request.

Declarations

Ethical Approval Each member of the team involved in data collection adhered to the ethical principles of their respective Institutional Review Boards and received approval. Data collection was conducted in accordance with the Declaration of Helsinki as it pertains to research with human participants.

Informed Consent Informed consent was obtained from all subjects involved in the study.

Competing Interests The authors declare no competing interests.

References

Apicella, C. L. (2014). Upper-body strength predicts hunting reputation and reproductive success in Hadza hunter–gatherers. *Evolution and Human Behavior*, *35*(6), 508–518.

Barber, N. (1995). The evolutionary psychology of physical attractiveness: Sexual selection and human morphology. *Ethology and Sociobiology*, *16*(5), 395–424.

Botzet, L. J., Shea, A., Vitzthum, V. J., et al. (2023). The Link between Age and Partner preferences in a large, international sample of single women. *Hum Nat*. https://doi.org/10.1007/s12110-023-09460-4.

Bovet, J. (2019). Evolutionary theories and men's preferences for women's Waist-to-hip ratio: Which hypotheses remain? A systematic review. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2019.01221. 10.

Bovet, J., Lao, J., Bartholomée, O., Caldara, R., & Raymond, M. (2016). Mapping female bodily features of attractiveness. *Scientific Reports*, *6*(1), 1–9.

Braun, M. F., & Bryan, A. (2006). Female waist-to-hip and male waist-to-shoulder ratios as determinants of romantic partner desirability. *Journal of Social and Personal Relationships*, *23*(5), 805–819.

Brooks, R., Scott, I. M., Maklakov, A. A., Kasumovic, M. M., Clark, A. P., & Penton-Voak, I. S. (2011). National income inequality predicts women's preferences for masculinized faces better than health does. *Proceedings Biological Sciences*, *278*(1707), 810–814. https://doi.org/10.1098/rspb.2010.0964.

Butovskaya, M., Sorokowska, A., Karwowski, M., Sabiniewicz, A., Fedenok, J., Dronova, D., & Sorokowski, P. (2017). Waist-to-hip ratio, body-mass index, age and number of children in seven traditional societies. *Scientific Reports*, *7*(1), 1–9.

Cashdan, E. (2008). Waist-to-hip ratio across cultures: Trade-offs between androgen-and estrogen-dependent traits. *Current Anthropology*, *49*(6), 1099–1107.

Cloud, J. M., Stone, A. M., & McCarthy, J. D. (2022). *No time to waist: Low waist-to-hip ratios pop out in visual search*. Evolutionary Behavioral Sciences.

Del Zotto, M., & Pegna, A. J. (2017). Electrophysiological evidence of perceived sexual attractiveness for human female bodies varying in waist-to-hip ratio. Cognitive, Affective, & Behavioral Neuroscience, 17(3), 577–591.

Del Zotto, M., Framorando, D., & Pegna, A. J. (2020). Waist-to-hip ratio affects female body attractiveness and modulates early brain responses. *European Journal of Neuroscience*, *52*(11), 4490–4498.

Derenne, A., Breitstein, R. M., & Cicha, R. J. (2008). Shifts in postdiscrimination gradients within a stimulus dimension based on female waist-to-hip ratios. *The Psychological Record*, *58*(1), 51–60.
Dixson, A. F., Halliwell, G., East, R., Wignarajah, P., & Anderson, M. J. (2003). Masculine somatotype and hirsuteness as determinants of sexual attractiveness to women. *Archives of Sexual Behavior*, *32*(1), 29–39.
Dixson, B. J., Dixson, A. F., Li, B., & Anderson, M. J. (2007a). Studies of human physique and sexual attractiveness: Sexual preferences of men and women in China. *American Journal of Human Biology*, *19*(1), 88–95.
Dixson, B. J., Dixson, A. F., Morgan, B., & Anderson, M. J. (2007b). Human physique and sexual attractiveness: Sexual preferences of men and women in Bakossiland, Cameroon. *Archives of Sexual Behavior*, *36*(3), 369–375.
Dixson, B. J. W., Dixson, A. F., Bishop, P. J., & Parish, A. (2010a). Human physique and sexual attractiveness in men and women: A New Zealand–US comparative study. *Archives of Sexual Behavior*, *39*(3), 798–806.
Dixson, B. J., Grimshaw, G. M., Linklater, W. L., & Dixson, A. F. (2010b). Watching the hourglass. *Human Nature*, *21*(4), 355–370.
Dixson, B. J., Grimshaw, G. M., Linklater, W. L., & Dixson, A. F. (2011). Eye-tracking of men's preferences for waist-to-hip ratio and breast size of women. *Archives of Sexual Behavior*, *40*(1), 43–50.
Dixson, B. J. W., Grimshaw, G. M., Ormsby, D. K., & Dixson, A. F. (2014). Eye-tracking women's preferences for men's somatotypes. *Evolution and Human Behavior*, *35*, 73–79.
Ellison, P. T. (1990). Human ovarian function and Reproductive Ecology: New hypotheses. *American Anthropologist*, *92*(4), 933–952.
Fiala, V., Třebický, V., Pazhoohi, F., Leongómez, J. D., Tureček, P., Saribay, S. A., & Kleisner, K. (2021). Facial attractiveness and preference of sexual dimorphism: A comparison across five populations. *Evolutionary Human Sciences*, 3.
Fincher, C. L., Thornhill, R., Murray, D. R., & Schaller, M. (2008). Pathogen prevalence predicts human cross-cultural variability in individualism/collectivism. Proceedings of the Royal Society B: Biological Sciences, 275(1640), 1279–1285.
Frisch, R. E., & Oxford (1987). *England)*, 2(6), 521–533. https://doi.org/10.1093/oxfordjournals.humrep.a136582.
Furnham, A., & Nordling, R. (1998). Cross-cultural differences in preferences for specific male and female body shapes. *Personality and Individual Differences*, *25*(4), 635–648.
Gallup, G. G. Jr., & Frederick, D. A. (2010). The science of sex appeal: An evolutionary perspective. *Review of General Psychology*, *14*(3), 240–250.
Garza, R., & Byrd-Craven, J. (2020). Effects of women's short-term mating orientation and self-perceived attractiveness in rating and viewing men's waist to chest ratios. *Archives of Sexual Behavior*, 1–9.
Garza, R., Heredia, R. R., & Cieslicka, A. B. (2016). Male and female perception of physical attractiveness: An eye movement study. *Evolutionary Psychology*, *14*(1), 1474704916631614.
Garza, R., Heredia, R. R., & Cieslicka, A. B. (2017). An eye tracking examination of men's attractiveness by conceptive risk women. *Evolutionary Psychology*, 1–11.
Garza, R., Pazhoohi, F., & Byrd-Craven, J. (2021). Women's preferences for strong men under Perceived Harsh Versus Safe Ecological conditions. *Evolutionary Psychology*, *19*(3), 14747049211032351.
Hönekopp, J., Rudolph, U., Beier, L., Liebert, A., & Müller, C. (2007). Physical attractiveness of face and body as indicators of physical fitness in men. *Evolution and Human Behavior*, *28*(2), 106–111.
Horvath, T. (1981). Physical attractiveness: The influence of selected torso parameters. *Archives of Sexual Behavior*, *10*(1), 21–24.
Jasieńska, G., Ziomkiewicz, A., Ellison, P. T., Lipson, S. F., & Thune, I. (2004). Large breasts and narrow waists indicate high reproductive potential in women. *Proceedings of the Royal Society of London Series B: Biological Sciences*, *271*(1545), 1213–1217.
Karastergiou, K., Smith, S. R., Greenberg, A. S., & Fried, S. K. (2012). Sex differences in human adipose tissues–the biology of pear shape. *Biology of sex Differences*, *3*(1), 13.
Kordsmeyer, T. L., Hunt, J., Puts, D. A., Ostner, J., & Penke, L. (2018). The relative importance of intra- and intersexual selection on human male sexually dimorphic traits. *Evolution and Human Behavior*, *39*(4), 424–436.
Kościński, K. (2013). Attractiveness of women's body: Body mass index, waist–hip ratio, and their relative importance. *Behavioral Ecology*, *24*(4), 914–925.
Kurki, H. K. (2011). Pelvic dimorphism in relation to body size and body size dimorphism in humans. *Journal of Human Evolution*, *61*(6), 631–643.

Lassek, W. D., & Gaulin, S. J. C. (2009). Costs and benefits of fat-free muscle mass in men: Relationship to mating success, dietary requirements, and native immunity. *Evolution and Human Behavior*, *30*(5), 322–328. https://doi.org/10.1016/j.evolhumbehav.2009.04.002.

Lassek, W. D., & Gaulin, S. J. C. (2018). Do the Low WHRs and BMIs Judged Most Attractive Indicate *Better Health? Evolutionary Psychology*, 16(4), 1474704918803998. https://doi.org/10.1177/1474704918803998.

Lassek, W. D., & Gaulin, S. J. (2019). Evidence supporting nubility and reproductive value as the key to human female physical attractiveness. *Evolution and Human Behavior*, *40*(5), 408–419.

Lee, A. J., & Zietsch, B. P. (2011). Experimental evidence that women's mate preferences are directly influenced by cues of pathogen prevalence and resource scarcity. *Biology Letters*, *7*(6), 892–895. https://doi.org/10.1098/rsbl.2011.0454.

Lipowska, M., Truong Thi Khanh, H., Lipowski, M., Różycka-Tran, J., Bidzan, M., & Ha, T. T. (2019). The body as an object of stigmatization in cultures of guilt and shame: A Polish–Vietnamese comparison. *International Journal of Environmental Research and Public Health*, *16*(16), 2814.

Little, A. C., Saxton, T. K., Roberts, S. C., Jones, B. C., Debruine, L. M., Vukovic, J., Perrett, D. I., Feinberg, D. R., & Chenore, T. (2010). Women's preferences for masculinity in male faces are highest during reproductive age range and lower around puberty and post-menopause. *Psychoneuroendocrinology*, *35*(6), 912–920. https://doi.org/10.1016/j.psyneuen.2009.12.006.

Marcinkowska, U. M., Kozlov, M. V., Cai, H., Contreras-Garduño, J., Dixson, B. J., Oana, G. A., & Rantala, M. J. (2014). Cross-cultural variation in men's preference for sexual dimorphism in women's faces. *Biology Letters*, *10*(4), 20130850.

Marcinkowska, U. M., Rantala, M. J., Lee, A. J., Kozlov, M. V., Aavik, T., Cai, H., & Dixson, B. J. (2019). Women's preferences for men's facial masculinity are strongest under favorable ecological conditions. *Scientific Reports*, *9*(1), 1–10.

Marlowe, F., & Wetsman, A. (2001). Preferred waist-to-hip ratio and ecology. *Personality and Individual Differences*, *30*(3), 481–489.

Marlowe, F., Apicella, C., & Reed, D. (2005). Men's preferences for women's profile waist-to-hip ratio in two societies. *Evolution and Human Behavior*, *26*(6), 458–468.

Mirfazeli, F. S., Lai, M. C., Memari, A., Rajab, A., Shafizadeh, M., Zarei, S., & Vahabie, A. H. (2021). Short-term and long-term mate preference in men and women in an Iranian population. *Scientific Reports*, *11*(1), 1–10.

Nettle, D. (2002). Women's height, reproductive success and the evolution of sexual dimorphism in modern humans. *Proceedings of the Royal Society of London Series B: Biological Sciences*, *269*(1503), 1919–1923.

Pawłowski, B., & Dunbar, R. I. (2005). Waist-to-hip ratio versus body mass index as predictors of fitness in women. *Human Nature*, *16*(2), 164–177.

Pazhoohi, F., Macedo, A. F., & Arantes, J. (2017). The effect of religious clothing on gaze behavior: An eye-tracking experiment. *Basic and Applied Social Psychology*, *39*(3), 176–182.

Pazhoohi, F., Garza, R., Doyle, J. F., Macedo, A. F., & Arantes, J. (2019). Sex differences for preferences of shoulder to hip ratio in men and women: An eye tracking study. *Evolutionary Psychological Science*, *5*(4), 405–415.

Pazhoohi, F., Arantes, J., Kingstone, A., & Pinal, D. (2020a). Waist to hip ratio and breast size modulate the processing of female body silhouettes: An EEG study. *Evolution and Human Behavior*, *41*(2), 150–169.

Pazhoohi, F., Macedo, A. F., Doyle, J. F., & Arantes, J. (2020b). Waist-to-hip ratio as supernormal stimuli: Effect of contrapposto pose and viewing angle. *Archives of Sexual Behavior*, *49*(3), 837–847.

Pazhoohi, F., Arantes, J., Kingstone, A., & Pinal, D. (2023a). Neural correlates and perceived attractiveness of male and female shoulder-to-hip ratio in men and women: An EEG study. *Archives of Sexual Behavior*, *52*, 1–19. https://doi.org/10.1007/s10508-023-02610-w

Pazhoohi, F., Garza, R., & Kingstone, K. (2023b). The interacting effects of height and shoulder-to-hip ratio on perceptions of attractiveness masculinity and fighting ability: Experimental design and ecological validity considerations. *Archives of Sexual Behavior*, *52*(1), 301–314. https://doi.org/10.1007/s10508-022-02416-2

Platek, S. M., & Singh, D. (2010). Optimal waist-to-hip ratios in women activate neural reward centers in men. *PLoS One*, 5(2), e9042.

Pokrywka, L., Čabrić, M., & Krakowiak, H. (2006). Body mass index and waist: Hip ratio are not enough to characterise female attractiveness. *Perception*, *35*(12), 1693–1697.

Provost, M. P., Komos, C., Kosakoski, G., & Quinsey, V. L. (2006). Sociosexuality in women and preference for facial masculinization and somatotype in men. *Archives of Sexual Behavior*, *35*, 305–312.
Provost, M. P., Troje, N. F., & Quinsey, V. L. (2008). Short- term mating strategies and attraction to masculinity in point-light walkers. *Evolution and Human Behavior*, *29*, 65–69.
Puts, D. A. (2010). Beauty and the beast: Mechanisms of sexual selection in humans. *Evolution and Human Behavior*, *31*(3), 157–175.
Ruff, C. (2002). Variation in human body size and shape. *Annual Review of Anthropology*, *31*(1), 211–232.
Sell, A., Lukazsweski, A. W., & Townsley, M. (2017). Cues of upper body strength account for most of the variance in men's bodily attractiveness. Proceedings of the Royal Society B: Biological Sciences, 284(1869), 20171819.
Singh, D. (1993). Adaptive significance of female physical attractiveness: Role of waist-to-hip ratio. *Journal of Personality and Social Psychology*, *65*(2), 293.
Singh, D., Dixson, B. J., Jessop, T. S., Morgan, B., & Dixson, A. F. (2010). Cross-cultural consensus for waist–hip ratio and women's attractiveness. *Evolution and Human Behavior*, *31*(3), 176–181.
Svare, A., Nilsen, T. I., Bjøro, T., Åsvold, B. O., & Langhammer, A. (2011). Serum TSH related to measures of body mass: Longitudinal data from the HUNT study, Norway. *Clinical Endocrinology*, *74*(6), 769–775.
Tovée, M. J., Maisey, D. S., Vale, E. L., & Cornelissen, P. L. (1999). Characteristics of male attractiveness for women. *The Lancet*, *353*(9163), 1500.
Wells, J. C. (2007). Sexual dimorphism of body composition. *Best Practice & Research Clinical Endocrinology & Metabolism*, *21*(3), 415–430.
Wetsman, A., & Marlowe, F. (1999). How universal are preferences for female waist-to-hip ratios? Evidence from the Hadza of Tanzania. *Evolution and Human Behavior*, *20*(4), 219–228.
Yu, D. W., & Shepard, G. H. (1998). Is beauty in the eye of the beholder? *Nature*, *396*(6709), 321–322.

Authors and Affiliations

Farid Pazhoohi[1] · Reza Afhami[2] · Razieh Chegeni[3] · Dmitrii Dubrov[4] · Katarzyna Gałasińska[5] · Ray Garza[6] · Nasim Ghahraman Moharrampour[7] · Dmitry Grigoryev[4] · Marta Kowal[8] · Ståle Pallesen[9] · Gerit Pfuhl[10]

✉ Farid Pazhoohi
pazhoohi@gmail.com

[1] School of Psychology, University of Plymouth, Plymouth, UK

[2] Tarbiat Modares University, Tehran, Iran

[3] PROMENTA Research Center, Department of Psychology, University of Oslo, Oslo, Norway

[4] HSE University, Moscow, Russia

[5] SWPS University, Warsaw, Poland

[6] Texas A&M International University, Laredo, USA

[7] University of Melbourne, Melbourne, Australia

[8] IDN Being Human Lab, University of Wrocław, Wrocław, Poland

[9] Department of Psychosocial Science, University of Bergen, Bergen, Norway

[10] Department of Psychology, Norwegian University of Science and Technology, Trondheim, Norway