

Original Article

Facial attractiveness and fertility in populations with low levels of modern birth control

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Abstract

Evolutionary models of human mate choice generally assume that physical attractiveness has evolved through sexual selection, i.e., it has been associated with higher mating opportunities and subsequent reproductive success across our evolutionary history. Here we investigate whether facial attractiveness is related to fertility in order to understand the extent to which selection can operate on attractive traits in modern populations. We used data from two populations where the prevalence of modern birth control methods is low and thus unlikely to disconnect mating opportunities from reproductive success: men and women from contemporary rural Senegal and men from the West Point Military Academy in the USA who graduated in 1950. We found that facial attractiveness negatively predicts age-specific reproduction in both sexes in Senegal and is independent from lifetime reproductive success in men from the USA. Overall, the results suggest that facial attractiveness is not under positive selection and raise questions about methodological approaches currently used to assess attractiveness.

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1. Introduction

Attractiveness can be defined as the ability of being preferred as a mate, and thus attractive traits are expected to indicate the reproductive value of an individual (Rhodes, Simmons, & Peters, 2005). There are two main hypotheses for the evolution of mating preferences: a runaway process (Fisher, 1930), predicting that an initial random preference for a trait can eventually lead to an increase in its frequency if attractive individuals have more offspring, and the good genes hypothesis (Hamilton & Zuk, 1982), which predicts that traits genuinely reflecting genetic quality are preferred. In humans, attractiveness encompasses several physical and psychological traits (Buss, 1989; Gangestad & Scheyd, 2005), and the facial phenotype, conveying critical informa-

tion such as sex and health, is likely to play a key role in a mate choice context. There is also some evidence that facial attractiveness is more relevant than body attractiveness in hypothetical mate choice decisions (Currie & Little, 2009).

So far, three main properties have been suggested to influence facial attractiveness: symmetry, averageness, and sexual dimorphism (Rhodes, 2006). While several studies have found a relationship between these attractive traits and markers of mate quality (e.g., Rhodes, Chan, Zebrowitz, & Simmons, 2003; Thornhill & Gangestad, 1999), a considerable number of studies have failed to detect any significant link (e.g., Rhodes & Simmons, 2007; Zebrowitz & Rhodes, 2004). In addition, it is unclear whether markers of mate quality reflect genetic quality or are instead cues of the phenotypic condition of the individual, unrelated to genetic quality.

Finally, even if preferences towards facially attractive individuals have now been well established (Langlois et al., 2000), only a few studies have investigated whether these preferences are adaptive, i.e., whether facial attractiveness

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is heritable and is associated with higher fertility. Livshits & Kobylansky (1989) found evidence for phenotypic similarity between parents and offspring for a combined measure of body and facial symmetry, while for the majority of specific facial measures, only a weak correlation was found. More recently, a study based on a sample of parent–offspring pairs from Scotland reported a significant positive correlation between parents' and daughters' facial attractiveness but not between parents and sons (Cornwell & Perrett, 2008). The association between facial attractiveness and reproductive success is also not clear. In the Ache of Paraguay, for instance, women with the most attractive faces were found to have 1.6 times higher fertility than those of average attractiveness (Hill & Hurtado, 1996: 312). In contrast, a study in Poland failed to find a correlation between women's facial attractiveness and the number of offspring (Pawlowski, Boothroyd, Perrett, & Kluska, 2008). However, according to a study based on a large sample of individuals from the USA, attractive men and women have, respectively, 12% and 16% more children than less attractive individuals (Jokela, 2009). Finally, a recent study found that attractive individuals in a sample of Slovak men are more likely to be married and consequently have higher number of children than unattractive individuals (Prokop & Fedor, 2011; but see Prokop, Obertová, & Fedor, 2010).

Besides the Ache study (Hill & Hurtado, 1996: 312), no other research has been conducted in a high-fertility and polygynous population with intense mating competition, although this socioecological setting is the most frequent among human societies (Marlowe, 2003). Moreover, in other studies, only short-term measures of reproductive success have been used (i.e., number of children). However, since the transition to low fertility rates observed in postindustrial populations is hypothesized to result from a higher demand of parental investment per child which possibly maximizes long-term reproductive success (Lawson & Mace, 2011), the use of multigenerational data may be required to investigate the fitness outcomes of facial attractiveness in modern populations.

The main objective of this study is to investigate whether facial attractiveness brings reproductive benefits in contemporary populations with low uptake of modern contraceptive methods. Indeed, modern birth control may not only lead to a disconnection between mating opportunities and fertility in men (Pérusse, 1993), but it is also possible that it affects mate preferences in both men and women (see Alvergne & Lummaa, 2010 for review). First, we used multigenerational historical data from the USA (men from the West Point Military academy born in the 1930s and graduating in the 1950s; note that the first birth control pill was available in 1960) to test whether facially attractive men have more children (completed fertility) and grandchildren. Second, we used data from contemporary rural Senegal where contraceptive prevalence is low [$<15\%$ (Wickstrom, Diagne, & Smith, 2006)] to investigate the link between facial attractiveness and age-specific reproduction in both men and women.

2. Materials and methods

2.1. Study populations

2.1.1. West Point Military Academy, VA, USA (35 men)

The sample is constituted of 35 men from the West Point Military Academy who graduated in the class of 1950 (see Mueller & Mazur, 1997 for details). Sociodemographic data were obtained in 1991 through postal questionnaires (Table 1). In the 1960s USA, fertility was moderate [total fertility rate in 1960=3.7 (World Bank, 2010)]; the sampled individuals are mostly Christians (82%), and remarriage is uncommon (14%). All participants gave their informed consent for the data collected to be used for research purposes.

2.1.2. Rural Senegal (62 men, 80 women)

In rural Senegal, fertility and mortality are high [total fertility rate=5.3 and infant mortality rate=61 deaths per 1000 births (APHRC, 2008)]. Most people are Muslims ($>90\%$) and polygynous marriages are allowed (see Alvergne, Faurie, & Raymond, 2009 for details). Data were collected in 2006 through questionnaires administered in four villages situated around Sokone, a small town ($\sim 10,000$ inhabitants) in southern Senegal (Table 2). Most people in the sampled populations are small-scale agriculturalists. However, the transition to a market economy has started (e.g., cash crops becoming more common than subsistence crops), and people frequently have secondary jobs in the main town. We obtained clearance from both the French National Committee of Information and Liberty and the ethical committee of the Senegalese National Research Council for Health, and also obtained informed consent from all participants.

2.2. Assessment of facial attractiveness

2.2.1. Pictures

We used 35 black and white facial pictures of men from the West Point Academy from the graduate class of 1950 taken at the time of graduation, with the ages of the individuals ranging from 21 to 26 years (mean \pm S.D.=22.7 \pm 1.4). We also used black and white pictures of 62 men and 80 women living in contemporary Senegal taken in 2006, with ages ranging from 26 to 69 years (mean \pm S.D.=46.4 \pm 9.2) in men and 18 to 53 years in women

Table 1
Descriptive statistics—USA (men)

	Mean (S.D.)	<i>n</i>
Age	22.7 (1.4)	35
Number of children	3.9 (1.7)	35
Number of grandchildren	3.7 (2.7)	35
Rank		35
Lieutenant colonel		7
Colonel		18
Brigadier general		3
Major general		2
Lieutenant general		1
“Full” general		4

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