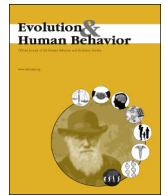




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Experiences during specific developmental stages influence face preferences

Tamsin K. Saxton*

Evolution, Perception & Behaviour Research Group, Psychology Department, Northumbria University, Northumberland Building, Ellison Place, Newcastle, NE1 8ST

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ABSTRACT

Much research has documented how people's face preferences vary, but we do not know whether there is a specific sensitive period during development when some individual differences in face preferences become established. This study investigates which specific developmental phases may be instrumental in forming individual differences in face preferences in adulthood. The study design is based on the established finding that people tend to be attracted to facial features that resemble those of their other-sex parent, particularly if they report a close childhood relationship with that parent. Accordingly, if individual differences in adult facial preferences (specifically, preferences for faces that resemble one's parents) are formed during specific developmental stages, then only the quality of the parental relationship in those stages should predict adult preferences for facial features that resemble one's parents. Heterosexual women reported the emotional support received from their parents during three different developmental phases and at the current time, and they reported the hair and eye colour of their ideal and actual partner, and their parents and selves. The study found that a woman's retrospectively reported greater emotional support from her mother or father after menarche predicted significantly stronger preferences for partners whose eye colour was closer to that of the parent. In contrast, emotional support prior to menarche predicted greater dissimilarity between the eye colour of the parent and a woman's preferred partner. These results indicate a possible interplay of positive and negative sexual imprinting that may arise from adaptations to promote optimal outbreeding. The study also found that parental hair colour, and in particular maternal hair colour, predicted women's preferences for hair colour in a partner, although this may have been driven by ethnic group matching. The results of the study suggest that experiences during specific childhood and adolescent developmental periods may have longstanding effects on individual differences in human facial preferences.

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1. Introduction

A basic attraction to faces is apparent from birth, and face preferences develop progressively across infancy, childhood and adolescence. Neonates and older infants spend more time looking at attractive than unattractive faces (Langlois, Ritter, Roggman, & Vaughn, 1991; Samuels, Butterworth, Roberts, Grauper, & Hole, 1994; Slater et al., 1998; Slater et al., 2000). Children as young as four or five years of age agree with adults explicitly about which people are attractive (Boothroyd, Meins, Vukovic, & Burt, 2014; Cavior & Lombardi, 1973; Kissler & Bäuml, 2000). Adults tend to prefer faces that are healthy in appearance, symmetric, and representative of the population average (Rhodes, 2006; Roberts & Little, 2008), and these preferences emerge during childhood. Children judge faces with more cues to health as more attractive from around age 6 to 8 (Boothroyd et al., 2014). Facial symmetry is preferred by infants aged around 12–24 months (Griffey & Little, 2014) (but not by younger infants; Rhodes, Geddes, Jeffery, Dziurawicz, & Clark,

2002), and children select the more symmetric face as more attractive from about age 9 (Boothroyd et al., 2014; Saxton, DeBruine, Jones, Little, & Roberts, 2009a; Saxton, DeBruine, Jones, Little, & Roberts, 2011; Saxton et al., 2010). Infants look preferentially at averaged compared with unattractive faces (Rubenstein, Kalakanis, & Langlois, 1999), but do not look preferentially at averaged over less average faces (Griffey & Little, 2014; Rhodes et al., 2002), while explicit preferences for facial averageness seem to emerge from about age 9 (Boothroyd et al., 2014; Saxton et al., 2009a; Saxton et al., 2010; Saxton et al., 2011). Facial sexual dimorphism (i.e. masculinity and femininity) also influences adult face preferences (Rhodes, 2006; Roberts & Little, 2008). Differences in the sexual dimorphism of facial stimuli affect looking duration of infants aged 12–24 months (Griffey & Little, 2014) and give rise to age-linked changes in explicit attractiveness judgements across the life span (Boothroyd et al., 2014; Little et al., 2010; Saxton et al., 2009a). In sum, many standard adult facial attractiveness judgements are becoming apparent within the first decade of life.

Experiences with faces also shape individual differences in face preferences. For example, children's experiences in seeing their peers' faces, and in viewing adults' faces more frequently from a lower

* Corresponding author. Tel.: +44 191 227 4486.

E-mail address: tamsin.saxton@northumbria.ac.uk.

perspective, shape the kind of face proportions that they find most attractive (Cooper, Geldart, Mondloch, & Maurer, 2006). Similarly, experience in a single-sex school environment or with other-sex siblings has been linked to variation in preferences for faces that have typically male or female facial proportions (Saxton, Little, DeBruine, Jones, & Roberts, 2009b). The outcomes of some developmental experiences persist in adult face preferences. Adults tend to be attracted to physical features that bear resemblance to those of their parents. For example, people choose partners, and are attracted to faces, that show some facial resemblance to their other-sex parent (Bereczkei, Gyuris, Koves, & Bernath, 2002; Bereczkei, Gyuris, & Weisfeld, 2004; Marcinkowska & Rantala, 2012; Wiszewska, Pawlowski, & Boothroyd, 2007; see also Fraley & Marks, 2010; but see Nojo, Ihara, Furusawa, Akamatsu, & Ishida, 2011; Nojo, Tamura, & Ihara, 2012). This phenomenon has also been tested in adopted women, who were found to have chosen marriage partners who tended to resemble their adoptive father (Bereczkei et al., 2004), suggesting that the entire phenomenon cannot be explained as arising from heritable preferences, nor from preferences for faces that resemble the self (as biological offspring resemble their father). Men and women are more likely to couple up with someone from the same race and culture, or with the same hair and eye colour, as their parents and particularly their other-sex parent (Jedlicka, 1980; 1984; Little, Penton-Voak, Burt, & Perrett, 2003; Wilson & Barrett, 1987). People with older parents, compared with people with younger parents, have older partners and have stronger preferences for partners with an older facial appearance (Heffernan & Fraley, 2013; Perrett et al., 2002; Wilson & Barrett, 1987; Zei, Astolifi, & Jayakar, 1981). Similarly, the amount of body hair on a woman's partner and father were found to be correlated, and a woman's preference for body hair correlated with the hairiness of her father (Rantala, Polkki, & Rantala, 2010); a woman's partner and father were found to have similar levels of facial hair (Dixon, Tam, & Awasthy, 2013); and the height of an individual's other-sex parent predicted their individual preferences for the height of an ideal partner (Seki, Ihara, & Aoki, 2012). Further, these preferences for faces that resemble one's other-sex parent are stronger when people report that they had a good relationship with their parent in childhood (Bereczkei et al., 2002; 2004; Wiszewska et al., 2007; see also Kocsor, Gyuris, & Bereczkei, 2013; Vukovic, Boothroyd, Meins, & Burt, 2015; Watkins et al., 2011; but see Marcinkowska & Rantala, 2012; Nojo et al., 2012).

However, we do not know when variation in adult preferences for parental features is acquired. Many fundamental human behaviours are shaped during sensitive periods (see e.g. Knudsen, 2004). In non-human animals, sensitive periods for the development of species-typical mate preferences have been demonstrated through cross-fostering experiments (review in e.g. Bischof, 1994). Despite this, it is not yet clear whether human adult face preferences rely on exposure during particular developmental periods. Children aged three to six with a more secure attachment to their parents had stronger preferences for fictional playmates who resembled their father (Kocsor et al., 2013), but infancy attachment did not predict 9-year-olds' facial attractiveness judgements of parent-similar faces (Vukovic et al., 2015). Nine-year-olds with less rejecting parental relationships were more likely to judge parental-similar faces as more attractive (Vukovic et al., 2015), but we should not necessarily expect those judgements to persist unchanged into adulthood. Expression of sensitive-period behaviours during the acquisition or consolidation phase may be different from their expression in the adult phase (e.g. Marler & Peters, 1982a, 1982b).

A reasonable hypothesis is that face preference formation might be tied to processes and phases related to reproduction, because facial preferences exist in part to support adaptive partner choice and attendant reproductive consequences (Rhodes, 2006; Roberts & Little, 2008). Accordingly, the current study investigated whether the formation of individual differences in adult facial preferences takes place within particular reproductively-relevant phases of development. It made use of the finding that people's preferences for faces that resemble

their parents are moderated by the quality of their relationship with that parent. Thus, if the relationship quality during only some phases of development predicts adult preferences for faces that resemble one's parents, then this would suggest that only those phases of development are instrumental in the acquisition of adult preferences for faces that resemble one's parents.

The study examined the relationship between heterosexual women's retrospectively reported emotional support received from their parents during four different lifespan phases, and the similarity between the hair and eye coloration of their parents and partners. The first developmental phase began at age six, because the link to parental relationship depends upon recollection of that relationship, and from about this age, children should have developed the ability to remember events as experienced (Perner & Ruffman, 1995), and adults recall a greater proportion of autobiographical events from about age six compared with younger ages (Rubin, 2000; Rubin & Schulkind, 1997). The first phase ended at age 10, because many adult-like face preferences (e.g. for facial symmetry, averageness, and health cues) are in place by this age (see first paragraph above). Further, this age has been proposed as a human universal in the developmental of sexuality and attraction, perhaps contingent upon rising levels of the adrenal steroid dehydroepiandrosterone (DHEA) (McClintock & Herdt, 1996), and it is the age at which retrospectively reported first hetero- and homosexual sexual attraction tends to arise (Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993; McClintock & Herdt, 1996; Pattatucci & Hamer, 1995). The second phase ended at menarche because menarche represents the endpoint in a complex sequence of developmental events related to reproduction, and because of the links between menarche and reproductive ecology (see e.g. Ellis, 2004). The third phase represented the post-menarchal phase, and ended at age 16. Participants were also asked to report on the current time as a comparison phase. In this way, the study aimed to uncover the impact of different developmental phases on the formation of individual differences in adult face preferences.

2. Methods

2.1. Participants

All of the students enrolled on the second year of three psychology-based undergraduate degree programmes were invited to participate in the study in the context of a data analysis teaching exercise, and 171 students accessed the study. In addition, a separate version of the study was advertised via social networks, and 58 people accessed the study. Data from 7 participants were deleted because they opted out of making their data available for research, and data from 16 participants were deleted because they answered fewer than eight questions. Male participants were removed because of small numbers ($n = 44$). Eleven female participants were removed because they stated their ideal partner was female rather than male. The data reported below come from the remaining 145 participants aged 18–48 (mean = 21 years, st.dev. = 4 years).

2.2. Material and methods

Data collection took place in the form of an online survey. Participants were asked their age and ethnicity; the gender of their ideal partner; and the hair and eye colour of their ideal partner, actual partner (if in a relationship), mother, father, and self. Ethnic group categories were taken from the current recommendations of the UK Office for National Statistics for surveys in England. Participants were asked for details of both their actual and ideal partner because both can provide important information: the ideal partner represents a choice in an unconstrained environment; the actual partner represents the distillation of a set of preferences that may fluctuate (e.g. Jones et al., 2008), and has ecological validity. Parental hair colour was requested with reference to the predominant colour while the participant was growing up. Hair and

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