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ORIGINAL PAPER

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Abstract Humans (*Homo sapiens*) are unique primates due to a lack of a thermally insulating fur covering, typical of all other primates. Our primary goal was to examine the "ectoparasite avoidance mediated by mate choice hypothesis" suggesting that women prefer men lacking chest hair in order to avoid ectoparasite loads. We predicted that women living in areas with high prevalence of pathogens ($n = 161$) would be less likely to show a preference for a male with chest hair in comparison with women living in areas with low pathogen prevalence ($n = 183$). We found that overall preference for man chest hair was low, but there were no significant associations between perceived vulnerability to diseases or disgust sensitivity and preference of men who have had experimentally removed chest hair. Women who lived in an environment with a high parasite prevalence rate (Turkey) showed a similar preference for man chest hair as did women from an environment with low parasite prevalence (Slovakia). The participants biological fathers' chest hair had no significant effect on their preference for men with chest hair. Women living in a high-parasite-prevalence environment reported a higher disgust score in the sexual domain and more recent experiences with illnesses, suggesting that parasites influence sensitivity to sexual disgust. These results provide no support for the ectoparasite avoidance hypothesis mediated by mate choice and suggest that shaved men bodies are preferred more by women.

Keywords Body hair · Disgust · *Homo sapiens* · Parasites

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Introduction

Paleontological evidence suggests that our earliest ancestors diverged from other hominids approximately 2.3–2.4 million years ago in South and East Africa (McHenry, 2009; Stringer, 1994). All of our closest relatives, the 192 species of monkeys and apes, have bodies covered with fur. Recent analyses of DNA suggest that humans for at least 1.2 million years have been relatively hairless (Rogers, Iltis, & Wooding, 2004) although the density of their hair follicles is similar to that found in apes of the same body size (Schwartz & Rosenblum, 1981).

The loss of body hair has attracted the attention of anthropologists and evolutionary biologists since Darwin (1871) (for a review, see Rantala, 2007). One of the most prominent explanations of human hairlessness is the "ectoparasite avoidance hypothesis" originally proposed by Belt (1874) and recently rediscovered and elaborated by Rantala (1999, 2007) and Pagel and Bodmer (2003). This hypothesis proposes that hairless skin reduces the risk of being infested by ectoparasites, which are vectors of serious diseases—some having lethal consequences (e.g., spotted fever, bubonic plague, typhus), particularly in the areas closer to the equator (see Guerniér, Hochberg, & Guégan, 2004). Hairless individuals were less vulnerable to parasites and infectious diseases, had higher reproductive success, and produced offspring with less hair (Rantala, 1999). They would be consequently preferred more by mates, and would produce more hairless children and hairless individuals who in turn would tend to prefer hairless mates. Because hairlessness is heritable (Rogers et al., 2004), the result of this "run-away" selection (Fisher, 1915) would be the almost completely hairless modern human (Pagel & Bodmer, 2003; Rantala, 1999, 2007). The process is termed "run-away" because over time it would facilitate the development of a greater preference for more pronounced traits, until the costs of producing the trait would balance the reproductive benefit of possessing it (Fisher, 1915).

Ultimately, parasite threat accounts for a number of behavioral, cognitive, and emotional adaptations that help to protect humans against disease transmission (Curtis & Biran, 2001; Oaten, Stevenson, & Case, 2009; Schaller & Duncan, 2007; Tybur, Lieberman, & Griskevicius, 2009) through what was elsewhere termed as the behavioral immune system (Schaller, 2006). In particular, the behavioral immune system is activated in people who are immunologically compromised, and thus more vulnerable to parasite infection (Fessler, Eng, & Navarrete, 2005; Navarrete, Fessler, & Eng, 2007). People who think of themselves as vulnerable to disease transmission show a relatively higher level of aversive response to immigrants (Faulkner, Schaller, Park, & Duncan, 2004) or toward disease transmitting animals (Prokop, Fančovičová, & Fedor, 2010; Prokop, Usak & Fančovičová, 2010a, 2010b). These people also engage more frequently in autogrooming behavior and less frequently in allogrooming behavior, suggesting that perceived risk of disease stimulates the act of grooming oneself more in order to maintain health and reduce the ectoparasitic load (Thompson, 2010). People who live in areas with a high pathogen prevalence have a greater fear of disease-relevant animals (Prokop et al., 2010a, 2010b) and perceive themselves as more vulnerable to infectious diseases (Prokop et al., 2010b). Disgust is defined by psychologists as an emotion that can be related to the avoidance of certain animals, ill humans, feces, vomit, sexual substances, and other harmful substances or events (Rozin, Haidt, & McCauley, 2000). There is general agreement that the emotion of disgust has three relatively independent domains: Pathogen disgust refers to disgust elicitors caused by sources of various pathogens (e.g., stepping in dog excrement). Moral disgust refers to disgust that pertains to social transgressions (e.g., deceiving a friend). These social transgressions broadly include non-normative, often antisocial activities such as cheating, stealing, etc. Sexual disgust (SD) refers to disgust which motivates sexual avoidance of an unsuitable mating partner or other reproductively costly behavior (e.g., performing anal sex or being in a situation with a high probability of having sex with a stranger).

Human mate choice appears to be influenced by parasite threat (Gangestad & Buss, 1993; Gangestad, Haselton, & Buss, 2006; Low, 1990). Some research suggests that man masculine traits (large jaws and cheekbones) and facial attractiveness (particularly symmetry) positively correlate with immunocompetence in humans (Lie, Rhodes, & Simmons, 2008; Rhodes, 2006; Thornhill & Gangestad, 1993). In line with this finding, women from areas with high parasite prevalence report a preference for more masculine and more facially attractive men than women from parasite-free environments (DeBruine, Jones, Crawford, Welling, & Little, 2010; Little, Jones, & Burriss, 2007; Penton-Voak, Jacobson, & Trivers, 2004). This preference is stronger during the ovulation phase of the menstrual cycle, when the likelihood of conception is highest (for a review, see Jones et al., 2008). Women in environments with a high pathogen prevalence have a more restricted approach to sexual relations (Schaller & Murray, 2008). In addition, mate choice can be influenced by sexual imprinting, which means that individuals use the phenotype of their opposite-sex parent as a template for choosing mates (for a review, see Rantala & Marcinkowska, 2011). Alternatively, because the genes for the male traits and the genes for the female preference should reside in the same individuals (Fisher's runaway mate choice hypothesis), the preference for some traits can be determined by pleiotropic effects (e.g., Bakker, 1993). Rantala, Polkki, and Rantala (2010) recently found that the hairiness of a woman's father correlated positively with her preference with regard to body hair and the hairiness of her current partner/husband. Collectively, this evidence suggests that mate choice preferences are flexible and are influenced by the risk of parasite transmission, by the phase of the menstrual cycle, and by sexual imprinting or by pleiotropic effects.

Previous research on man chest hair preferences using images of front-posed male figures indicated that man chest hair had a positive effect on women's ratings of attractiveness in England and Sri Lanka (Dixson, Halliwell, East, Wignarajah, & Anderson, 2003). In Cameroon, body hair had a positive effect on women's attractiveness ratings of men, although the hairiest figure was not rated as the most attractive (Dixson, Dixson, Morgan, & Anderson, 2007). In contrast, in China, New Zealand, and California women rated figures with no or little chest hair as the most attractive (Dixson, Dixson, Bishop, & Parish, 2010; Dixson, Dixson, Li, & Anderson, 2007). Rantala et al. (2010) used pictures of real men bodies and found that when woman fertility was at its highest, women preferred men with less body hair than when woman fertility was low. This is expected especially when the preference for man chest hair is associated with indirect (heritable) benefits (e.g., producing hairless offspring in a high-pathogen environment). However, if chest hair preferences relate to the risk of being infected by ectoparasites (direct benefits), they may not be expected to be enhanced at high conception risk. This is because high conception risk is actually associated with a lower disease threat than low conception risk, especially during the high-progesterone luteal phase (Fessler, 2001; Jones et al., 2005; for no cyclic shifts in pathogen disgust, see also Fessler & Navarrete, 2003). This suggests that there are mixed results for preference for man chest hair and factors influencing this preference are not well known.

We recruited participants from two countries which differ in pathogen threat: Slovakia and Turkey. Previous research showed that the prevalence of serious parasitic diseases, such as malaria, schistosomes, or dengue from historical (Schaller & Murray, 2008) and current estimates (Prokop et al., 2010a) is significantly higher in Turkey than in Slovakia.

In this study, we investigated whether individual differences regarding concern about disease and pathogens, the phase of the menstrual cycle, and sexual imprinting/pleiotropy affect woman preferences for man chest hair. Our hypotheses and predictions were as follows:

Hypothesis 1: Ectoparasite avoidance hypothesis mediated by mate choice: A woman preference for man chest hair, a possible sign of an ectoparasite transmission, will be negatively influenced by conditions which increase the risk of disease threat.

Prediction 1: Turkish women will be less likely to show a preference for a man with chest hair in comparison with Slovak women.

Prediction 2: Turkish men will have less dense chest hair as compared with Slovak men.

Prediction 3: Preferences for chest hair will be negatively associated with disgust sensitivity (particularly in the pathogen domain) and with perceived vulnerability to diseases (PVD). Moral disgust need not necessarily show a correlation with preferences for chest hair.

Hypothesis 2: Conception risk hypothesis: Women will avoid males with chest hair during the peak of sexual receptivity more than women in other (non-fertile) phases of the menstrual cycle.

Prediction 4: If preferences for chest hair are driven by indirect (genetic) benefits (Andersson, 1994), then women at a high conception risk will prefer men with chest hair to a lesser extent than women at a low conception risk.

Prediction 5: If preferences for chest hair are driven by direct benefits, then chest hair preferences will not be influenced by conception risk.

Hypothesis 3: Sexual imprinting/pleiotropic effect hypothesis: Mate choice will be influenced by the phenotype of the opposite-sex parent.

Prediction 6: Women who have fathers with dense chest hair will prefer pictures of men with chest hair more than women who had fathers with no (or less dense) chest hair.

Hypothesis 4: Disgust sensitivity mediated by pathogen threat hypothesis: Women living in environments with a high risk of parasite transmission will be more disgust/disease sensitive and will experience more illnesses than females living in environments with a low risk of parasite transmission.

Prediction 7: Turkish women will report higher disgust sensitivity (particularly in the pathogen and sexual domain) and a higher PVD than Slovak women.

Prediction 8: Turkish women will report more incidences of illnesses as compared with Slovak women.

Method

Participants

Female participants were recruited from one Slovak and one Turkish university. Only women from the schools of education were asked to participate, because there is strong female bias in these schools in both countries; thus, the accessibility of female participants is higher compared with other disciplines. Overall, 183 Slovak and 161 Turkish women participated in the study.

The research was carried out in lecture halls in October–November 2010. All the participants were volunteers and were given extra credit for the human biology class for their participation.

Procedure

The participants were presented in PowerPoint presentation slides projected on a screen with forced-choice paired image trials of 20 men with and without body hair, and then asked to choose between the hairy and the completely bare (shaved) version of the same body. In each trial, the participants were asked to choose the image that they found sexually most attractive. Preference for hairy body was coded as 1 (i.e., the deviation from the anchor) and preference for shaved version was coded as 0 (i.e., the anchor). The black-and-white photographs of man torsos were identical to those used in the Rantala et al. (2010) study. Briefly, 20 Finnish men aged 20–32 years with visible chest hair participated in the research. Front-views of the male torso were taken under symmetrical lighting conditions from a fixed distance of 200 cm. Immediately after the photo session, the men were asked to shave their abdomen with a razor. After shaving, a new set of pictures was taken with an identical setup (Fig. 1).

The trials were presented in a random order. After the trial, each woman was given a questionnaire to fill out, asking about: (1) her age; (2) whether she was currently using contraceptive pills or another form of hormonal contraception; (3) her sexual orientation; (4) whether she was pregnant; (5) the first day of her last menstrual period and the typical length (in days) of her cycle; (6) the hairiness of her father's chest on a 1-to-4 scale (How hairy is your father's chest?), and (7) the number of illnesses over the last year (How many times were you ill over the last 365 days?). Women raters that reported having a 28 day

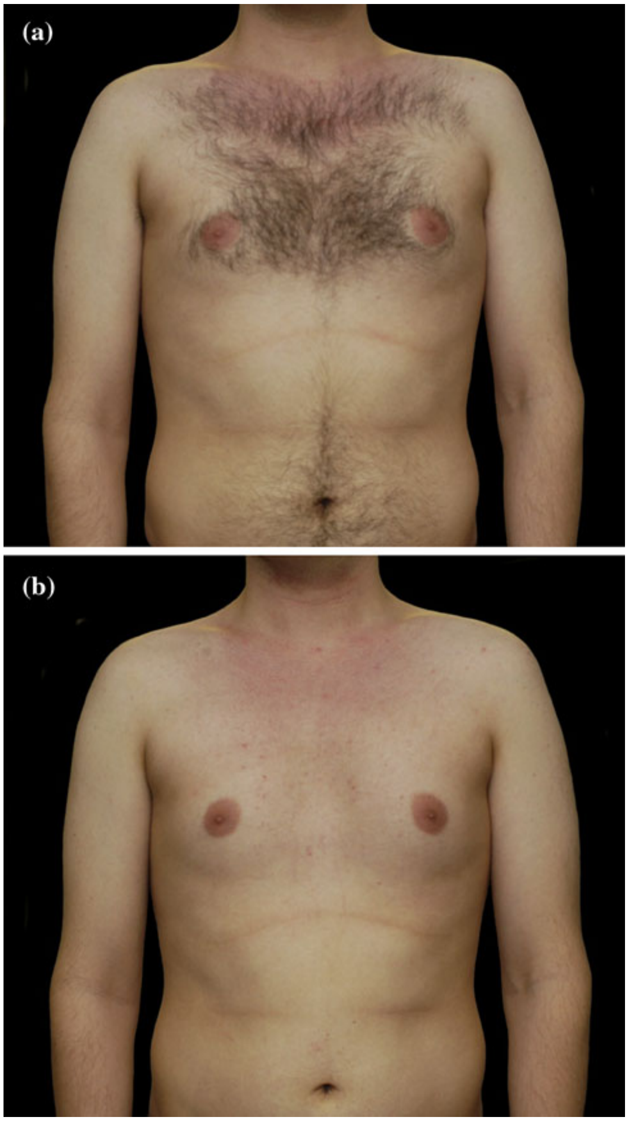

Fig. 1 Paired photographs of a male body before (**a**) and after (**b**) the removal of body hair. The photographs were presented to women in the forced-choice trial

menstrual cycle were divided into high days (9–14) or a low day (0–8 and 15–28) of conception risk based on self-report of the previous onset of menstruation. These groups correspond to the follicular phase and menstruation and the luteal phase, respectively (e.g., Regan, 1996), and were categorized similarly in previous research (e.g., Little et al., 2007; Rantala et al., 2010). If a woman reported to have a longer or a shorter cycle, the conception risk was adjusted accordingly (e.g., high conception risk days for women with a 32-day cycle were days 13–18, as measured from their first day of menstruation). The mean length of menstrual cycle was $M = 28.74$ days ($SE = .22$, range, 20–36 days). All women who reported current use of contraceptive pills or another form of hormonal contraception (55 of 183 Slovak females and 17 of 161 Turkish females) and women that did not provide complete data regarding their last menstruation and/or reported to have an irregular menstrual cycle (additional 8 Slovak and 9 Turkish women) were excluded from the analyses. The final sample consisted of 120 Slovak and 135 Turkish heterosexual, non-pregnant women. The mean age of the Slovak and Turkish women in the final sample was similar ($M = 19.50$, $SE = .11$, and $M = 19.67$, $SE = .11$, range, 18–28, respectively, $t(253) = 1.11$); thus, the effect of age was not controlled in the statistical analyses.

Measures

Each woman received a set of questionnaires designed to examine her disgust sensitivity and PVD. The disgust sensitivity scale was adopted from Tybur et al. (2009). This multidimensional questionnaire with a Cronbach $\alpha = 0.61$ consists of 21 5-point Likert scale items (1 = not at all disgusting, 5 = extremely disgusting) for measuring three dimensions of disgust: pathogen (PD, 7 items), moral (MD, 7 items), and SD (7 items). Examples of the items are: *Stepping in dog excrement, Stealing from a* neighbour, and *Watching a pornographic video*, respectively. All the subscales had moderate, but acceptable reliabilities (0.44, 0.68, and 0.69, respectively).

The PVD scale adopted from Duncan, Schaller, and Park (2009) with the actual Cronbach $\alpha = 0.64$ was used to assess self-PVD. This two-dimensional scale consisted of 15 items. One subscale assessed beliefs about one's own susceptibility to infectious diseases (perceived infectability [PI] with 7 items, e.g., *I have a history of susceptibility to infectious disease*). The second subscale assessed emotional discomfort in contexts that suggest a particularly high potential for pathogen transmission (germ aversion [GA] with 8 items, e.g., *It does not make me anxious to be around sick people*). The reliability of the PI and GA subscale was 0.45 and 0.50, respectively. The items were rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Negatively worded items were reverse-scored.

The translation of the questionnaire from English to Slovak/Turkish proceeded in the following stages. Firstly, two bilingual speakers from Slovakia and Turkey translated the English questionnaire into Slovak/Turkish. Two additional bilingual speakers (one in each country) translated the English version independently from the first one in both countries. Finally, the two bilingual speakers in each country consensually resolved the few resulting discrepancies between the original English questionnaire and the translated Slovak/Turkish version.

Statistical Analyses

To avoid multicollinearity between variables, we checked if the effects of country, the phase of the menstrual cycle, the perceived hairiness of the woman's biological father, and the interaction between these variables on the preference of man chest hair were mediated by any of the other variables,

Table 1 Descriptive statistics for mean scores of PD, MD, and SD and PI and GA subscales as a function of country and conception risk

Conception risk	PD		MD		SD		PI		GA	
	M	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*
SK										
Low ($n = 93$)	3.61	0.05	3.70	0.06	3.60	0.06	2.88	0.05	3.00	0.05
High ($n = 27$)	3.64	0.09	3.33	0.11	3.51	0.12	2.96	0.09	3.09	0.10
TR										
Low ($n = 112$)	3.67	0.05	3.61	0.05	4.13	0.06	2.71	0.04	3.13	0.05
High ($n = 23$)	3.71	0.10	3.32	0.11	4.21	0.13	2.80	0.09	3.26	0.11
Country	ns		ns		$p < .001$		$p < .05$		$p = .07$	
Conception risk	ns		$p < .001$		ns		ns		ns	

p values are from a 2 (Country: Slovakia vs. Turkey) × 2 (Conception Risk: Low vs. High) analysis of variance

SK Slovakia, *TR* Turkey

Table 2 Descriptive statistics for mean scores of total number of reported illnesses (*n*), perceived hairiness of father's chest, and preference for hairy man chest (%) as a function of country and conception risk

Conception risk	Illnesses		Father's chest		Man's chest	
	M	*SE*	*M*	*SE*	*M*	*SE*
SK						
Low ($n = 93$)	2.83	0.37	2.34	0.07	22.37	1.59
High ($n = 27$)	4.26	0.70	2.41	0.13	18.33	2.95
TR						
Low ($n = 112$)	7.07	0.34	2.28	0.06	21.34	1.45
High ($n = 23$)	7.78	0.75	2.17	0.14	21.09	3.20
Country	$p < .001$		ns		ns	
Conception risk	$p = .06$		ns		ns	

p values are from a 2 (Country: Slovakia vs. Turkey) × 2 (Conception Risk: Low vs. High) analysis of variance

SK Slovakia, *TR* Turkey

namely, the GA, PI, PD, SD, and MD subscales. Two-tailed multiple linear regression analyses were conducted to check these effects.

Results

There were moderate, but significant correlations between the PD and GA subscale ($r = .43$), between the MD and SD subscale ($r = .36$), and between preference for man chest hair and the PD subscale ($r = -.22$) (all $ps < .05$) among Slovak women. Other correlations were not significant. Turkish women showed only one weak correlation between the MD and SD subscale ($r = .17$, $p < .05$), but the other correlations were not significant.

A 2 (country) × 2 (conception risk) ANOVA revealed that Turkish women scored higher on the SD subscale and Slovak women scored higher on the PI subscale (Table 1). Women in the low conception risk phase scored lower on the MD subscale. Interactions between the variables were not significant.

Table 2 shows that Turkish women reported more experiences with illnesses in past year, but reported hairiness of father's chest and preferences for man's chest do not differ with respect to country and conception risk. Interactions between the variables were not significant.

Overall, preference for man chest hair was low ($M\,\% = 21$, $SE = .96$) and this significantly differed from chance (50 %), one-sample *t* test, $t(254) = 22.32$, $p < .001$. This showed that women preferred photos with shaved men significantly more than photos of unshaved men.

To see if the effects of country, the phase of the menstrual cycle, the interaction of these two variables, and the perceived hairiness of the woman's biological father on the preference for male chest hair were mediated by the GA, PI, PD, SD, and MD subscales, we first regressed the former set of variables on the preference of male chest hair, which was the percentage of times a participant selected the hairy chest across the 20 trials of the experiment. None of these variables (country, the phase of the menstrual cycle, the interaction of these two variables, and the perceived hairiness of the woman's biological father) significantly predicted the preference for man chest hair, βs = .03, −.08, and .08, respectively.

Second, we regressed the same set of variables on the participants' GA, PI, PD, SD, and MD scores. In the case of MD, those with a higher conception risk had lower levels of moral disgust, $\beta = -.21$, $p = .02$. None of the other predictors had a significant effect on MD. In the case of SD, Turkish participants reported a greater SD in general as compared with the Slovakian participants, $\beta = .40$, $p < .001$. There were no other significant effects on SD. The Slovakian sample had a higher PI score, $\beta = .20$, $p = .004$. No other variables had a significant effect on PI. In the case of GA, the GA was marginally greater among the Turkish sample, $\beta = .13$, $p = .066$. There were no other significant effects on GA. There were also no significant effects on PD. When all the variables with a potential to create a co-linearity (country, the phase of the menstrual cycle, the interaction of these two variables, the perceived hairiness of the woman's biological father, MD, SD, PI, GA) were included in one overall model as predictors, only the GA's effect was approaching a marginally significant level, $\beta = .11$, $p = .103$. Thus, it does not seem likely that GA, PI, PD, SD, and MD could have mediated the effect of country, the phase of the menstrual cycle, the interaction of these two variables, and the perceived hairiness of the woman's biological father on the preference for the hairy chest. However, although the GA does not mediate the effect of the pathogen-threat status of a country on hairy body preference, it is marginally affected by country and also has a nearly marginal effect on hairy-body preference.

Discussion

A number of researchers have suggested that human hairlessness evolved as a response to a parasite threat (Belt, 1874; Pagel & Bodmer, 2003; Rantala, 1999, 2007). This hypothesis predicts that hairless individuals should have an advantage over hairy individuals in terms of disease threat, resulting in a higher survivor rate and the reproductive success of the former group (e.g., Rantala, 2007). Here, we report the first direct test of this hypothesis by means of explicit measures of PVD and sensitivity to the three types of disgust: pathogen, moral, and sexual (Tybur et al., 2009). Women generally preferred men without chest hair, which suggests that man chest hair is not maintained by mate choice, which is consistent with theoretical models (Puts, 2010). Although our sample was limited to university students, we made a conservative selection of women who did not use hormonal contraceptives and improved conception risk phase according to the reported duration of their menstrual cycles. Thus, the results obtained provide certain useful insights concerning woman mate preferences under conditions with a different pathogen threat.

According to the ectoparasite avoidance hypothesis mediated by mate choice, we predicted that Turkish women would have a lower preference for chest hair than Slovak women. We found no support for this prediction, because women in both countries revealed very similar mate preferences with respect to chest hair. This result could be considered particularly surprising especially because, in comparison with Slovak students, Turkish students of various age groups have previously shown a significantly higher fear and disgust of ectoparasites (Prokop et al., 2010a, 2010b) and body hair is thought to be a sign of ectoparasite transmission (e.g., Rantala, 1999, 2007).

One could argue that this lack of expected difference could be caused by the increased accessibility of internet-based pornography which sets the current trend of pubic hair removal (Ramsey, Sweeney, Fraser, & Oades, 2009). Although we cannot completely rule out this possibility, it can be argued that this explanation is not very likely because we did not find any association between man hairlessness preferences and the SD subscale which explicitly measures (among other things) disgust of pornography. Another possibility is that all of the scores in both countries were so low that there was insufficient variation to detect cross-cultural differences. Alternatively, the hairy male could be perceived as older and this resulted in less interest in that stimulus. This alternative cannot be ruled out and further research should take this possibility into account. Possible cultural factors that could account for some variance in results is not yet clear, because we are not aware of any specific perception of man hairiness within the traditions of Turkey and Slovakia. While body hair removal below the neck in post-pubertal men is sanctioned in certain countries, no similar traditions in Turkey or Slovakia exist. Moreover, there are no published reports on body depilation practices in these countries. In summary, we found no evidence for cross-cultural variation in chest hair preferences between two countries that differ in parasite threat. On the contrary, the present study provides some evidence against the general ectoparasite theory of hairlessness, since Turkish women didn't have lower preferences for body hair than Slovakian women.

The second prediction of ectoparasite avoidance hypothesis mediated by mate choice was that Turkish men will have less dense chest hair compared with Slovak men and a preference for chest hair would be negatively correlated with disgust/disease sensitivity. We found no support for these predictions, because Turkish and Slovak women reported similar hairiness of their biological fathers and scores of subscales that measured disgust sensitivity and PVD did not correlate with preference for man chest hair. Previous research revealed that these subscales correlate with various parasite avoidance strategies (Duncan et al., 2009; Prokop & Fančovičová, 2011; Prokop, Usak et al., 2010a, 2010b; Thompson, 2010). Thus, our results provide no support for the idea that women who act to reduce the likelihood of being infected by diseases transmitted from other people avoid hair on the male chest which is considered a sign of parasite threat (Pagel & Bodmer, 2003; Rantala, 1999, 2007). Importantly, however, this study used conventional instruments for measuring disgust sensitivity (Tybur et al., 2009), although body hair is thought to be explicitly associated with ectoparasites (Pagel & Bodmer, 2003; Rantala, 1999, 2007). Further studies, in which preferences for hairiness will be preceded with participants' exposure to visual signs of ectoparasites, are therefore needed (Prokop, Rantala, & Fančovičová, 2012).

Rantala et al. (2010) found that women who were in their high conception period preferred hairless (shaved) men more than women in the low conception risk phase or postmenopausal females. Several studies indicated that woman mate preferences are influenced by conception risk (Gangestad & Thornhill, 2008; Jones et al., 2008) supporting the idea that masculine traits, as signs of pathogen resistance, are preferred more during the high conception risk period. In this study, however, we found mixed results for the conception risk hypothesis. In particular, we found no significant association between the phase of the menstrual cycle and preference for male chest. This failure may be a result of the small sample size and/or the fact that it was not possible to measure an accurate timing of ovulation based on female self-reports. Further research on possible cyclic shifts based on risk of conception (Fessler, 2001; Jones et al., 2005) in preference for chest hair as signs of pathogens is required.

The sexual imprinting/pleiotropic effect hypothesis assumes that mate choice will be influenced by the phenotype of their opposite-sex parent. Our study provided no support for this hypothesis, because women who had fathers with dense chest hair did not prefer pictures of men with chest hair more than other women. This is in disagreement with Rantala et al. (2010) who found opposite evidence in a Finnish sample. In summary, this study casts doubts on the role of sexual imprinting in mate choice in humans (see Rantala & Marcinkowska, 2011).

The disgust sensitivity mediated by pathogen threat hypothesis assumes that women living in environments with a high risk of parasite transmission will be more disgust/disease sensitive and will experience more illnesses than women living in environments with a low risk of parasite transmission. Our support for this hypothesis was mixed. In line with prediction 7, we found that the SD subscale elicited a higher mean score in Turkish women as compared with Slovak women. We argue that the more pronounced disgust sensitivity in the sexual domain could be influenced by parasite stress that is significantly higher in Turkey than in Slovakia (Prokop et al., 2010a; Schaller & Murray, 2008). To support this, Turkish women reported more incidences of illnesses than Slovak women, supporting prediction 8. Using the General Health Questionnaire (GHQ), Prokop et al. (2010a) found that Turkish school age children had significantly lower GHQ scores than Slovak children, supporting the idea that the prevalence of parasitic diseases in Turkey is higher and thus could promote parasite avoidance behaviors (Prokop et al., 2010a, 2010b; Schaller & Murray, 2010). In support of this view, the GA was marginally greater among Turkish sample and its effect on hairy body preference was approaching a marginally significant level in general. Contrary to this view, however, the PI subscale was higher among Slovak women. The latter finding was puzzling considering that both the prevalence of parasites and the incidence of illnesses were higher in Turkey. In addition, our previous research found that Turkish participants generally scored higher on this subscale (Prokop et al., 2010b). Future research should include larger and more diverse samples of participants to test the cross-cultural differences in PVD.

Conclusion

This study found that women in countries with high and low pathogen threat generally prefer men without chest hair. This suggests that body hair would be associated with ectoparasite transmission and is therefore less preferred by women. However, there were no correlations between disgust sensitivity and PVD and chest hair preference, which does not support the idea that body hair loss in humans was driven by ectoparasite avoidance. Women living in an environment with relatively higher parasite prevalence reported not only of more frequent illnesses over the last year, but also higher disgust in the sexual domain. This supports the hypothesis that cross-cultural differences in a more restricted approach to sexual relations may at least be partly related to a high pathogen prevalence (Schaller & Murray, 2008). We suggest that the generally low preference for hairy men by women and the absence of items that could explicitly measure ectoparasite avoidance could account for the absence of cross-cultural differences in woman mate preferences with respect to the chest hair in this study. Alternatively, the presence of chest hair in men may be associated with age and/or male dominance over other men and can be beneficial in intrasexual competition rather than in mate choice (Puts, 2010). More cross-cultural studies including participants from areas differing in parasite prevalence are needed.

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