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Men With a Terminal Illness Relax Their Criteria for Facial Attractiveness

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Abstract

According to the life history paradigm, in life-threatening conditions, sexual selection criteria are relaxed in order to increase the probability of a last resort reproduction, ultimately contributing to reproductive success. This should be reflected in loosened mating preferences — a process observed in nonhuman animals. Studies investigating this aspect in humans, however, are scarce. This study explored the aesthetic preferences towards facial and nonfacial stimuli in terminally ill patients with heart failure (HF) and their healthy, same-sex peers. The aim was to examine if these two groups of men demonstrate different patterns of aesthetic judgments. Using a 7-point scale, 65 male patients with HF and 143 healthy men evaluated the perceived attractiveness of 15 photographs (five adult male faces, five adult female faces, and five nonfacial pictures). A mixed-design analysis of variance was run to assess group differences in aesthetic preferences. Compared to healthy controls, stimuli. HF patients rated the pictures using significantly higher scores, but this applied only to male and female, but not nonfacial, stimuli. We propose that lower criteria for facial attractiveness in HF patients are linked to relaxation of mate preferences as a result of a life-threatening conditions, and that this process can be an adaptive mating strategy from an ultimate, evolutionary perspective. However, other mechanisms (e.g., seeking social support) may be also responsible for the observed patterns.

Keywords

facial attractiveness, sexual selection, life history paradigm, terminal illness, heart failure

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Introduction

The number of people with chronic diseases has been consistently rising worldwide (World Health Organization, 2013a, 2013b) and a substantial proportion of the affected suffers from heart failure (HF; Liu & Eisen, 2014; Mozaffarian et al., 2016). HF is a final stage of many other, both cardiovascular (such as coronary heart disease or hypertension) and noncardiovascular (such as chronic kidney disease, infections, and/or cancer; McMurray et al., 2012; Shakir & Rasul, 2009; Silverberg, Wexler, Blum, Schwartz, & Iaina, 2004), diseases. Medical developments have significantly reduced the number of deaths caused by acute cardiac events and increased life expectancy of people with chronic HF. This resulted, especially in contemporary developed countries, in a high number of people with HF having relatively "normal" life (Cleland et al., 2002; Go et al., 2014). Importantly, the recent data indicate that men and women are similarly vulnerable to HF (Mozaffarian et al., 2016; Roger, 2013) implying that approximately half of the affected are males (Taylor, 2015). Although mate choice is clearly not the primary concern for HF patients, it is commonly argued that sexuality is still an important aspect of everyday functioning of the affected influencing their well-being and quality of life (Jaarsma, 2002;

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Jaarsma, Dracup, Walden, & Stevenson, 1996; Jaarsma, Fridlund, & Mårtensson, 2014; Levine et al., 2012; Westlake, Dracup, Walden, & Fonarow, 1999). In this perspective, it is puzzling that the analysis of sexual selection and partner choice mechanisms in chronically ill male patients appears to be neglected by the scientific literature.

The trade-offs in resource allocation between processes related to reproduction and survival are important aspect of an individual's life history (Roff, 1992; Stearns, 1989, 1992). By implementing such biocompromises, an organism aims to optimize life processes in order to maximize reproductive success. This may be achieved by redirection of energy investments from mating effort to life/health rescue processes. Relaxation of both intersexual and intrasexual selection criteria might be an example of a mechanism reflecting this process.

Studies on condition-dependent preferences in animals suggest that survival versus reproduction trade-off influence sexual selection. For example, Lopez (1998) showed that parasite infection significantly alter mating preferences in guppies (*Poecilia reticulata*). When compared with healthy individuals, infected females were less discriminatory in their mating preferences. According to Lopez (1998) energetic costs related to infection may prohibit females from more energy-consuming discriminatory mate choice. A similar disease-dependent pattern of mate preferences was reported in female crickets *Gryllus lineaticeps* (Beckers & Wagner, 2013), where parasitized females showed no preferences towards males with attractive male characteristics (Beckers & Wagner, 2013). The authors suggested that in life-threatening situations, mate selection criteria are less strict to facilitate rapid reproduction. As far as humans are concerned, males exposed to short physical stressors alter their mate preferences (Lass-Hennemann et al., 2010) by biasing them towards potential mates who were regarded as less attractive under nonstressful circumstances. Although these results are in line with the survival versus reproduction trade-off paradigm, there have been no studies investigating whether long-lasting and life-threatening conditions such as chronic illnesses affect human aesthetic preferences. Addressing this unexplored to date issue seems to be especially relevant since recent theoretical and empirical studies on humans have demonstrated that mating preferences, including preferences for physical attractiveness, are consistent with real-life mating decisions (Conroy-Beam & Buss, 2016a, 2016b; Fletcher, Kerr, Li, & Valentine, 2014; Li et al., 2013).

Evaluating facial attractivenessis crucial in human mate choice (Little, Jones, & DeBruine, 2011; Rhodes, 2006). Although humans share some standards for assessing facial attractiveness (Kościński, 2008; Little et al., 2011), there are also individual differences in this respect resulting from a number of factors, such as the observer's own attractiveness (Burriss, Welling, & Puts, 2011; Penton-Voak et al., 2003), relationship context (Burriss et al., 2011; Penton-Voak et al., 1999), intrapopulation settings (Danel et al., 2012), fertility status (e.g., Danel & Pawłowski, 2006; Penton-Voak et al., 1999, for menstrual phase effect), gonadal hormonal conditions (e.g., estradiol; Roney & Simmons, 2008), and (putatively) progesterone concentrations in women (Danel & Pawłowski, 2006; Jones, Little, Boothroyd, DeBruine, et al., 2005) and testosterone level in both sexes (Welling et al., 2007; Welling et al., 2008).

The status of physical health is another potential factor modifying aesthetic preferences. For example, a study on the association between self-reported health and preferences toward facial sexual dimorphism in relatively traditional, non-Western population indicated that preferences for male-typical (masculinized) faces were stronger in healthy women and that healthy men preferred more sex-typical faces in females for long-term relationships (Scott, Swami, Josephson, & Penton-Voak, 2008). In contrast, more recent study in rural Bangladesh revealed that self-reported health conditions experienced over the past year had no direct effect on men and women preferences for facial sexual dimorphism (de Barra, DeBruine, Jones, Mahmud, & Curtis, 2013). However, as mentioned above, still little is known about evaluation of facial attractiveness in people with serious, ongoing, and long-lasting diseases.

The aim of this study was to examine aesthetic preferences in HF male patients and compare them with that of same-sex healthy peers. In particular, the study aimed to compare aesthetic preferences towards male and female faces between HF and healthy men, and to identify differences in facial beauty perception between these two groups. Referring to the survival versus reproduction trade-off (Roff, 1992; Stearns, 1989, 1992), relaxation of both intersexual and intrasexual selection mechanisms, which could be reflected in facial attractiveness preferences, was expected. The specific hypothesis was that the modification of the perception of facial attractiveness in chronically ill individuals is reflected in (a) lower criteria regarding facial attractiveness of potential partners and (b) overestimation of attractiveness of potential mating rivals putatively as a strategy of intersexual conflict avoidance. Both these mechanisms, from an ultimate perspective, may facilitate "last-resort" reproduction and promote reproductive success. In addition, the study examined whether possible health-related differences in aesthetic evaluation were limited only to human faces or they were more general and therefore affected aesthetic perception of nonhuman stimuli.

Materials and Methods

Study Population

Study participants were adult males: patients with HF (age: $M = 56.45$, $SD = 11.38$, $n = 65$) and age-matched healthy controls (age: $M = 55.23$, $SD = 11.24$, $n = 143$). The age difference between the two groups was not significant (Mann–Whitney U test: $Z = -1.29$, $p = .20$). Patients with HF were recruited at the Department of Cardiology, Military Hospital in Wroclaw, Poland. Subjects' criteria for the study were as follows: (a) a documented history of HF of ≥6 months, (b) left ventricular ejection fraction ≤45% as assessed by echocardiography, (c) unchanged medications for ≥1 month preceding the study, (d) clinical stability (i.e., patients with acute coronary syndrome, coronary revascularization, or with any major surgery within the 3 months preceding the study were excluded from the study). All HF patients were interviewed individually.

The control group (healthy men) consisted of men living in Wroclaw and Brzeg (Poland). All participants were interviewed individually and only those with no history of any acute or chronic illness were included in the study.

Stimuli

A set of 15 photographs (9 × 13 cm) of 10 adult faces (en face or half profiles; 5 women, 5 men) and 5 nonfacial pictures of nature was used. The nonfacial pictures presented landscapes and animals and were taken from the Internet.

All facial portraits used in the study came from several freely available Internet casting databases storing public Internet profiles of actors and actresses. To exclude a possible effect of familiarity on judgments, only pictures of noncelebrities were selected for the study. Since the study was not focused on the examination of individual's reactions to particular facial characteristics (e.g., details of facial morphology and apparent emotions), presumably more ecologically valid, "natural" (although still to some extent standardized—see below) photographs of men and women were used.

The face of each individual was clearly visible, with no facial hair or glasses and filled around 2/3 of each portrait. All pictures were with white or blurred, undistinguishable background. All men and women in the pictures were Caucasians. Since the study aimed to compare perception of the same pictures in the two groups of participants, further strict standardization of the stimuli (absolutely standardized size of faces, strictly no head rotation, hairstyle masking, etc.) was unnecessary.

Procedure

Participants were asked to establish the attraction of each picture on a 7-point scale (where 1 represented *the lowest score* while 7 represented *the highest score*). The scores were written down by the participants and collected by the investigator. Subsequently, all scores from each participant were averaged (arithmetic mean) separately for male faces, female faces, and nonfacial stimuli. This resulted in three general perception scores reflecting how a particular individual perceived the aesthetics of men, women, and nonfacial stimuli presented in the photographs.

Ethical Note

The project was approved by the ethics committee of the Wroclaw Medical University. Participants gave informed written consent to participate in the study. The study was conducted in accordance with the Helsinki Declaration.

Statistical Analyses

Reliability of the rating scales was measured separately for each stimuli category using the Cronbach's alpha index. The mixed-design analysis of variance (split-plot ANOVA), with the attractiveness scores of male, female, and nonhuman stimuli, as within-subjects repeated measures (Stimuli), two groups of participants (HF patients, Healthy) as between-subjects factors and participants age as a continuous variable, was employed to investigate differences in participants' beauty judgments. The assumption of sphericity required by the mixed-design model was marginally violated (Mauchly's test: $\chi^2 = 5.86$, $p = .05$). Consequently, in the model, the degrees of freedom were corrected using Huynh–Feldt correction ($\varepsilon = .99$). Wherever applicable, statistically significant results were post-hoc tested to reveal possible differences in beauty judgments between compared groups. The reported values of means were corrected for a covariate effect. A value of $p < .05$ indicated statistically significant results. All statistical analyses were conducted in STATISTICA, version 10 (www.statsoft.com).

Results

Cronbach's alpha for the attractiveness judgments of facial portraits (men = .90; women = .80) and nonfacial stimuli (.75) proved high internal consistency of the rating scales. HF patients evaluated the attractiveness of all stimuli (regardless of the stimuli type), using higher ratings than healthy participants (HF patients: $M = 5.04$, standard error [SE] = .09 vs. healthy: $M = 4.42$, $SE = .06$; $F_{1, 205} = 29.00$, $p < .0001$, $\eta_p^2 = .12$). The main effect of stimuli type was also significant ($F_{1.98, 406.40} = 41.46$, $p < .0001$, $\eta_p^2 = .17$) indicating that stimuli type received different scores regardless of the group of participants. A post-hoc Tukey's test revealed that male portraits received the lowest scores ($M = 3.96$, $SE = .07$) which differed significantly (at $p < .0001$) both from ratings of female

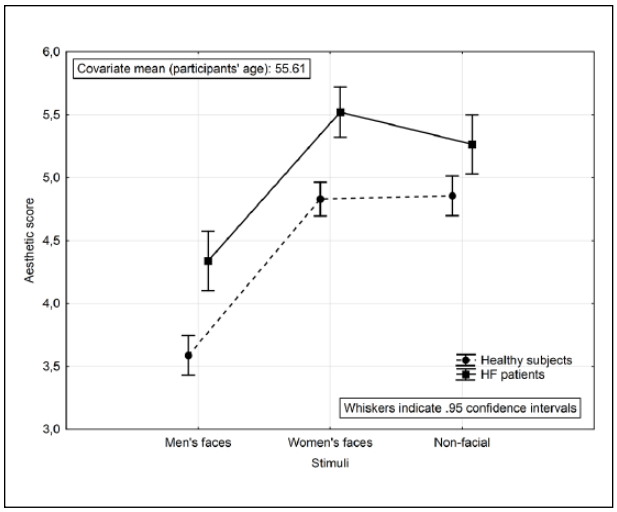

Figure 1. Aesthetic preferences for facial and nonfacial stimuli in HF male patients and their healthy same-sex peers.
Note. HF = heart failure.

(M = 5.17, SE = .06) and neutral stimuli (M = 5.06, SE = .07). Assessment scores of female and nonfacial stimuli did not differ significantly (p = .56). Significant interaction between stimuli type and groups of participants ($F_{1.98,\ 406.40}$ = 3.92, p = .02, η_p^2 = .02) indicated that scores differed between healthy controls and HF patients (Figure 1). Post-hoc Tukey's tests revealed that, compared with healthy men, scores given by HF patients were significantly higher but only for male (HF patients: M = 4.34, SE = .12 vs. healthy: M = 3.59, SE = .08, p < .0001) and female stimuli (HF patients: M = 5.52, SE = .10 vs. healthy: M = 4.83, SE = .07, p = .0003). Ratings of nonfacial stimuli were not significantly different between healthy and HF subjects (HF patients: M = 5.27, SE = .12 vs. healthy: M = 4.86, SE = .08, p = .11). Further analysis of the effect sizes (Nakagawa & Cuthill, 2007) confirmed that observed differences in aesthetics preferences were much larger for facial (men's faces: d = .78, 95% confidence interval [CI; .48, 1.09]; women's faces: d = .86, 95% CI [.55, 1.16]) than for the nonfacial (d = .43, 95% CI [.13, .72]) stimuli.

The covariate, participants age, was unrelated to the general (regardless of the stimuli type) aesthetics perception ($F_{1,\ 205}$ = 2.33, p = .13, η_p^2 = .01). However, the significant interaction between the type of stimuli and participants' age ($F_{1.98,\ 406.40}$ = 11.93, p < .0001, η_p^2 = .05) was statistically significant only for the assessment of men's portraits. Older participants assessed attractiveness of men's faces higher (β = .24, t_{205} = 3.75, p = .0002).

Discussion

This study is probably the first attempt to examine the effect of severe and chronic cardiovascular disease on aesthetic perception of human faces. The resultsshowed that men with HF assessed the attractiveness of the presented photographs using higher scores as compared with healthy same-sex peers. Patients with HF, therefore, seemed to be less critical in aesthetic judgments than healthy individuals. This effect was significant only for attractiveness judgments of male and female faces, but not for that of nonfacial stimuli.

The fact that HF patients exhibited higher scores for perceived attractiveness of male and female faces is consistent with the idea that the survival versus reproduction trade-off may lead to the relaxation of sexual selection processes, which may be beneficial from an evolutionary standpoint. More specifically, the shift in face preferences of HF patients may have adaptive value as a potential strategy to maximize reproductive opportunities in situations where life is at risk (see also Lass-Hennemann et al., 2010). The fact that HF patients perceived female faces as more attractive suggests lower selectivity of those patients to female facial attractiveness. In evolutionary perspective, such indifferentism in preferences may be adaptive since it likely increases the probability of reproduction by lowering attractiveness criteria in individuals suffering from chronic/terminal health disturbances (cf. Beckers & Wagner, 2013). Indeed, previous studies demonstrated that mating preferences reflect actual partner choice (Conroy-Beam & Buss, 2016a, 2016b; Fletcher et al., 2014; Li et al., 2013).

In a similar vein, from an evolutionary perspective, perceiving other males as more attractive in HF men, as shown in the current study, may be a result of fading of intrasexual competition in these men. It is possible that by overrating attractiveness of potential same-sex rivals, seriously ill and physically weaker individuals pursue a strategy of withdrawal and self-protection from often aggressive, risky, and cost-incurring between-men contests over mates (for more discussion on mate choice and male aggression, see Archer, 2009; Puts, 2010).

The above interpretation corresponds with a previous analysis of psychological gender of patients with HF (Makowska et al., 2014), showing that none of the men with HF had masculine type of psychological gender. For example, male patients with HF did not perceive themselves as "independent," "dominant," "masculine," "aggressive," "competitive," or "ambitious." This may be a result of withdrawal from the "matrimonial market," as a consequence of the disease, rather than other processes (e.g., aging), as healthy, age-matched controls did exhibit typical features of masculine psychological gender (Makowska et al., 2014). Similarly, in the present study, although the control group consisted of age-matched participants, the perception of facial attractiveness of patients with HF was significantly different from that of healthy men.

Another way of interpreting the results is that, rather than being a product of sexual selection, general deprivation of psychological status of HF individuals accounted for the observed patterns, since chronic illnesses, such as HF, often influence psychosocial functioning of patients (Siennicka, Stromberg, Banasiak, Ponikowski, & Jankowska, 2015). It is well documented that among psychological correlates of HF, depression is a common comorbidity (Dekker et al., 2014; Herr et al., 2014; Konstam, Moser, & De Jong, 2005; Lossnitzer et al., 2015; MacMahon & Lip, 2002; Woltz et al., 2012). Not only may depression reduce sexual desire, capacity, and activity in chronically ill patients (McInnes, 2003; Nusbaum, Hamilton, & Lenahan, 2003) but it may also affect mechanisms of social cognition (Weightman, Air, & Baune, 2014). As far as facial perception is concerned, it has been reported that depressed patients are more likely to interpret negatively (e.g., as sad) emotionally neutral faces when compared with healthy controls (Gollan, Pane, McCloskey, & Coccaro, 2008; Leppanen, Milders, Bell, Terriere, & Hietanen, 2004). In the current study, we did not examine whether aesthetic preferences were actually related to depression symptoms in HF patients. However, if the reported results were to be affected by the fact that HF patients are more likely to suffer from impaired psychological states, a negative bias in perception of other people faces in the HF, but not healthy, group would be expected. The results indicate an inverse pattern though, with HF participants perceiving facial stimuli as more attractive.

As chronic conditions are known to have a negative impact on self-esteem (Bonsaksen, Lerdal, Småstuen, & Fagermoen, 2016; Nicolson & Anderson, 2003; Pinquart, 2013; Seigel, Golden, Gough, Lashley, & Sacker, 1990), it is plausible that HF patients demonstrate general lower self-esteem. Consequently, HF patients may perceive themselves as less attractive and be more willing to assess others' attractiveness higher than they would if they were healthy. This is consistent with studies reporting that, at least in women, lower self-assessments of attractiveness (Little, Burt, Penton-Voak, & Perrett, 2001) as well as anxiety, depression, and stress symptoms (Jones, Little, Boothroyd, Feinberg, et al., 2005) are associated with decreased preferences for selected markers of apparent health and facial attractiveness in men's faces. Clearly, without detailed studies on the effect of HF on self-esteem it is premature to conclude that deteriorated evaluation of own confidence was one of the mechanisms affecting patients' aesthetic preferences. However, even if self-perception was responsible for the recalibration of preferences in chronically ill patients, it would not contradict the ultimate evolutionary interpretation based on sexual selection. In fact, proximate and ultimate explanations of a given behavior are not mutually exclusive (Tinbergen, 1963). For example, the putative negative effect of self-esteem on attractiveness criteria in HF patients is potentially a proximate-level explanation for the observed phenomenon, whereas the ultimate- or evolutionary-level explanation may be related, as suggested above, to the process of optimizing sexual selection mechanisms in life-threatening situations.

The statistically nonsignificant effect of the preference shift for the nonfacial stimuli seems to be consistent with the view that the HF effect on aesthetic perception is related specifically to mate selection mechanisms. However, effect sizes for the observed differences in aesthetic judgments suggest that the possibility of the observed phenomenon being more general in nature cannot be excluded. This is because the magnitude of the preference modification in HF patients observed for nonfacial stimuli, although considerably lower when compared with facial stimuli, was not negligible. Certainly, larger effect sizes observed for human faces suggest that it is the perception of facial attractiveness that is especially affected by terminal conditions. Nonetheless, further studies are needed to conclusively determine if the observed effect is strictly face specific.

As noted above, the proposed interpretation of the results is concordant with sexual selection theory. However, other explanations of the observed relaxation of criticism regarding facial attractiveness in HF patients are possible. For example, it is well known that HF is a disease affecting mainly elderly people, and prevalent particularly among people above 60 years of age (Braunwald, 2013; Roger, 2013). Seniors at this age usually have grown offspring and the desire for further reproduction may not be a sole cause for relaxation of attractiveness standards in HF men. Therefore, it is plausible that increased preferences towards men and women's facial attractiveness simply reflect general need for companionship and assistance in terminally ill individuals. In such a case, being judgmental about people's appearance may affect social interactions (Zebrowitz & Montepare, 2008) and, in turn, limit receptiveness to potential carers and social supporters. Importantly, numerous studies found that loneliness and lack of social support may worsen prognosis in HF patients and be detrimental for their self-care as well as quality of life (Barutcu & Mert, 2013; Compare et al., 2013; Gallagher, Luttik, & Jaarsma, 2011; Löfvenmark, Mattiasson, Billing, & Edner, 2009). From this perspective, the findings from the current study may have practical implementations. Being aware of mechanisms involved in social perception in terminally ill patients, for example, may be valuable for effective counselling that aims at helping them to cope with the disease, or to improve their quality of life and well-being in general.

Limitations

The reported study is, to date, probably the only one that examined the relationship between chronic and terminal health condition and perception of facial attractiveness, and therefore is subjected to limitations. For example, since this study involved only male participants, future studies should aim to test whether similar alteration of aesthetic preferences occurs in chronically ill women controlling for women's age and menopause status as a fertility limiting factors. In addition, including direct measures of depression and self-esteem to explicitly analyze the role of proximate mechanisms in the observed phenomenon, is also a promising research avenue. Another limitation stems from the fact that the study focused only on one particular chronic illness. Similar experiments with patients suffering from other chronic diseases are needed to investigate whether illness-related shifts in aesthetic preferences are not HF specific. Moreover, it should be noted that the current study is correlational in nature and does not demonstrate a causal relationship between incidence of HF and changes in aesthetic perception. Therefore, conducting logistically challenging but scientifically valuable longitudinal studies may provide new insights into the effect of terminal conditions on perceptual processes. Also, targeting serious but short-term illnesses may help to shed light on cause-effect relationships governing observed shift in aesthetic preferencesand to examine whether the reported mechanism is reversible when health status improves.

Conclusions

The results of this study indicate that men suffering from HF relax their criteria for facial attractiveness. Although the observed shift in aesthetic preferences is consistent with the sexual selection model, there may be also other, not necessarily evolutionary-based, explanations for the observed effect. This calls for a more comprehensive investigation of the reported phenomenon. Since the prevalence of chronic diseases is continuously growing in modern societies, and is diagnosed in increasingly younger generations (World Health Organization, 2013a, 2013b), the current study offers a promising direction for further investigations. The findings of this study may be also useful when designing frameworks aiming at improving quality of life of patients with HF.

Declaration of Conflicting Interests

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