The Oxford Handbook of Human Mating

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CHAPTER

33   Mating in the Digital Age 🔓

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Abstract

Charles Darwin identified two basic forms of sexual selection: intrasexual selection, in which members of the same sex of a species evolved biobehavioral mechanisms to compete with one another to win mating opportunities with the opposite sex—male–male competition and female–female competition —and intersexual selection in which members of each sex of a species evolved biobehavioral mechanisms to attract members of the opposite sex for the purpose of mating—mate choice. Miller proposed that two aspects of mate choice have evolved in tandem: (1) traits of the *display producer* that evolved to attract mating partners and (2) traits of the *display chooser* that evolved to discriminate between specific courtship displays and prefer those of specific display producers. Fisher has proposed that a third mechanism evolved in tandem with hominin mate choice: the brain system for romantic love. Regardless of *whom* the *display chooser* chooses, this corresponding neural mechanism provides the focus, motivation, optimism, and energy to pursue this preferred mating partner. This chapter first reviews current data on this mechanism of mate choice, romantic love. Then, using a sample of 39,913 single adult Americans, the chapter discusses four broad temperament dimensions that play a role in mate choice today; and using a sample of 28,128 single Americans, it discusses three biologically based patterns of mate choice associated with these four neural systems. Last, using a national representative sample of 55,000 single adult Americans, the chapter discusses contemporary patterns of mate choice that most likely evolved during hominin evolution.

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> "It's better to be looked over than overlooked."
>
> —Mae West

Premise

Charles Darwin (1871 identified two basic forms of sexual selection: *intrasexual selection*, in which members of the same sex of a species evolve biobehavioral mechanisms to compete with one another to win mating opportunities with members of the opposite sex—known as male–male competition and female–female competition—and *intersexual ↳ selection*, in which members of each sex of a species evolve biobehavioral mechanisms to attract members of the opposite sex in order to attain mating opportunities—generally known as mate choice. Darwin's theoretical framework remains intact and relevant to contemporary studies of evolution and mating. This chapter focuses on human mate choice in today's digital age.

The phenomenon of mate choice is so common in nature that the ethological literature regularly uses several terms to describe it, including *mate preference*, *individual preference*, *favoritism*, *sexual choice*, *female choice*, and *selective proceptivity* (Andersson, 1994). Evolutionary psychologist Geoffrey Miller (2000) has proposed that mate choice has two basic aspects that evolved in tandem: (1) traits that evolved in the *display producer* to attract mating partners of the opposite sex and (2) corresponding neural mechanisms in the *display chooser* to discriminate between various courtship displays, become attracted to traits of specific individuals, and pursue preferred potential mating partners. Anthropologist Helen Fisher has proposed that a third mechanism evolved in tandem with hominin mate choice: the brain system for romantic love. Regardless of *whom* the display chooser chooses, this corresponding neural mechanism provides the focus, energy, and motivation to pursue this preferred mating partner (Fisher, 2006; Fisher et al., 2006).

This chapter first reviews the primary neural mechanism that facilitates mate choice in humans, commonly known as romantic love. Using a sample of 39,913 single adult Americans, the chapter then presents data on four broad evolved temperament dimensions that play a role in mate choice today (Fisher, 2009, 2012; Brown et al., 2013; Fisher et al., 2015), and using a sample of 28,128 singles, it discusses three biologically based patterns of mate choice associated with these four neural systems. Last, using a national US sample of 55,000 single adult Americans, the chapter discusses several traits that contemporary human display producers present and choosers prefer in a partner, specifically, indicators of genetic quality that most likely evolved in the environment of evolutionary adaptedness (EEA), perhaps with the emergence of hominin serial, social monogamy and concomitant clandestine adultery 4.4 million years before present (Fisher, 2011, 2016; Gray & Garcia, 2013).

Romantic Love: The Primary Neural Mechanism of Mate Choice

Romantic love is a cross-cultural human phenomenon associated with a specific suite of biobehavioral traits. These include focused courtship attention on a *specific* partner; intense energy; ecstasy; mood swings; bodily reactions including "butterflies in the stomach" and anxiety; emotional dependence; separation anxiety; frustration-attraction; intrusive, obsessive thinking about the specific beloved; sexual possessiveness; craving for emotional union with the beloved; and extreme motivation to win this *preferred* mating partner (see Fisher, 1992, 2004, 2009, 2011, 2016).

Several neuroimaging studies indicate a primary neural system associated with human romantic love (Bartels & Zeki, 2000; Fisher et al., 2003; Fisher et al., 2005; Aron et al., ↳ 2005; Ortigue et al., 2007). And "courtship attraction" among other mammals has neurological similarities human romantic love: all these motivation systems are primarily orchestrated by dopamine pathways in the mammalian brain (see Fisher et al., 2006; Fisher, 2011). In fact, considerable behavioral data now suggest that human romantic love arose from mammalian antecedents (Fisher, 1998, 2004). Mammalian "courtship attraction" is focused on a *specific* individual, as well as associated with increased energy, obsessive following, affiliative gestures, possessive mate guarding, goal-oriented behaviors, and motivation to win this *preferred* mating partner (Fisher, 2004; Fisher et al., 2006; Fisher, 2011). These are central traits of human romantic love. However, in most mammalian species, courtship attraction is brief, lasting only minutes, hours, days, or weeks, while among humans, intense, early-stage romantic love can last twelve to eighteen months or much longer (Fisher, 2009; Acevedo et al., 2011, 2012; Fisher, 2016).

Perhaps the extended duration of human romantic love evolved in tandem with the evolution of human serial social monogamy to enable and sustain long-term social commitment for parenting (Fisher, 2011, 2016). In fact, romantic love has been called a commitment device (Buss, 1988; Frank, 1988; Fletcher et al.,

2015; Sorokowski et al., 2017); and because relationship commitment has a direct, positive correlation with reproductive success in both sexes (Sorokowski et al., 2017), romantic love has also been referred to as a "survival mechanism" (Frascella et al., 2010; Fisher, 2016) that evolved to ensure one's genetic viability in subsequent generations (Fisher, 2016).

Biopsychological Traits Associated with Mate Choice

But what activates this brain circuitry of romantic passion? What traits do human display choosers choose? Scientists have discussed a host of bodily traits that most likely evolved by mate choice in the EEA, including aspects of height, facial averageness, bilateral symmetry, scent, male jaw shape, female waist-to-hip ratio, resource control, and proneness to accidents and injury (Miller & Todd, 1998; Gallup & Frederick, 2010).

Researchers have likewise noted a host of psychological traits that men and women choose. Both sexes tend to choose individuals who share similar attitudes and values, a pattern known as homogamy; those from a similar socioeconomic and ethnic background; those with a similar level of education and intelligence; and those who share their religious views, political opinions, and social goals (see Fisher, 2011). Men and women gravitate to individuals with a similar sense of humor and social and communication skills. One's parents and childhood experiences play roles in mate choice, and individuals tend to choose a partner who reflects the values, interests, ideals, and goals of their friends during their formative years (see Fisher, 2011). Timing plays a role, as does proximity, and the major histocompatibility complex (MHC) component of the immune system appears to play a role in mate choice (Havlíček & Roberts, 2009).

p. 780 Miller (2000) has proposed that humans have evolved a host of other behavioral and cognitive traits via mate choice. Among them are our increased human linguistic skills and musical abilities; our drive to create visual arts, stories, myths, comedies, and dramas; our agility at all kinds of sports; our intense curiosity; our ability to solve complex math problems; our moral virtue; our religious fervor; our impulse for charitable giving; our political convictions; our sense of humor; and our courage, pugnacity, perseverance, and kindness (Miller & Todd, 1998; Miller, 2000). Miller concluded that "the mind evolved by moonlight" (Miller, 2000, p. 7).

Four Neural Systems That Play a Role in Human Mate Choice

Fisher has proposed that four primary neural systems also play a role in human mate choice—the dopamine, serotonin, testosterone, and estrogen systems (Fisher, 2009, 2011, 2012; Brown et al., 2013; Fisher et al., 2015; Fisher, 2016). Each of these four neural systems is associated with a distinct *constellation* or *suite* of related biobehavioral traits, known as temperament dimensions or behavior syndromes (Fisher, 2009, 2011, 2012; Brown et al., 2013; Fisher et al., 2015; Fisher, 2016).

The suite of biologically based traits associated with the dopamine system (DA) include exploratory behavior, novelty, thrill, experience and adventure seeking, boredom susceptibility and disinhibition, mania and hypersocial behavior, enthusiasm, energy, stamina, motivation and achievement striving, abstract intellectual exploration, cognitive flexibility, curiosity, idea generation, verbal and nonlinguistic creativity, low anxiety, and poor introspection (see Fisher, 2009, 2011; Brown et al., 2013; Fisher et al., 2015). This dopamine-linked behavior syndrome had been named the curious/energetic temperament dimension (Fisher, 2009, 2011, 2012; Brown et al., 2013; Fisher et al., 2015; Fisher et al., 2016).

The suite of biologically based traits associated with the serotonin system (5-HT) include adherence to social norms (conventionalism), self-control and self-regulation, sociability, harm avoidance, precision, interest in details, conscientiousness, orderliness, sustained attention, concrete thinking, managerial skills (cooperation, reduced commands, and reduced autonomous problem-solving), figural and numeric creativity, and self-transcendence or religiosity (see Fisher, 2009, 2011; Brown et al., 2013; Fisher et al., 2015). This serotonin-linked behavior syndrome has been named the cautious/social norm compliant temperament dimension (Fisher, 2009, 2011, 2012; Brown et al., 2013; Fisher et al., 2015; Fisher, 2016).

The suite of biologically based traits associated with prenatal testosterone priming include enhanced visual–spatial perception, mathematical skills, musical aptitude, aggressiveness, and compromised verbal fluency. Endogenous testosterone is also associated with enhanced attention to detail, focused attention,

diminished emotion recognition, eye contact and social sensitivity, and reduced empathy. Characteristics correlated with ↳ activational testosterone (postnatal exposure) include enhanced self-assurance, candid and assertive communication, sensitivity to social dominance, drive for rank, and heightened sex drive (see Fisher, 2009, 2011; Brown et al., 2013; Fisher et al., 2015). This testosterone-linked behavior syndrome has been named the analytical/tough-minded temperament dimension (Fisher, 2009, 2011, 2012; Fisher et al., 2015; Fisher, 2016).

The suite of biologically based traits associated with prenatal estrogen priming include contextual thinking, linguistic skills, agreeableness, cooperation, theory of mind (i.e., intuition), empathy, and nurturing. In addition, activational estrogen (postnatal exposure to estrogen) is positively correlated with generosity and trust, agreeableness, the drive to make social attachments, and heightened memory for emotional experiences. Similarly, oxytocin (secondarily associated with the estrogen system) is correlated with prosocial behavior, including trust, prosody, introspection, and perspective-taking (see Fisher, 2009, 2011; Brown et al., 2013; Fisher et al., 2015). This estrogen-linked behavior syndrome has been named the prosocial/empathetic temperament dimension (Fisher, 2009, 2011, 2012; Brown et al., 2013; Fisher et al., 2015; Fisher, 2016).

The Fisher Temperament Inventory

To study the possible role of these four broad temperament dimensions (or behavior syndromes) in human mate choice, a questionnaire was designed to measure the degree to which an individual expressed the traits associated with each of these four brain systems (Fisher, 2009). Reliability was obtained in a US sample of 39,913 anonymous men and women, using factor analyses and an Eigen analysis (Fisher et al., 2015). The final assessment measure was named the Fisher Temperament Inventory (FTI).

The FTI was also administered to subscribers of an international dating site (Match.com) in thirty-nine other countries, and reliability was confirmed among 15,000 individuals in six of these countries: Germany, France, Spain, Australia, Japan and Sweden (Fisher et al., 2015).

The FTI was also correlated with the NEO-FFI (or Big Five), a standard psychological measure, as an additional reliability index (Fisher et al., 2015).

Last, the FTI was administered to participants in two functional magnetic resonance imaging studies (fMRI) to measure the degree to which this psychological measure correlated with these four brain systems (Brown et al., 2013). Results indicated that those individuals who scored higher on the FTI scale measuring traits linked with the dopamine system also expressed more activity in primary dopamine pathways; those who scored higher on the FTI scale measuring traits linked with the serotonin system expressed more activity in a brain region associated with social norm conformity, a core trait of the serotonin system; those who scored higher on the FTI scale measuring the traits linked with the testosterone system also expressed more activity in neural regions built by fetal testosterone and regions associated with activational testosterone;

and those ↳ who scored higher on the FTI scale measuring traits linked with the estrogen system also expressed more activity in neural regions associated with both organizational and activational estrogens. These results in two independent fMRI studies show that FTI scores on all four temperament dimensions were directly correlated with appropriate and predicted brain regions and brain activity; thus correlational validity was established (Brown et al., 2013).

These above findings suggest that these four temperament dimensions constitute *foundational* mechanisms in personality structure (Fisher, 2009; Brown et al., 2013; Fisher et al., 2015).

The FTI was then employed to investigate *initial* mate preference in a random sample of anonymous participants on the online dating website, Chemistry.com (a member of Match Group Inc.). The sample consisted of 28,128 heterosexual adults (17,776 men, 10,352 women) who had just met a potential partner for the first time and given a positive rating of this partner after returning from this first date. First dates were studied because they were most likely to represent initial chemical attraction—a preference least likely to be contaminated by or facultatively adjusting to cultural factors and thus more likely to indicate preferences based on an evolved behavioral adaptation.

The Role of Four Temperament Dimensions in Mate Choice

Those men and women who expressed a disproportionately greater number of the traits associated with the dopamine system (the curious/energetic temperament dimension) initially preferred partners who also displayed a disproportionately large number of these dopamine-related traits (see fig. 31.1). Supporting this result, previous studies indicate that individuals with significant dopamine expression also tend to marry one another (Zuckerman, 1994). This dopamine-measuring temperament dimension of the FTI also correlated positively with the NEO-FFI domain for openness to experience (Fisher et al., 2015); and spouses who shared openness to experience were more satisfied with their marriage (Watson & Humrichouse, 2006); women whose husbands scored high on sensation seeking, a primary trait of the dopamine system, were more satisfied with their marriage (Charania, 2007), and wives' openness to experience was associated with the marital satisfaction of both husbands and wives (Donnellan et al., 2004; Claxton et al., 2012). These data are further evidence that the dopamine system plays a role in mate choic; specifically, those who disproportionately express these dopamine-liked traits initially prefer one another.

Those who expressed more of the traits linked with the serotonin system (the cautious/social norm compliant temperament dimension) tended to prefer partners who also displayed a disproportionately large number of these serotonin-related traits (see fig. 31.1). ↳ Supporting this result, previous studies indicate that those who are cautious, a core trait of the serotonin system, disproportionately tend to marry one another (Zuckerman, 1994). Moreover, scores on the serotonin-linked scale of the FTI had a positive correlation with the Conscientiousness Scale of the NEO-FFI scale (Fisher et al., 2015); and individuals who score high on the NEO-FFI scale measuring conscientiousness tend to prefer and select one another (Little et al., 2006; Gyuris et al., 2010), further evidence that the serotonin system plays a role in mate choice; specifically, those who disproportionately express these related traits initially prefer one another.

Those men and women who expressed more of the traits linked with the testosterone system (the analytical/tough-minded temperament dimension) tended to prefer partners who displayed a disproportionately large number of traits in a different but complementary trait constellation, that linked with the estrogen system (see fig. 31.1). Supporting this result, previous studies indicate that high-testosterone men gravitate to high-estrogen women (Jones, 1995), further evidence that the testosterone system plays a role in mate choice; specifically, those who disproportionately express these testosterone-related traits initially seek their opposite.

Last, those who disproportionately expressed the traits in the estrogen system (the prosocial/empathetic temperament dimension) tended to prefer partners who displayed a lot of traits linked with the testosterone system (see fig. 31.1). Supporting this result, previous studies indicate that very feminine, high-estrogen women tend to form partnerships with very masculine, high-testosterone men (Feinberg et al., 2005), further evidence that the estrogen system plays a role in mate choice; specifically, those who disproportionately express these estrogen-related traits initially seek their opposite.

Figure 33.1

FTI Mate Preferences (N = 28,128)

Male	Female	Like Attracts		Opposites Attract	
		Dopamine	Serotonin	Testosterone	Estrogen
Dopamine		117%	100%	93%	98%
Serotonin		97%	111%	93%	91%
Testosterone		99%	92%	100%	112%
Estrogen		98%	93%	114%	99%

FTI mate preferences

↳ Three Neural Patterns of Mate Choice

Three patterns of mate choice have emerged from the above data that may have evolved in the EEA, each for a different evolutionary purpose (Fisher, 2016).

1. Mate preference between individuals predominantly expressing the traits associated with the testosterone system and those predominantly expressing the traits of mate estrogen system may have evolved to pool suites of *complementary* traits of temperament, a likely adaptive mechanism for competent parenting.

2. Mate preference between those expressive of the traits linked with the serotonin system may have evolved to capitalize on a suite of *similar* (and likely adaptive) parenting skills, including adherence to social norms, self-control, sociability, harm avoidance, conscientiousness, cooperation, and managerial skills. Other data suggest that marital partners who are *similar* in an array of personality traits are more satisfied with their marital partner, remain wedded longer, and bring up more children than those with fewer homogamous personality traits (Gyuris et al., 2010), data also suggesting that this preference for similarity is conducive to competent parenting.

3. It is more difficult to hypothesize the merits of mate preference by men and women who predominantly express the suite of traits linked with the dopamine system. Both partners are likely to seek novelty, thrills, and adventure, as well as being prone to boredom, disinhibition, mania, and lack of introspection—traits likely to contribute to an *unstable* long-term parenting partnership. But perhaps the potential instability of these partnerships had a genetic payoff in the EEA—leading to more extra-pair copulations and serial partnerships likely to produce more genetic variety in their lineages.

Data on 13,224 gay men and lesbian women, collected via Match.com in a national sample of singles (unpublished data), show some similar patterns of mate choice. Curious/energetic individuals (dopamine-linked) foremost chose to meet others like themselves. Cautious/social norm compliant individuals (serotonin linked) also preferred individuals similar to themselves in this temperament dimension. These data are similar to the data on Fisher's heterosexual population.

Unlike heterosexuals, however, those of the analytical/tough-minded temperament dimension (testosterone-linked) chose to meet others similar to themselves rather than those exhibiting many traits linked with estrogen, those of their opposite. And those of the prosocial/empathetic temperament dimension (estrogen-linked) also preferred those of the same biological profile, rather than their opposite. These data suggest that the heterosexual pattern of preference *complementarity* is a specific aspect of mate

p. 785 choice that ↳ evolved in the EEA for parenting, perhaps in tandem with the evolution of serial social monogamy (Fisher, 2009, 2011, 2016).

Mate Choice in the Digital Age: The *Singles in America* Study

Between 2010 and 2021, Fisher and Garcia examined mate choice among 55,000+ contemporary singles, in collaboration with the online relationship company Match.com; 5,000+ single adults were studied annually. In these studies, referred to as the *Singles in America* (SIA) data set, we used a demographically representative opt-in panel sample of single adults, based on national demographic distributions reported in the US census. Participants were all single at the time of survey. Some were casually dating; some were never married; some were divorced, separated, or widowed; all were between ages eighteen and seventy-plus; of all major sexual orientations; and from every major ethnic group and every region of the country. No members of the Match.com dating site or of any other site in the Match Group were polled or knowingly included. We used a third-party data collection company. This data set (unpublished) suggests several more biobehavioral and cognitive traits associated with mate choice that may have evolved in the EEA.

Physical Attraction as an Evolved Mechanism of Mate Choice

Men and women differed (respectively) in the degree to which they regarded it as "desirable" or "essential" that their potential partner be good-looking (92% M vs. 84% W; d = 0.39) and have a slender body (80% M vs. 58% W; d = 0.53). This predominantly male preference may have evolved in the EEA because being good-looking is a signal of parasite and disease resistance, health, and well-balanced hormone activities—important aspects of female fertility (see Buss, 1989; Miller & Todd, 1998; Miller, 2000).

Men and women (respectively) also differed in their preference for a financially stable partner, as first established in Buss (1989). Our data included someone with a steady income (74% M vs. 97% W; d = 1.17), someone who made/will make a lot of money (47% M vs. 69% W; d = 0.49), someone who made at least as much money as themselves (24% M vs. 46% W; d = 0.60), and someone who has a successful career (33%M vs. 61% W; d = 0.57). Women sought these qualities more than men, preferences likely to have evolved in the EEA because with the evolution of serial, social pair-bonding (Fisher, 2011, 2016), it would have been adaptive for ancestral females to prefer a partner who was a good provider. Supporting this hypothesis are the data that men cater to these female preferences: men lie about their finances (29 percent) and career success (32 percent).

These above data support extensive research that heterosexual men are predisposed to seek female partners who can bear them healthy offspring and heterosexual women are predisposed to seek male partners who can help to provide for these offspring—adaptive preferences that most likely evolved in the EEA.

The top three physical attributes that singles notice first in a potential partner are their teeth (76 percent), their grammar (83 percent), and their self-confidence (78 percent). ↳ These may be yet more evolved physical preferences because one's teeth signal good health and age, one's grammar advertises their background and level of education, and one's self-confidence indicates their psychological stability and perhaps also their social status. All are reliable indicators of reproductive quality that may have evolved.

Relationship Transparency as an Evolved Mechanism in Mate Choice

Today's display choosers seek psychological transparency in a potential partner: 77 percent of women and 53 percent of men would not date someone who is secretive with their texts; 69 percent of women and 47 percent of men would not date someone who answered their cell phone calls discreetly; and 74 percent of women and 48 percent men would not date someone who wouldn't let them use their cell phone. These large sex differences suggest that women are considerably more concerned about transparency than men, perhaps because women generally play a larger role in hands-on parenting and have thus evolved a somewhat greater predisposition to focus their courtship energy on more stable relationships. These sex differences also suggest that men are more likely to seek a short-term mating opportunity in which transparency is less important.

Some 60 percent of singles think it is rude to text during a date; and 43 percent of singles are turned off by someone who hides information from them on social media. Singles also regard it as rude (while on a date) to take one's phone to the bathroom or outside the venue or to answer their phone secretly and without explanation. Moreover, more than 90 percent of singles (including gays and lesbians) also seek a partner whom they can trust and confide in (98 percent), and 56 percent worry about whether they are assessing a potential partner accurately.

This preference for relationship transparency could have evolved because transparency generally signals commitment. And greater partnership commitment is correlated with more offspring (Sorokowski et al., 2017) and less divorce (Cherlin, 2010), phenomena associated with higher long-term reproductive success.

Laughter and Humor as Evolved Mechanisms of Mate Choice

Some 96 percent of today's display choosers prefer a partner who makes them laugh, most likely also for evolved adaptive reasons. Laughter upregulates the dopamine system to generate optimism, energy, focus, and motivation. Laughter also boosts the immune system and the endorphins (associated with painrelief), elevates heart rate and blood circulation, builds muscle tone, reduces inflammation after injury, and stimulates brain growth. Moreover, laughter can diffuse arguments to alleviate relationship tension, as well as entertain in stressful situations. All these biobehavioral payoffs of laughter are likely to contribute to general health and longevity—important contributions to reproductive potential, parental competence, and overall survival, thus likely to have evolved in the EEA.

Interestingly, 85 percent of singles are particularly attracted to wit, as opposed to puns (60 percent), sarcasm (50 percent), dry humor (49 percent), sexual innuendos (39 percent), political humor (38 percent), self-deprecating humor (33 percent), offensive humor (17 percent), or bathroom jokes (6 percent). Wit may

be a preferred trait because puns are unexpected linguistic juxtapositions which aren't funny to everyone, sarcasm and offensive humor can be taken as rude, dry humor can be hard to understand, sexual innuendos can appear sexually threatening or signal a short-term mating strategy, political humor can offend one's values, and self-deprecating humor can be mistaken for weakness. Moreover, wit is associated with creativity. And creativity has been linked with intelligence, energy, and resilience—traits that are likely to be adaptive for rearing young. Hence the preferences for laughter and wit are likely to have evolved in the EEA.

There is a gender difference in wit producers, however. When singles in the SIA data set were asked, "Have you ever fallen in love with someone because of their sense of humor?" 57 percent of women said "yes," as opposed to 40 percent of men. Thus, a man's sense of humor plays a larger role in female mate preference. So it is not surprising that men believe it is more important to be humorous than do women (men, 79 percent; women, 50 percent). Today male display producers with a sense of humor have an advantage in the mating market; hence sense of humor may have evolved as an adaptive courtship strategy.

Lying as an Adaptive Trait That Evolved via Mate Choice

Three forms of lying, known as "impression management," may have evolved in the EEA because each appears to have adaptive value today.

Women (consciously or unconsciously) lie about their weight (17 percent W vs. 10 percent M), most likely because overweight women have more problems with fertility. They are more likely to have trouble conceiving, to have a miscarriage, and to have chronic diseases. Hence in the EEA, it would have been adaptive for men to prefer women of normal weight, selecting for an evolved female strategy to lie when not of optimal weight. Men lie about their finances (29 percent) and their job (32 percent). These male mating strategies must have had mate value in the EEA because ancestral females most likely sought males who could help provide for their young, another predisposition that could have emerged with the evolution of serial social monogamy by 4.4 million years BP (Fisher, 1992, 2011, 2016).

Both sexes lie about orgasm: 37 percent of men have faked or pretended an orgasm and 41 percent of these men faked orgasm to show their partner that they loved them, whereas 72 percent of women have faked or pretended orgasm, and 39 percent also said they faked it to show their partner that they loved them. Faking orgasm is not taught by parents, friends, colleagues, books, or school systems. Instead, faking orgasm appears to be a courtship tactic—an adaptive courtship strategy that could have evolved among display producers of both sexes in the EEA to trigger and/or sustain a mating partnership.

The Role of Uncommitted Sex in Mate Choice

Some 63 percent of single men and 83 percent of single women would prefer a traditional romantic relationship to an uncommitted sexual event; 32 percent of singles agree that you have to be in love to have great sex (M = 28 percent, W = 36 percent), and 84 percent say sex is better when you're in love. Nevertheless, 77 percent of singles approve of premarital sex, 52 percent have had a one-night stand (58 percent men; 45 percent women), and 55 percent have had a friends-with-benefits relationship.

Because casual, uncommitted sex can lead to disease, unwanted pregnancy, and/or social ostracism, it is parsimonious to suggest that singles engage in uncommitted sex because they accrue some reproductive payoffs from it. They do. Our SIA data indicate that 35 percent of singles have had a one-night stand turn into a long-term partnership, and 45 percent have had a friends-with-benefits relationship turn into a committed relationship. Other research supports this finding, reporting that 50 percent of women and 52 percent of men have had casual sex turn into a committed partnership (Garcia & Reiber, 2008). Interestingly, men were three times more likely than women to say that a one-night stand is useful because it can lead to a relationship; men were also two times more likely to say that they have one-night stands to find a long-term partner.

This tendency to engage in uncommitted sex may have evolved. With uncommitted sex, the *display producer* is able to signal that they can attend to their partner's sexual needs, and uncommitted sex enables the display chooser to assess the physical and mental health of the display producer. In fact, 28 percent of

millennials report that they have uncommitted sex to see if they love someone. Today, singles appear to use uncommitted sex as a form of interview as they assess potential mating and parenting partners.

Some 33 percent of single men and 32 percent of single women have also sent a sexy photo to a potential partner, and 58 percent of men and 41 percent of women have received one—despite the fact that 75 percent of singles believe that "sexting" can jeopardize their reputation and 72 percent believe it can hurt their career. Sending sexy photos, despite the consequences, suggests that display producers regard "sexting" as a selling strategy, and display choosers use these photos to assess the physical attributes of these display producers. Sexy photos were not available in the EEA. But our forebears may have advertised their bodies through dance and athletic competitions instead, selecting for the impetus of today's display producers to send sexy photos and display choosers to assess the qualities of these display producers via these displays. Both propensities are likely evolutionary strategies associated with mate choice.

Age and Mate Choice

Our SIA data suggest that single women approaching menopause alter their behavior, becoming less likely to establish relationship exclusivity prior to sexual activity with a new partner. Moreover, after the typical age of menopausal onset, women return to former (elevated) levels of commitment choosiness. Men exhibit similar, though attenuated, ↳ changes in midlife (Cohen et al., 2019). These changes in mating strategies would have been adaptive in the EEA.

With advancing age, display choosers alter their mating strategies in other ways as well (Fisher, 2016). When singles were asked, "How likely are you to make a committed relationship with someone who offers everything you are looking for in a relationship but with whom you are not in love?" the older one gets, the more discriminating they become: Of those ages twenty to twenty-nine and thirty to thirty-nine, 30 percent were "very likely" or "somewhat likely" to make a commitment even when not in love. But after reproductive years are largely over, singles become less and less likely to make a commitment without being in love (ages forty to forty-nine: 27 percent; ages fifty to fifty-nine: 26 percent; ages sixty +: 23 percent). The older one gets, the less likely they are to compromise and make a commitment to someone with whom they are not in love.

The same trend emerged when singles were asked, "How likely are you to make a committed relationship with someone who offers everything you are looking for in a relationship, but whom you don't find sexually attractive?" Of those ages twenty to twenty-nine, 31 percent were "very likely" or "somewhat likely" to make this compromise; and among those ages thirty to thirty-nine, 28 percent were "very likely" or "somewhat likely." But after reproductive years are largely over, singles become less and less likely to make a commitment to someone without sexual attraction (forty to forty-nine: 22 percent; fifty to fifty-nine: 23 percent).

Perhaps those of reproductive age are the most likely to compromise because the young are obliged to choose a partner with whom they can reproduce. The predisposition to compromise *during reproductive years* may be another aspect of mate choice that evolved in the EEA (Fisher, 2016).

Deal-Breakers in Mate Choice

Mate preference research has largely focused on traits people desire in partners (deal-makers) rather than the traits they avoid (deal-breakers) (Jonason et al., 2015). Nevertheless, today's display choosers have traits they choose to avoid.

When display choosers in our SIA samples considered a committed relationship (Jonason et al., 2015), their top deal-breakers included disheveled or unclean appearance (67 percent); laziness (66 percent); being too emotionally needy (63 percent); lacking a sense of humor (54 percent); living more than three hours away (49 percent); bad sex (47 percent); lacking self-confidence (40 percent); watching too much TV or playing too many video games (33 percent); having low sex drive (33 percent); talking too much (23 percent); and airing emotional drama in social media posts (61 percent). Almost all of the above deal-breaker traits are associated with either mental instability or lack of sincere interest in the partnership. So the disposition to avoid these traits may have evolved in the EEA as more adaptive mechanisms.

Another case of mating aversion in the modern digital world involves sex with a robot. Although 31 percent of men and 15 percent of women would have sex with a robot, nearly half of singles would consider it cheating if their partner had sex with a robot (39 percent of men; 56 percent of women). Perhaps this sex difference stems from the fact that men can't be cuckolded if a female partner has sex with a robot; while male sex with a robot may threaten a woman with the potential withdrawal of her mate's attention and emotional support, both likely to be critical to the parenting of her young in the EEA. Regardless, display choosers of both sexes appear to dislike anything they associate with adultery, a likely predisposition that evolved in prehistory because relationship infidelity can lead to genetic cuckoldry for males and a loss of protection and provisioning for females—destabilizing the pair-bond and leading to reproductive failure.

Today's display producers also believe that signals of poor health and mental, financial, and career instability are deal-breakers in the mating market, so they strive to be prepared. Some 40 percent feel they need self-acceptance (a signal of mental stability) before they pursue a relationship; 23 percent feel they need to reach a certain point in their career; 20 percent feel they need to reach a certain income level; 29 percent say their financial situation is a barrier to pursuing love; 16 percent say they must first pay off debt; and 28 percent feel they must first lose weight. Singles appear to believe that these issues jeopardize their viability in the mating market.

Altering Patterns of Mate Choice in the Digital Age

The current proliferation of digitally mediated introducing platforms also affects mate choice. In the SIA data set, 40 percent of American singles met their last first date on the internet, whereas only 25 percent met through a friend and 6 percent met in a bar/restaurant. Moreover, some 51 percent of singles research a date on Facebook, and 34 percent use Google to investigate a potential partner. On these venues, one cannot touch, see, smell, or contextualize a potential mating partner. So alternative cues to health, interests, and personality are becoming more important in triggering mate preference, particularly those traits most visible in a photograph (Fisher & Garcia, 2019).

One's written descriptions of themselves on dating sites/apps are also becoming important. With no knowledge of a potential partner's background, family, or social networks, today 57 percent of single men and 61 percent of single women report that they carefully evaluate a profile, and only 30 percent report that they swipe quickly through these profiles.

An evolutionary strategy of female display choosers is also emerging. Today, 75 percent of men say they would be comfortable if a woman was the first to say hello on a dating app/site, yet only 19 percent of women regularly take this lead; 90 percent of men are happy to have a woman ask them for their phone number, yet only 14 percent of women often do; 90 percent of men would be happy if a woman initiated the first kiss, yet only 15 percent of women often do; 84 percent would be pleased if a woman initiates sex for ↵
the first time, yet only 12 percent do; and 68 percent of men in every major ethnic group would be "very comfortable" or "somewhat comfortable" if a female partner proposed marriage.

Perhaps women's wish to remain the display choosers is driven by evolutionary requirements. Women expend more metabolic energy and time in reproduction—due to months of pregnancy, the energy expenditure and danger of parturition, and women's primary role in infant care cross-culturally. So it is to women's reproductive advantage to remain the primary display choosers, thus able to assess potential partners and select those of greater mate value.

The 2020 coronavirus pandemic is also altering patterns of mate choice, due to the rise of video chatting (Fisher, 2020). Prior to the US pandemic beginning in February/early March 2020, only 6 percent of Match.com members used video chatting *before* meeting in person, but by mid-March, 69 percent of singles in our SIA sample were open to video chatting before meeting on a first date, and by August, 19 percent had engaged in video chatting. In our 2021 SIA study, 27% of singles had used video chatting; and 51 percent of Gen Z and 46% of Millennials has used video chatting prior to meeting in person.

This new stage in the courtship process is enabling display producers to advertise more details of their mate value (including showing their home, pets, companions, and the trappings of their lifestyle and interests) before meeting. Video chatting is also enabling display choosers to assess these accoutrements before meeting in person. In fact, as of August 2020, 68 percent had used video to vet a potential partner, 56 percent had felt some romantic chemistry during a video chat, and 50 percent had fallen in love.

The Fluctuating Frequency of Mate Choice

The primary human reproductive strategy in almost every society on record is pair-bonding, a reproductive strategy that could have evolved some 4.4 million years BP (Fisher, 1992, 2004, 2011; Gray & Garcia, 2013; Fisher, 2016) to ensure the survival of highly altricial young that required many years of parenting. Thus, across prehistory (and today), people of reproductive age have been obliged to invest considerable time, metabolic energy, and resources to assess and choose effective *long-term* parenting partners. Moreover, due to the cross-cultural high divorce rate (Fisher, 1992, 2016), many men and women are obliged to return to the mating market and renew the process of mate choice periodically throughout the life course. Adultery is common cross-culturally as well (Fisher, 1992; Tsapelas et al., 2010; Fisher, 2016), also predisposing men and women to engage in mate assessment and mate choice periodically across their lives—sustaining high levels of mate choice.

However, countering this evolutionary trend toward lifelong courtship display and mate choice is an emerging social trend known as "slow love" (Fisher, 2016; Fisher & Garcia, 2019). Men and women are now marrying (on average) in their late twenties rather than in their early twenties. And data on eighty societies collected between 1947 ↳ and 2011 by the Demographic Yearbooks of the United Nations, as well as several ethnographic studies, indicate that the later you marry, the more likely you are to remain married (Fisher, 1992, 2016).

Supporting these data, a study of more than three thousand married Americans indicates that couples who dated for one to two years (compared to those who dated less than a year prior to wedding) were 20 percent less likely to get a divorce, and couples who dated for three years or longer were 39 percent less likely to part (Francis-Tan & Mialon, 2015). So, to some degree, the extension of the precommitment stage of courtship and subsequent later marriage may reduce the frequency of lifelong courtship display and mate choice.

Conclusion

Fisher has proposed that the neural system associated with feelings of intense romantic love evolved in tandem with human mate choice to provide the focus, motivation, and energy to pursue preferred mating partners. This brain system provides only general motivation, however. Specific mate preferences appear to be guided (in part) by a different set of neural systems: the dopamine, serotonin, testosterone, and estrogen systems.

A literature review indicates that each of these four neural systems is associated with a distinct *constellation* of related biobehavioral traits. So the *Fisher Temperament Inventory* was constructed to measure the degree to which participants express the traits associated with each of these four primary brain systems. This personality measure was administered to fifteen million + single men and women in forty countries and validated in a population of 39,913 Americans using factor analyses, an Eigen-value analysis, two neuroimaging (fMRI) studies, and correlations with a standard personality measure, the Big Five. Then, using a population of 28,128 single Americans, it was established that those who primarily express the traits in each of these four basic brain systems expressed initial romantic attraction in specific patterns.

Those individuals particularly expressive of the traits associated with the dopamine system, including risk taking, novelty seeking, curiosity, creativity, and mental flexibility tend to initially gravitate to individuals who share these traits. Those individuals primarily expressive of the traits biologically linked with the serotonin system in the brain, including conventionality, harm avoidance, concrete thinking, and adherence to rules and schedules, also disproportionally express an initial attraction to those with similar traits. Those individuals particularly expressive of several traits in the testosterone system, including assertiveness, tough-mindedness, skepticism, fairness and mathematical/spatial aptitudes, initially gravitate to those expressive of the traits linked with the estrogen system. And those individuals primarily expressive of several traits in the estrogen system, including contextual thinking, linguistic skills, and prosocial skills including empathy and nurturing, are disproportionately initially attracted to those expressive of traits in the testosterone system.

Fisher has proposed that these biologically based patterns of mate choice may have served different adaptive purposes in the EEA: (1) the high-testosterone/high-estrogen partnerships may have served to pool *complementary* traits useful for parenting; (2) high-serotonin partners may have benefited from their

shared parenting traits; and (3) high-dopamine partners (who express several destabilizing traits) may have disproportionately practiced *serial* pair-bonding in the EEA, thereby producing more genetic variety in their lineages.

A host of psychological traits also play a role in mate choice. To further this research, we used a sample of 55,000 single adult Americans to explore current trends in mate choice, specifically those preferences that are likely to have evolved in the EEA via mate choice.

We found that men are considerably more likely than women to seek a female partner who is good-looking and has a slender body, while women are considerably more likely than men to prefer a financially stable male partner. The top three physical attributes that single men and women notice first in a potential partner are their teeth, their grammar, and their self-confidence—traits respectively likely to express one's health and age, one's background and level of education, and one's self-confidence and thus psychological stability. Today's singles also prefer partners who express relationship transparency. They gravitate to humorous individuals. Courting women lie about their weight, courting men lie about their financial stability, and both sexes fake orgasm to please their partner. Last, middle-aged singles change their courtship strategies to secure a preferred partner. All these courtship strategies are likely to be adaptive mechanisms that evolved via mate choice in the EEA.

Today's display choosers also have a host of traits they do *not* prefer in a mate. These deal-breakers include disheveled or unclean appearance; being too emotionally needy; lacking self-confidence; watching too much TV or playing too many video games; airing emotional drama in social media posts; lacking a sense of humor; engaging in sex with a robot; and bad sex. These are more courtship strategies likely to be adaptive preferences that evolved in the EEA.

Due to the human inclination for serial monogamy (divorce, repartnering/remarriage) and extra-pair copulation (adultery), many men and women return to the mating market periodically across their lives. Nevertheless, countering these predispositions, men and women in industrialized societies are currently marrying later—regularly in their late twenties rather than in their early twenties. And cross-culturally, the longer one courts and the later one marries, the more likely they are to remain married. This current trend, "slow love," is likely to reduce the incidence of mate choice across the life course, potentially contributing to a few decades of relative family stability.

References

Acevedo, B., Aron, A., Fisher, H. E., & Brown, L. L. (2011). Neural correlates of long-term intense romantic love. *Social Cognitive and Affective Neuroscience,* 7(2), 145–159. https://doi.org/10.1093/scan/nsq092
Google Scholar   WorldCat

p. 794   Acevedo, B., Aron, A., Fisher, H. E., & Brown, L. L. (2012). Neural correlates of marital satisfaction and well-being: Reward, empathy, and affect. *Clinical Neuropsychiatry,* 9(1), 20–31.
Google Scholar   WorldCat

Andersson, M. (1994). *Sexual selection.* Princeton University Press.
Google Scholar   Google Preview   WorldCat   COPAC

Aron, A., Fisher, H. E., Mashek, D. J., Strong, G., Li, H. F., & Brown, L. L. (2005). Reward, motivation and emotion systems associated with early-stage intense romantic love: An fMRI study. *Journal of Neurophysiology*, *94*, 327–337.
Google Scholar   WorldCat

Bartels, A., & Zeki, S. (2000). The neural basis of romantic love. *NeuroReport,* 11, 3829–3834.
Google Scholar   WorldCat

Brown, L. L., Acevedo, B. P., & Fisher, H. E. (2013). Neural correlates of four broad temperament dimensions: Testing predictions for a novel construct of personality. *PLoS ONE,* 8(11), Article e76734.
Google Scholar   WorldCat

Buss, D. M. (1988). Love acts: The evolutionary biology of love. In R. J. Sternberg & M. L. Barnes (Eds.), *The psychology of love* (pp. 100–118). Yale University Press.
Google Scholar   Google Preview   WorldCat   COPAC

Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences,* 12(1), 1–14.
Google Scholar   WorldCat

Cherlin, A. J. (2010). Demographic trends in the United States: A review of research in the 2000s. *Journal of Marriage and Family*, *72*, 403–419.
Google Scholar   WorldCat

Claxton, A., O'Rourke, N., Smith, J. Z., & DeLongis, A. (2012). Personality traits and marital satisfaction within enduring relationships: An intra-couple discrepancy approach. *Journal of Social and Personal Relationships,* 29(3), 375–396. https://doi.org/10.1177/0265407511431183
Google Scholar   WorldCat

Charania, M. R. (2007). *Personality influences on marital satisfaction: an examination of actor, partner, and interaction effects* [Unpublished doctoral dissertation]. University of Texas at Arlington.
Google Scholar   Google Preview   WorldCat   COPAC

Cohen, S., Todd, P. M., Garcia, J. R., & Fisher, H. E. (2019). Singles of both sexes expedite reproduction: Shifts in sexual timing strategies before and after typical age of female menopause. *Evolution and Human Behavior,* 2019, 557–569.
Google Scholar   WorldCat

Darwin, C. (1871). *The descent of man and selection in relation to sex*. Modern Library.
Google Scholar   Google Preview   WorldCat   COPAC

Donnellan, M. B., Conger, R. D., & Bryant, C. M. (2004). The Big Five and enduring marriages. *Journal of Research in Personality,* 38(5), 481–504.
Google Scholar   WorldCat

Feinberg, D. R., Jones, B. C., Law Smith, M. J., Moore, F. R., DeBruine, L. M., Cornwell, R. E., Hillier, S. G., & Perrett, D. I. (2005). Menstrual cycle, trait estrogen level and masculinity preference in the human voice. *Hormones and Behavior*, *49*, 215–222.
Google Scholar   WorldCat

Feingold, A. (1992). Gender differences in mate selection preference: A test of the parental investment model. *Psychological Bulletin,* 112, 125–139.
Google Scholar   WorldCat

Fisher, H. E. (1992). *Anatomy of love*. W. W. Norton.
Google Scholar   Google Preview   WorldCat   COPAC

Fisher, H. E. (1998). Lust, attraction, and attachment in mammalian reproduction. *Human Nature,* 9(1), 23–52.
Google Scholar   WorldCat

Fisher, H. E. (2004). *Why we love: The nature and chemistry of romantic love*. Henry Holt.
Google Scholar   Google Preview   WorldCat   COPAC

Fisher, H. E. (2006). The drive to love: The neural mechanism for mate selection. In J. R. Sternberg & K. Weis (Eds.), *The new psychology of love* (2nd ed., pp. 87–115). Yale University Press.
Google Scholar   Google Preview   WorldCat   COPAC

Fisher, H. E. (2009). *Why him? Why her?* Henry Holt.
Google Scholar   Google Preview   WorldCat   COPAC

Fisher, H. E. (2011). Serial monogamy and clandestine adultery: Evolution and consequences of the dual human reproductive strategy. In S. C. Roberts (Ed.), *Applied evolutionary psychology* (pp. 96–111). Oxford University Press.
Google Scholar   Google Preview   WorldCat   COPAC

Fisher, H. E. (2012). "We have chemistry!" The role of four primary temperament dimensions in mate choice and partner compatibility. *The Psychotherapist*, *52*, 8–9.
Google Scholar   WorldCat

Fisher, H. E. (2016). *Anatomy of love: The natural history of monogamy, adultery, and divorce* (2nd ed.). W. W. Norton.
Google Scholar   Google Preview   WorldCat   COPAC

Fisher, H. E. (2020, May 7). How Coronavirus is changing the dating game for the better. *The New York Times*.
WorldCat

Fisher, H. E., Aron, A., & Brown, L. L. (2005). Romantic love: An fMRI study of the neural mechanism for mate choice. *Journal of Comparative Neurology,* 493(1), 58–62.
Google Scholar   WorldCat

Fisher, H. E., Aron, A., & Brown, L. L. (2006). Romantic love: A mammalian brain system for mate choice. *Philosophical Transactions of the Royal Society: Biological Sciences,* 361, 2173–2186.
Google Scholar   WorldCat

Fisher, H. E., Aron, A., Mashek, D., Strong, G., Li, H., & Brown, L. L. (2003, November 11). *Early stage intense romantic love activates cortical-basal-ganglia reward/ motivation, emotion and attention systems: An fMRI study of a dynamic network that varies with relationship length, passion intensity and gender* [Poster presentation]. Annual meeting of the Society for Neuroscience, New Orleans, LA.

Fisher, H. E., & Garcia, J. R. (2019). Slow love: Courtship in the digital age. In R. J. Sternberg & K. Sternberg (Eds.), *The new psychology of love* (2nd ed., pp. 208–222). Cambridge University Press.
Google Scholar   Google Preview   WorldCat   COPAC

p. 795   Fisher, H. E., Island, H. D., Rich, J., Marchalik, D., & Brown, L. L. (2015). Four broad temperament dimensions: Description, convergent validation correlations, and comparison with the Big Five. *Frontiers in Psychology: Personality and Social Psychology,* 6, 1098.
Google Scholar   WorldCat

Fletcher, G. J. O., Simpson, J. A., Campbell, L., & Overall, N. C. (2015). Pair-bonding, romantic love, and evolution: The curious case of *Homo sapiens*. *Perspectives on Psychological Science*, *10*(1), 20–36.

Francis-Tan, A., & Mialon, H. M. (2015). "A diamond is forever" and other fairy tales: The relationship between wedding expenses and marriage duration. *Economic Inquiry,* 53(4), 1919-1930.
Google Scholar   WorldCat

Frank, R. H. (1988). *Passions within reason: The strategic role of the emotions*. W. W. Norton.
Google Scholar   Google Preview   WorldCat   COPAC

Frascella, J., Potenza, M. N., Brown, L. L., & Childress, A. R. (2010). Shared brain vulnerabilities open the way for nonsubstance

addictions. Carving addiction at a new joint? *Annals of the New York Academy of Sciences*, *1187*, 294–315.
Google Scholar   WorldCat

Gallup, G. G., & Frederick, D. A. (2010). The science of sex appeal: An evolutionary perspective. *Review of General Psychology*, *14*, 240–250.
Google Scholar   WorldCat

Ganzaga, G. C., Turner, R. A., Keltner, D., Campos, B., & Altemus, M. (2006). Romantic love and sexual desire in close relationships. *Emotion,* 6, 163–179.
Google Scholar   WorldCat

Garcia, J. C., & Reiber, C. (2008). Hook-up-behavior: A biopsychosocial perspective. *Journal of Social, Evolutionary and Cultural Psychology*, *2*, 192–208.
Google Scholar   WorldCat

Gray, P. B., & Garcia, J. R. (2013). *Evolution and human sexual behavior*. Harvard University Press.
Google Scholar   Google Preview   WorldCat   COPAC

Gyuris, P., Jarai, R., & Bereczkei, T. (2010). The effect of childhood experiences on mate choice in personality traits: Homogamy and sexual imprinting. *Personality and Individual Differences*, *49*(5), 467–472.
Google Scholar   WorldCat

Havlíček, J., & Roberts, S. C. (2009). MHC-correlated mate choice in humans: A review. *Psychoneuroendocrinology,* 34(4), 497–512.
Google Scholar   WorldCat

Little, A. C., Burt, D. M., & Perrett, D. I. (2006). Assortative mating for perceived facial personality traits. *Personality and Individual Differences,* 40, 973–984.
Google Scholar   WorldCat

Jonason, P. K., Garcia, J. R., Webster, G. D., Li, N. P., & Fisher, H. E. (2015). Relationship deal-breakers: Traits people avoid in potential mates. *Personality and Social Psychology Bulletin*, *41*(12), 1697–1711.
Google Scholar   WorldCat

Jones, D. (1995). Sexual selection, physical attractiveness and facial neoteny: Cross-cultural evidence and implications. *Current Anthropology,* 36, 723–748.
Google Scholar   WorldCat

Miller, G. F. (2000). *The mating mind: How sexual choice shaped the evolution of human nature*. Doubleday.
Google Scholar   Google Preview   WorldCat   COPAC

Miller, G. F., & Todd, P. (1998). Mate choice turns cognitive. *Trends in Cognitive Science,* 2(5), 190–198.
Google Scholar   WorldCat

Ortigue, S., Bianchi-Demicheli, F., Hamilton, A. F., & Grafton, S. T. (2007). The neural basis of love as a subliminal prime: An event-related functional magnetic resonance imaging study. *Journal of Cognitive Neuroscience,* 19, 1218–1230.
Google Scholar   WorldCat

Singles in America. [Unpublished data set]. Match.com, at Kinsey Institute for Research in Sex, Gender and Reproduction.
Google Scholar   Google Preview   WorldCat   COPAC

Sorokowski, P., Sorokowska, A., Butovskaya, M., Karwowski, M., Groyecka, A., Wojciszke, B., & Pawłowski, B. (2017). Love influences reproductive success in humans. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2017.01922
Google Scholar   WorldCat

Tsapelas, I., Fisher, H. E., & Aron, A. (2010). Infidelity: Who, when, why. In W. R. Cupach & B. H. Spitzberg (Eds.), *The dark side of close relationships II* (pp. 175–196). Routledge.
Google Scholar   Google Preview   WorldCat   COPAC

Watson, D., & Humrichouse, J. (2006). Personality development in emerging adulthood: Integrating evidence from self-ratings and spouse ratings. *Journal of Personality and Social Psychology,* 91(5), 959–974.
Google Scholar   WorldCat

Zahavi, A., & Zahavi, A. (1997). *The handicap principle: A missing piece of Darwin's puzzle*. Oxford University Press.

Google Scholar   Google Preview   WorldCat   COPAC

Zuckerman, M. (1994). *Behavioral expression and biosocial basis of sensation seeking*. Cambridge University Press.

Google Scholar   Google Preview   WorldCat   COPAC