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Original Article

Illness in childhood predicts face preferences in adulthood

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ABSTRACT

The value of different mate choices may depend on the local pathogen ecology and on personal infection susceptibility: when there is a high risk of infection, choosing a healthy or immunocompetent mate may be particularly important. Frequency of childhood illness may act as a cue of the ecological and immunological factors relevant to mate preferences. Consistent with this proposal, we found that childhood illness – and frequency of diarrhea in particular – was positively correlated with preferences for exaggerated sex-typical characteristics in opposite-sex, but not same-sex, faces. Moreover, this relationship was stronger among individuals with poorer current health. These data suggest that childhood illness may play a role in calibrating adult mate preferences and have implications for theories of disease-avoidance psychology, life-history strategy and cross-cultural differences in mate preferences.

1. Introduction

Reproductive success is often a function of how well one can mitigate the pervasive costs of infectious disease (Combes, 2001). To this end, humans have evolved a set of immunological and cognitive mechanisms that reduce the impact of infectious agents (Combes, 2001; Curtis, de Barra, & Aunger, 2011; Fumagalli et al., 2011; Schaller & Park, 2011). The cognitive mechanisms, often referred to as the behavioral immune system (Schaller & Park, 2011), may also be important in shaping human mate preferences. Mating with healthy partners can (i) reduce the chance that you or future offspring contract an infection from that partner, (ii) lessen the risk that partners' direct investment will be curtailed due to illness, and (iii) increase the likelihood that offspring inherit genes that confer resistance to locally prevalent pathogens (Tybur & Gangestad, 2011).

Recent work suggests that individual differences in preferences for exaggerated sex-typical characteristics may be a component of the behavioral immune system. Although links between exaggerated sex-typical characteristics and measures of health remain controversial to some researchers (Boothroyd et al., 2005; Scott, Clark, Boothroyd, & Penton-Voak, 2013), recent studies suggest that masculine and testosterone-dependent characteristics in men (Gangestad, Merriman, & Emery Thompson, 2010; Rantala et al., 2012; Rhodes, Chan, Zebrowitz, & Simmons, 2003; Thornhill & Gangestad, 2006) and feminine characteristics in women (Gray & Boothroyd, 2012; Thornhill & Gangestad, 2006) are positively correlated with measures of actual health (reviewed in Thornhill & Gangestad, 2008). Consistent with these findings, masculine men and feminine women are also perceived to be particularly healthy (Johnston, Hagel, Franklin, Fink, & Grammer, 2001; Scott, Swami, Josephson, & Penton-Voak, 2008, but see also Boothroyd et al., 2005). Such findings suggest that there may be health-related benefits associated with choosing mates with exaggerated sex-typical characteristics. However, given that some research also suggests that people with more exaggerated sex-typical characteristics may be more to prone infidelity (Hughes & Gallup, 2003), there may also be costs associated with choosing such individuals as long-term mates. While there is general agreement among researchers that feminine characteristics in women's faces are important for men's mate preferences, evidence that masculine characteristics in men's faces are important for women's mate preferences is considerably more mixed (for review, see Rhodes, 2006). For example, some researchers have found that masculine characteristics have no effect on women's attractiveness ratings of men's faces, at least when faces differ simultaneously on other dimensions (Scott, Pound, Stephen, Clark, & Penton-Voak, 2010; Stephen et al., 2012), while other studies have reported that masculine characteristics do influence women's judgments of men's attractiveness under these circumstances (Quist, DeBruine, Little, & Jones, 2012; Said & Todorov, 2011).

While the importance of male masculinity for women's mate choices remains somewhat controversial, there is evidence that disease-related factors can modulate preferences for exaggerated sex-typical characteristics in potential mates in ways that might compensate for actual or perceived vulnerability to disease. For example, women who score high on a measure of pathogen disgust (Tybur, Lieberman, & Griskevicius, 2009), which is thought to index

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individual differences in concerns about disease, show stronger preferences for masculine characteristics in men's faces, voices and bodies (DeBruine, Jones, Tybur, Lieberman, & Griskevicius, 2010; Jones, Feinberg et al., 2013). Men scoring higher on pathogen disgust also tend to show stronger preferences for feminine women (Jones, Fincher et al., 2013). Additionally, women in geographic regions with higher pathogen loads demonstrate stronger preferences for masculine men (DeBruine, Jones, Crawford, Welling, & Little, 2010, DeBruine, Jones, Little, Crawford, & Welling, 2011) and facial cues of high testosterone (Moore et al., 2013). While these correlational findings are open to interpretation because of the potential effects of third variables (Brooks et al., 2011; Little, DeBruine, & Jones, 2011), recent experiments have demonstrated that priming men's and women's concerns about disease directly increased their preferences for exaggerated sex-typical characteristics in potential mates, but not in own-sex individuals (Little et al., 2011; see also Lee & Zietsch, 2011; Watkins, DeBruine, Little, Feinberg, & Jones, 2012). A notable criticism of this work is that it has generally investigated individual differences in mate preferences in relatively developed, industrialized countries (Scott et al., 2013). Consequently, tests for converging evidence that disease-related factors predict, and potentially influence, mate preferences in other types of samples would be desirable.

Given children's susceptibility to disease, the local prevalence of childhood infections may be particularly important for mate preferences. Demographic data from Matlab, Bangladesh in 1990 (the site of the current study and birth year of oldest participants) illustrate the severity of children's disease risk: a new-born had a 1 in 9 chance of dying before its fifth birthday while a young adult had a 1 in 165 chance of dying between the ages of 20 and 25 (ICDDRB, 1994).

Data from Matlab also shows that the *causes* of death are different for adults and children (Adjuik et al., 2006): children were most at risk from diseases like diarrhea and pneumonia while adults were most at risk from TB and other gastrointestinal diseases (ICDDRB, 1994). Together, these findings suggest that an adult's own childhood disease frequency is likely to be a more reliable cue to the disease threat that will be experienced by their offspring than is that adult's current health. Consequently, it is plausible that childhood health will be a particularly important predictor of mate preferences in adulthood; individuals who were in relatively poor health as children may place greater emphasis on the health of potential mates in adulthood, potentially leading to stronger preferences for exaggerated sex-typical characteristics in opposite-sex faces.

Condition-dependent adaptations of this kind are expected to evolve when environmental conditions change at intermediate rates (Penke, 2009). If conditions change rapidly, childhood environment will not be a reliable predictor of the environment decades later when adults reproduce. On the other hand, condition-dependent preferences may be redundant if conditions change very slowly (Penke, 2009). Pathogen stress depends on diverse factors that often display intermediate rates of change, such as where water is sourced, how food is prepared, the nature of intergroup contact, population density, hygiene culture, altitude, and weather patterns (Cairncross, Blumenthal, Kolsky, Moraes, & Tayeh, 1996; Checkley et al., 2000; Kuris, 2012). Thus, responses to disease burden may be condition-dependent. Current health may also predict preferences for exaggerated sex-typical characteristics in opposite-sex faces if, like childhood health, current health is correlated with the prevalence of diseases that threaten offspring health.

A different set of predictions, in which current heath could be negatively correlated with preferences for exaggerated sex-typical characteristics in opposite-sex faces, is suggested by a series of studies that have reported positive correlations between participants' own attractiveness and their mate preferences (reviewed in Little & Mannion, 2006). Given the positive relationship between attractiveness and health reported in some studies (e.g., Lie, Rhodes, & Simmons, 2008), early interpretations of these findings (Little, Burt, Penton-Voak, & Perrett, 2001; Penton-Voak et al., 2003) suggested they were examples of condition-dependent preferences (i.e., assortative mating for health), similar to those reported in some other species (see Cotton, Small, & Pomiankowski, 2006 for a review). Such findings raise the possibility that childhood and/or current health will be positively, rather than negatively, correlated with preferences for exaggerated sex-typical characteristics in potential mates. However, subsequent research suggests previous findings reporting correlations between own attractiveness and preferences for exaggerated sex-typical characteristics may be better characterized as market-value-dependent preferences, rather than condition-dependent preferences (Little & Mannion, 2006). For example, experimentally increasing women's perceptions of their own market value increases their preferences for masculine men (Little & Mannion, 2006). Further evidence that the effects of own attractiveness on mate preferences may have little to do with one's own health comes from a recent study finding that women's ratings of their own attractiveness were positively correlated with their masculinity preferences, women's ratings of their own health were negatively correlated with their masculinity preferences, and that these correlations were independent (Feinberg et al., 2011). Nonetheless, one previous study has suggested that healthier men and women in rural Malaysia showed stronger preferences for exaggerated sex-typical characteristics in potential mates (Scott et al., 2008). In a sample of 25 men and 26 women, this study found that the 13 men and 6 women who reported having never missed work due to illness in the past year had stronger preferences for exaggerated sex-typical characteristics in potential mates than did the 12 men and 20 women who had missed at least one day of work due to illness in the past year.

In light of the above, we investigated the inter-relationships among childhood illness, current illness, and preferences for exaggerated sex-typical facial characteristics in opposite-sex and own-sex faces in a sample of 90 men and 150 women living in rural Bangladesh.

2. Methods

Data were collected in Matlab, a rural subdistrict of Bangladesh and the site of a long-term health and demographic research program, between September and November 2010. The sample was randomly selected from a list of all individuals born between January 1990 and July 1994 within 16 different villages and included 150 women and 90 men. The mean age at the time of interview was 17.2 years (SD = 1.6 years), 86% were Muslim, 8% were married, 52% lived in households with electricity, and 38% had primary school education only. Participants were interviewed at their homes by one of four experienced field-workers.

Childhood health data were extracted from the Matlab Health and Demographic Surveillance System database (HDSS). Research began in Matlab in 1963 as part of a Cholera vaccine trail. In the late 1960s and 1970 the remit of the research in Matlab was broadened and systematic health and demographic data collection began. The data collection is monitored by a field team including research assistants and medical workers, and the HDSS is one of the most detailed high-quality longitudinal databases from the developing world. Community health workers make fortnightly or monthly visits to every household and record births, deaths, migrations, divorce. Data on child health (vaccination, breastfeeding, and disease) are also collected from mothers with children under five. Questions about offspring health were relevant to this study: has the child experienced diarrhea in the past fortnight (defined as "three or more loose stools per 24 h with or without mucus or blood") or pneumonia in the past month ("symptoms such as fever, cough, rapid breathing, or breathing difficulty and chest in-drawing")? These are the two major causes of infant mortality in the region (Baqui et al., 1998). We selected a