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Changes in Women's Mate Preferences Across the Ovulatory Cycle

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Previous research has shown that women's mate preferences change across the ovulatory cycle in a number of ways. The leading explanation for these changes—the good genes hypothesis—predicts that women should prefer presumed markers of genetic benefits ("good genes") most strongly when they are fertile and evaluating men as possible short-term mates. Research testing this hypothesis has almost exclusively examined preferences for purported markers of good genes. Little is known about how preferences for men who display traits valued in long-term, investing mates (e.g., warmth and faithfulness) change across the cycle. The authors had women at different points in their ovulatory cycle rate videotapes of men in terms of how attractive they found each man as a short-term and long-term mate. The authors then examined how women's preferences for traits typically valued in long-term and/or short-term mates varied according to women's fertility status. The results supported the good genes hypothesis. Implications of these findings for models of human mating are discussed.

Keywords: evolutionary psychology, mate preferences, ovulation, sexual selection

Recent research has indicated that women's mate preferences are not constant across the ovulatory cycle. The characteristics of men that normally cycling women find attractive when they are most fertile (just prior to ovulation) differ from those they find attractive when they are not. Several converging lines of evidence support this claim. During fertile relative to infertile days of their cycles women (a) particularly prefer the scent of men who have higher developmental stability (measured by fluctuating asymmetry) and are more socially dominant (Gangestad & Thornhill, 1998; Havlicek, Roberts, & Flegr, 2005; Rikowski & Grammer, 1999; Thornhill & Gangestad, 1999; Thornhill et al., 2003), (b) prefer more masculine male faces (Johnston, Hagel, Franklin, Fink, & Grammer, 2001; Penton-Voak & Perrett, 2000; Penton-Voak et al., 1999), (c) find men who display greater social presence and dominance more attractive (Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004), (d) prefer deeper male voices (Puts, 2005), and (e) prefer creativity over wealth (Haselton & Miller, 2006). These shifts in preferences for select male traits tend to be found *only* when ovulating women evaluate men as potential short-term partners. Previous research has not found that women's evaluations of men as long-term stable partners also systematically shift across the reproductive cycle (Gangestad et al., 2004; Haselton & Miller, 2006; Penton-Voak et al., 1999; Puts, 2005).

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Good Genes Sexual Selection Theory

The theory that initially led researchers to test for patterned changes in women's preferences for certain male characteristics across the reproductive cycle is good genes sexual selection theory. In natural populations, variation in heritable fitness (i.e., variation in genetic factors passed from parents to offspring that had different effects on the reproductive success of offspring) accumulates for several reasons. By chance, some individuals have more mutations than others, resulting in differences in fitness. In addition, some genes are not subjected to consistent selection pressures across time. Cell-surface markers and proteins in many organisms, for instance, are subject to selection by pathogens, but some markers and proteins coded by DNA are better able to resist local pathogens than others. Pathogens, however, also evolve in response to these markers and proteins, which permits changes across time in the precise genes that are favored in host populations. These changes generate variation in the ability to resist pathogens at any given point in time (Hamilton, 1980) across host individuals.

When individuals differ in their heritable fitness, people who mate with those who have greater heritable fitness should accrue a fitness advantage over those who do not. The primary reason for this is that the offspring of mates who have higher fitness should benefit reproductively from these good genes. As a result, selection should favor individuals who prefer to mate with those who possess attributes that are likely to signal heritable fitness. Because individuals cannot directly read the fitness effects of potential mates' genes, however, preferences for individuals with good genes must be based on traits or attributes that correlate with heritable fitness, known as good genes indicators. Evolutionary biologists have shown that "honest" indicators of good genes that

evolve through intersexual selection (i.e., the differential reproduction in one sex owing to mate preferences of the other sex) tend to be traits or attributes that individuals who lack heritable fitness cannot effectively cheat (e.g., Houle & Kondrashov, 2002; Kokko, Brooks, Jennions, & Morley, 2003). In other words, despite the reproductive benefits that such indicators could confer, individuals who lack heritable fitness would pay steep reproductive costs if they had these indicators in terms of reduced survival that would more than offset any potential benefits. The classic prototype of a sexually selected feature—the peacock's tail—appears to be one such indicator (Petrie, 1994).

There are good reasons to believe that considerable variation in heritable fitness existed in ancestral human populations (Burt, 1995). If so, good genes indicators and accompanying preferences for them could have been shaped by selection pressures. Masculinized male features, which develop in response to high levels of testosterone, are believed to be one possible indicator of good genes in men (Thornhill & Gangestad, 1993). Testosterone, which purportedly modulates the utilization of energy, may shift energy into traits associated with "mating effort" in males, that is, into traits or behaviors that enhance male–male competitiveness and mate seeking (Ellison, 2001). These characteristics include muscularity, physical strength, and perhaps motivational and other psychological traits that promote status seeking and mate seeking. These characteristics cannot be developed, maintained, and displayed without detracting from energy utilization in other important domains, such as body repair and immunocompetence.

Indeed, during adolescence, greater testosterone masculinizes facial features, which serve as a marker of testosterone levels in adolescents (Swaddle & Reierson, 2002). Androgen metabolism may also be evident in cues in body scent (Grammer, 1993), voice qualities (Dabbs & Mallinger, 1999), and behavioral displays toward other men (Ellison, 2001). Thus, ancestral men who had lower heritable fitness may not have profited from high levels of investment in mating effort during years of intense male–male competition when men typically enter the mating market because of costs associated with lower immunocompetence and compromised body repair (Daly & Wilson, 1988).[1]

Paternal Investment

For species (such as humans) in which females mate with males in both long-term mateships and short-term sexual encounters, female mate preferences may differ systematically across these mating contexts. A male's relative value as a long-term mate should depend both on his ability and willingness to provide paternal care *and* on his heritable fitness. Because of this, females should prefer indicators of both types of characteristics, depending on the particular mating context (Gangestad & Simpson, 2000). In most contexts, a male's value as a short-term mate should be tied more directly to evidence of his heritable fitness, with indicators of heritable fitness being weighted more heavily in short-term than in long-term mating contexts. This is true in some species of birds (e.g., collared flycatchers; Qvarnström, 1999). Carefully conducted studies have confirmed that short-term mating with male flycatchers who display honest heritable fitness cues results in genetic benefits to offspring. Because female flycatchers do not expect to receive paternal care in short-term mating situations, they focus most heavily on indicators of good genes in potential mates.

Similarly to many bird species, in human evolution paternal investment has probably also played a critical role (Geary, 2000; Kaplan, Hill, Lancaster, & Hurtado, 2000; Marlowe, 2001). Cross-cultural research has shown that women prefer men as long-term mates partly for their ability and willingness to provide investment and paternal care (Buss, 1989). Several theorists (e.g., Buss & Schmitt, 1993; Gangestad & Simpson, 2000; Trivers, 1972), however, have proposed that ancestral women evolved to engage in "mixed" mating strategies in which long-term and/or short-term mateships were pursued in appropriate social contexts to enhance reproductive fitness. Indeed, several investigators (e.g., Buss & Schmitt, 1993; Li & Kenrick, 2006; Little, Jones, Penton-Voak, Burt, & Perrett, 2002; Regan, 1998) have demonstrated that women's mate preferences systematically differ in long-term versus short-term mating contexts. In many cultures, for example, women place relatively greater emphasis on the physical attractiveness and muscularity of men when evaluating them as short-term mates and less weight on attributes that signal the quality of paternal care and investment (e.g., conscientiousness, loyalty, good parenting qualities) in short-term contexts (see Buss & Schmitt, 1993; Schmitt, 2005).

Ovulatory Cycle Effects

If women evolved to enact mixed mating strategies, occasionally engaging in short-term or extrapair sex to obtain heritable fitness benefits at the potential cost of losing their primary partner, selection may have shaped women's mate preferences to be contingent on their fertility status across the ovulatory cycle (Gangestad & Thornhill, 1998). When evaluating men as short-term mates, women in the fertile phase of their reproductive cycles should find male traits or characteristics that might honestly signal a man's heritable fitness more appealing. The logic underlying this prediction is that, because women cannot benefit from a short-term mate's heritable fitness when they cannot conceive, they should value indicators of heritable fitness less when genetic benefits cannot be gained (see Penton-Voak et al., 1999). When women evaluate long-term mates, however, shifts in these mate preferences should be small or absent. As discussed earlier, cycle shifts in preferences for purported indicators of male heritable fitness, as well as theoretically expected interactions with mating context, have been documented. Women tend to find these features most appealing when they evaluate potential short-term mates *and* they are ovulating in comparison to other contexts.

Despite the fact that over a dozen studies have found support for the good genes hypothesis, more work is needed to make a completely compelling case. Typically, researchers have sought to find convergent evidence for the hypothesis by examining how women's preferences for purported ancestral markers of good genes change across the cycle. Few studies have sought to provide

[1] We do not and need not assume that testosterone and related traits are associated with good genes or fitness in the modern world, in which survival risks and avenues to reproduction are in some ways very different from ancestral environments.

discriminant evidence by showing that preferences for some traits—most notably, those that would have been particularly valued in long-term, investing mates—do *not* similarly change across the cycle. Good genes models do not expect that preferences for traits ancestrally important for parenting, such as warmth, kindness, and faithfulness, to become more important across the cycle. These preferences are some of the most important documented in long-term mate choice (see Buss, 1989). Few studies, however, have tested ovulatory cycle shifts in preferences for these or related traits.

Three exceptions exist. In one important study, Haselton and Miller (2006) asked women to choose one of two hypothetical men as more attractive as a long-term and as a short-term mate. One man was described as creative and talented in his field but not financially successful. The other was described as wealthy but not highly talented. Fertile women particularly preferred talent over wealth in short-term mates. Because male traits were pitted against one another, however, this study did not show whether preferences for wealth do or do not change across the cycle. Rather, it showed that these preferences apparently change in ways different from preferences for talent. Moreover, it examined only one trait valued in long-term mates (wealth). Thornhill et al. (2003) found that women's preferences for the scent of men heterozygotic at major histocompatibility complex genes tend to be stronger during nonfertile periods than fertile periods (though this effect only neared significance). Major histocompatibility complex heterozygosity should be favored more in long-term mates than in short-term mates (see Thornhill et al., 2003). DeBruine, Jones, and Perrett (2005) found no systematic association between women's preference for self-resembling faces and conception risk. Women's progesterone levels predicted preference for self-resemblance, which the authors interpreted as evidence for a preference for kin when women are pregnant (progesterone is highest during the nonfertile luteal phase, but exceptionally high during pregnancy).

These studies indicate that not all preferences change across the cycle in ways similar to preferences for scents associated with symmetry, masculine faces, and socially dominant displays. Nonetheless, no research has systematically examined how preferences for traits particularly valued in long-term, investing mates, such as kindness, faithfulness, and good parenting, change across the cycle (see Buss, 1989).

Why might even traits valued in long-term, investing mates be more preferred when women are fertile? Ancestrally, individuals had competing demands on their time and effort (e.g., finding food, caring for young, maintaining alliances). To the extent that the relative importance of these tasks routinely changed, selection might have shaped women's allocation of effort and/or attention to these tasks to vary in response to factors that affected the relative importance of each task, especially as it related to their reproductive fitness. If so, selection might have favored an allocation strategy that motivated women to pay more attention in general to the reproductive task of selecting a good mate when they were fertile and less attention when they were not. Consistent with this idea, recent research has confirmed that women are actually least hungry when close to ovulation, despite the fact that they have greater caloric needs when they are ovulating (Fessler, 2003). Appetite motivates the search for food, which may be given lower priority at midcycle in favor of reproductive tasks. In essence, women's mate preferences for attractiveness in men might change across their cycles because fertile women should be more attuned to the general task of mate selection.

The Current Study

In the current study, we examined whether and how women's preferences for a broad range of traits perceived in men change across the ovulatory cycle. Normally ovulating women viewed videotapes of men who had been interviewed for a potential lunch date. The women rated the attractiveness of each man both as a long-term and a short-term mate. A different sample of women then rated each man's perceived traits and characteristics on 10 broad dimensions preferred in long-term and/or short-term mates: intelligence, warmth, degree of social respect, ability to be a good father, sexual faithfulness, capacity for financial success, physical attractiveness, muscularity, confrontativeness with other men, and arrogance (see Simpson & Gangestad, 1992).

Gangestad et al. (2004) used portions of this data to test for shifts in women's preferences for men's observer-coded displays of behavioral presence and intrasexual competitiveness. There are several critical differences between that study and the current one. First, whereas Gangestad et al. (2004) examined men's nonverbal displays, verbal content, and observers' impressions to test for preferences of specific behavioral displays, the current study focuses on completely new codes (and therefore new data) that test for mate preferences involving a much wider range of traits that could be valued in short-term *and/or* long-term mating contexts. Second, the current study also provides the first attempt to assess how important preferences for traits highly valued in investing partners, such as warmth, intelligence, ability to be a good father, and faithfulness, vary across the cycle. Gangestad et al. (2004) examined only two broad behavioral traits related to social presence and intrasexual competitiveness, both of which are largely unrelated to the key traits preferred in long-term partners. Because Gangestad et al. (2004) found some fertility effects for women's short-term mate preferences, however, we performed the analyses reported below twice, once controlling for the specific behavioral displays examined by Gangestad et al. (2004). The current results, therefore, are new and include effects that are statistically independent of those reported by Gangestad et al. (2004).

Based on actuarial estimates of women's fertility risk given both the day of their cycle when they made the ratings and the typical length of their cycle, we examined (a) the extent to which men who were perceived to possess each trait or characteristic were rated as particularly attractive by fertile women and (b) whether women's fertility risk interacted with relationship context (i.e., rating each man as a long-term mate vs. a short-term mate) to predict how attractive women perceived certain men to be. If women favor both good genes indicators and good investment indicators more when they are fertile (at midcycle), the good genes hypothesis for ovulatory cycle shifts, which expects only the former effects, is challenged. If, on the other hand, women prefer only the purported good genes indicators more when they are fertile, particularly when they are evaluating men as short-term mates, the good genes hypothesis is supported.

Method

Participants and Procedures

Participants were 76 men (who had been interviewed and videotaped while competing for a possible lunch date) and 238 women (who rated the attractiveness of men from the videotapes). Men were recruited from introductory psychology classes at Texas A&M University (mean age = 18.8 years). (An earlier article describes analyses of these interviews; see Simpson, Gangestad, Christensen, & Leck, 1999.) Women raters were recruited from introductory psychology classes at the University of New Mexico (mean age = 19.26 years). All participants received credit for a course research requirement in return for their participation. Of the men in the Texas A&M sample, 66% were Anglo, 24% were Hispanic, 5% were Asian, and 5 % were African American, Native American, or another category. Of the women in the University of New Mexico sample, 45% were Anglo, 33% were Hispanic, 6% were Asian, and 14% were African American, Native American, or another category (2% did not answer the question). Women were recruited to be normally ovulating (not using a contraceptive hormone or pregnant) and heterosexual.

Procedures

Phase 1. Men at Texas A&M University were recruited for a study on relationship formation. When they arrived (individually) at the lab, they were led to a room that contained a swivel chair, a 16-in. color TV monitor (attached to a wall outlet), and a video camera (unobtrusively suspended in one corner of the room). After obtaining informed consent, the experimenter read the following statement, after which she or he left the room:

> We are studying how people choose dating partners. In one of the other rooms, we have a woman who is going to choose either you or another person (who is also participating in this study) for a lunch date. We're interested in studying what kinds of questions she asks and how she decides whom to date.
>
> The interviewer will appear on the monitor and introduce himself/herself. The screen will go blank while you introduce yourself. The interviewer will be able to see you through that camera [experimenter points to camera] and hear you through the microphone in the ceiling [experimenter points to microphone], just as you will be able to hear and see him/her. When you answer the questions, please look at the camera to talk to him/her.
>
> After you've introduced yourself, the interviewer will come back on and ask you a few questions. The screen will go blank between each question so you can answer without distraction. His/her instructions are to choose either you or the other person for the lunch date based on your introductions and the answers you give to the questions. For this portion of the study, the interviewer has been told not to answer any questions from you. The interviewer also has been told that she can ask each question only one time, so please pay careful attention. We'll start in a couple of minutes. Remember, when the interviewer appears on the monitor, please answer his/her questions as best as you can. Just relax and be yourself.

Two minutes later, the interviewer (one of two videotaped female experimental assistants) appeared on the monitor and introduced herself. The introduction (which lasted approximately 75 s and the content of which was scripted by the authors) depicted a relaxed, friendly, and outgoing woman who enjoyed a variety of activities. After the introduction, the interviewer asked the participant the first question: "Please tell me about yourself, including who you are, what you like to do, and what you don't like to do." The monitor then went blank and the participant responded to the question for as long as he wished. After the participant responded, the interviewer asked several more questions, all developed by the experimenters (see Simpson et al., 1999). A second experimenter in a nearby control room synchronized the interaction between the videotaped interviewer and the participant, making sure that the interviewer reappeared on the participant's monitor immediately after the response to each question. Participants' answers to the interviewer's questions were videotaped.

After the participant's final answer, the other man (i.e., the competitor) appeared on the monitor. He was sitting at a table in another laboratory room and said nothing. The competitor also was a videotaped experimental assistant. After 1 min, the screen went blank and the experimenter reentered the room. The experimenter then said the following:

> The person you just saw on your TV screen is also being considered for the lunch date. For the next part of the study, the interviewer would like you to tell this person why she should choose you over him. In other words, the interviewer wants to hear why you think you'd be the better choice for the date. We've set things up so that both the interviewer and the other person will be able to see you through the camera and hear you through the microphone in the ceiling. For this portion of the study, though, you will not be able to see either of them. When you indicate to the other person why the interviewer should choose you, please look at the camera. Once the system is set up, I'll let you know through the intercom and you can make your statement.

The experimenter began videotaping the participant and then cued him to make the statement. This permitted each participant to give a spontaneous, open-ended response.

Participants were then escorted to a private room to complete a battery of self-report measures. These included the Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991), a rating version of the California Adult Q-Set (Block, 1961; Lanning, 1994), and a report of number of lifetime sex partners. Participants were then fully debriefed. The reasons for the videotaping were explained, and all participants were given an opportunity to erase their videotape if they wanted to. No one did. Participants then signed a release form so their videotapes could be coded.

Phase 2. One-minute segments from each interview were copied on to videotapes to be shown to women. For one set of tapes, the 1st min of each man's interview was copied (when he was introducing himself to the interviewer). For a 2nd set of tapes, each man's response to the male competitor was copied.

Women ($n = 277$) were then recruited from introductory psychology classes at the University of New Mexico to participate in a study of attraction. All were normally ovulating (i.e., not using a contraceptive pill or injection). Women who had not had a menstrual period in the preceding 50 days ($n = 4$) or who did not provide information sufficient to determine their cycle day ($n = 8$) were excluded from the analyses. Women ranged in age from 18 to 49 years. Because some older women in the sample reported difficulty rating the attractiveness of much younger men (the oldest male was 23) and given that U.S. women from their mid-20s onward tend to be most interested in men older than themselves (Kenrick & Keefe, 1992), the 27 women in the sample who were older than 25 were also excluded from the analyses (though inclusion of their data did not change the results). The final sample size was 238 (mean age = 19.26 years). Women were randomly assigned to view either the 1st min (when men answered the question, "Please tell me about yourself, including who you are, what you like to do, and what you don't like to do"; $n = 134$) or the segment in which men responded to the competitor ($n = 104$). Each woman saw approximately half of the interviews; one set saw the first 40 men ($n = 108$), and the other set saw the last 36 men ($n = 130$).

Participants were instructed to rate each man on a series of dimensions, the first two of which were central to the current study: (a) "*Attractive as a short-term mate*: High scores are males who are very attractive for

short-term sexual affairs. Low scores are given to men who tend to be unattractive as short-term sexual partners"; (b) "*Attractive as a long-term mate:* High scores are males with whom you would want a long-term relationship. Males scoring low would be unattractive as a long-term partner." All ratings were made on 5-point scales, on which 1 = *lowest 5%*, 2 = *lower 30%*, 3 = *middle 30%*, 4 = *higher 30%*, 5 = *highest 5%*, and percentages referred to the general population of men.

Each woman rater reported the first day of her last menstrual cycle as well as her typical cycle length. Using actuarial medical data reported by Wilcox, Duncan, Weinberg, Trussell, and Baird (2001), we estimated women's conception risk in two ways (see Baker & Bellis, 1995). First, we used actuarial tables to estimate the probability of conception for each woman on the day that she made her ratings (based on her reports of the first day of the last menstruation). Second, we took into account each woman's reported cycle length (sample $M = 28.7$ days, $SD = 3.4$) to put each woman on a 29-day cycle before estimating her day in the cycle and, thus, her probability of conception based on the actuarial data (see Gangestad & Thornhill, 1998; Thornhill & Gangestad, 1999). On average, women who have longer cycles tend to ovulate later in the cycle. We assumed that the typical day of ovulation was approximately 15 days prior to the end of the typical cycle (e.g., Day 14 in a 29-day cycle). The two estimates were highly correlated ($r = .86$, $p < .00001$) and, as in previous studies (e.g., Gangestad & Thornhill, 1998; Thornhill & Gangestad, 1999), were averaged to estimate each woman's conception risk.[2]

After completing the procedures, women were debriefed and thanked.

Phase 3. Informed by prior theory and research (e.g., Buss & Schmitt, 1993), we had a separate group of women ($n = 125$) then rate each man on several perceived and/or inferred mate qualities, including the extent to which each man came across as (a) socially respected and influential, (b) faithful, (c) arrogant and self-centered, (d) warm (kind and understanding), (e) likely to be financially successful, (f) intelligent, (g) physically attractive, (h) muscular, and (i) likely to be a good parent. Women who viewed the statement that men made to the competitor (i.e., the intrasexual interaction) also rated each man in terms of the extent to which he was (j) confrontative with other men. All ratings were made on 5-point scales, on which 1 = *lowest 5%*, 2 = *lower 30%*, 3 = *middle 30%*, 4 = *higher 30%*, and 5 = *highest 5%*, and on which percentages referred to the general population of men. Given the length of the rating task, each woman rated only a subset of the men. On average, 29.75 women rated each man, approximately half during each segment of the interview (range = 26–32). Ratings of men's perceived and/or inferred mate traits were aggregated across all women, yielding several indexes of male traits. Cronbach's alphas ranged from .70 to .90 (mean $\alpha = .85$).

Phase 4. Following the procedure described by Gangestad et al. (2004), sets of trained raters then coded (a) "*Men's behavioral tactics*: Adopt a Direct Approach, Focus on the Conversation, Use Humor, Just Be Oneself, Assert Superiority over the Competitor, Assert Niceness/Promise to Treat the Woman Well, Claim Communality with the Woman, Claim To Be Likeable, Claim To Be a Good Conversationalist, and Ensure a Good Time with the Woman" (mean $\alpha = .90$; see Simpson et al. [1999] for details); (b)"*Men's nonverbal displays*: Time spent gazing downward, Time spent having direct eye contact, Number of smiles, and Number of laughs" (αs = .88, .96, .81, and .86, respectively); and (c) "*Specific impressions of men's interview performance*" (e.g., "appeared laid back," "appeared composed/together," "seemed nerdish"). Measures were assessed by 18 ratings made on 9-point scales for each of two segments (i.e., the 1st min of the interview and the response to the competitor; mean $\alpha = .83$). Behavioral tactics and impression ratings were factor analyzed separately to yield three and six measures, respectively (see Gangestad et al., 2004; Simpson et al., 1999, for details).

Two higher level dimensions involving men's displays tapped by these observer-rated measures were identified through principal-components analysis of all of the measures (i.e., factors) that defined the behavioral tactics, the nonverbal behaviors, and the general impressions. In particular, two components explaining 18% and 17% of the variance respectively (and approximately 1.5 times more variance than any other component) were extracted and rotated using oblimin criteria. The first component, labeled *Social Presence*, was defined by composure, presentation as athletic, eye contact, lack of self-deprecation, lack of downward gaze, and lack of nice-guy self-presentation (all loadings $> \pm .50$). The second component, labeled *Direct Intrasexual Competitiveness*, was defined by derogation of the competitor, direct intrasexual competitive tactics, lack of laughing, and lack of mentioning a nice personality (all loadings $> \pm .50$). Component scores were then computed. Given that Gangestad et al. (2004) have already documented shifts across the cycle in female preferences on these two dimensions, scores on these dimensions were used as control variables in the analyses presented below.

Results

Correlations Between Women's Ratings and Men's Self-Reported Measures

Women's ratings of men's traits do not have to be accurate in order to demonstrate systematic changes in women's preferences for the qualities that women perceive in men. Nonetheless, patterns of correlations between these ratings and men's self-report measures are of interest, particularly the correlations between women's trait ratings and measures of the Big Five personality traits gleaned from the California Adult Q-Set (Lanning, 1994). On an a priori basis, we also created a measure of self-perceived intelligence from California Adult Q-Set items, summing responses from the items "is intellectually capable," "genuinely values intellectual matters," and "can express ideas well." This measure had modest internal consistency ($\alpha = .61$). These correlations are displayed in Table 1.

In general, women's perceptions of men's mate qualities were meaningfully associated with men's own self-reports of what they were like on four of the five Big 5 traits as well as on self-rated intellectual abilities. Men who reported being more Neurotic, for example, were perceived by women as being less muscular and less socially respected. Men who reported being more Agreeable were viewed by women as less confrontative, less arrogant, and warmer. Men who reported being more Conscientious were perceived as more intelligent, less confrontative, more faithful, less arrogant, and warmer. And men who reported being more Extraverted were viewed as more muscular and more socially respected. In addition, men who rated themselves as athletic were indeed viewed by women as being more muscular. Men who rated themselves as having higher intellectual abilities were seen as more intelligent. Finally, men reporting greater narcissism were seen as

[2] Researchers have also used actuarial data on conception risk published by Jöchle (1973). The estimates based on Wilcox et al. (2001) correlate .76 with those estimated by Jöchle (1973). Because the former are more recent, we used them. Analyses using the latter estimates, however, produced very similar results.

Table 1
Correlations Between Women's Trait Ratings and Men's Self-Report Measures

	CAQ Big Five					Other scales			
Trait	N	A	O	C	E	SOI	Athl.	NPI	Intell
Muscular	**−.44**	−.12	.05	−.13	**.26**	**.32**	**.46**	**.32**	−.01
Intelligent	−.11	.20	*.22*	**.28**	.08	**−.35**	−.12	−.06	**.30**
Good father	−.20	.18	.17	*−.22*	.06	*−.20*	.14	−.01	**.28**
Confrontative	*−.23*	**−.31**	−.20	**−.29**	.20	**.47**	*.23*	**.34**	**−.26**
Socially respected	**−.32**	−.03	.08	.01	**.27**	.08	**.28**	*.20*	.05
Faithful	.04	.25	.12	**.37**	−.09	**−.43**	−.19	*−.22*	**.28**
Arrogant	−.11	**−.34**	−.09	**−.29**	.10	**.34**	.14	**.43**	**−.23**
Warm	−.12	**.29**	.15	**.36**	−.02	**−.37**	−.01	−.11	**.30**
Financially successful	−.17	*.23*	.12	**.29**	.16	**−.28**	−.12	−.03	*.22*

Note. *n*s = 63–73. Bold values are significant at $p < .05$; *Italicized* values are significant at $p < .10$. CAQ = California Adult Q-Set; N = Neuroticism; A = Agreeableness; O = Openness; C = Conscientiousness; E = Extraversion; SOI = Sociosexual Orientation Inventory; Athl. = Athleticism; NPI = Narcissistic Personality Inventory; Intell = CAQ composite of intellectual ability.

more confrontative and arrogant, and men reporting greater unrestricted sociosexual orientation were seen as less faithful.[3]

Because the trait ratings are not independent, we conducted a maximum likelihood factor analysis with promax rotation on the 10 perceived male traits. A scree test of the principal components yielded two clear factors (eigenvalues = 4.78, 3.23, 0.60, 0.47, and 0.32). The rotated factors correlated minimally ($r = -.13$). The first factor can be interpreted as Good Investing Mate Qualities. It comprises intelligent (.96), financially successful (.93), warm (.87), faithful (.84), good father (.80), socially respected (.40), and the absence of arrogance (−.49). The second factor appears to tap Intrasexual Competitiveness. It is defined by socially respected (.86), muscular (.84), physically attractive (.78), confrontative (.64), and arrogant (.57). Each of the 10 variables, then, achieved a loading of at least .50 on one of the two factors. Using the regression method, we then computed factor scores for each woman who had rated the male traits. Similarly, we reduced personality measures (the Big Five measures in addition to SOI and Narcissism; self-rated intellectual ability correlated .72 with Openness and, thus, was excluded) using the same factor analytic procedures. Two factors, accounting for 55% of the total variance, emerged (eigenvalues = 2.05, 1.81, .97). The first factor was interpreted as Assertion. It is defined by SOI (.47), lack of Agreeableness (−.83) and lack of Conscientiousness (−.65). The second factor was interpreted as Self-Confidence and is defined by Narcissism (.61), Extraversion (.51), and lack of Neuroticism (−.65). (We offer these labels cautiously. The factors may loosely correspond to the broad dimensions of Ego Control [reversed] and Ego Resilience.)

We then regressed individual self-reported personality traits and the personality factors on the trait rating factors (see Table 2). For all traits except Openness, the multiple correlation was significant or neared significance. Moreover, for all cases except Openness, traits were significantly predicted by at least one of the rating factors. The multiple correlations for the two trait factors were, in each instance, an impressive .40. Assertion was significantly predicted (in a negative direction) by Good Investing Mate Qualities and neared significance by Intrasexual Competitiveness. Self-Confidence was predicted by Intrasexual Competitiveness. The size of these effects compare favorably with those documented in other studies of accuracy of social perceptions involving minimal exposure (see Funder, 1995). Considered together, these findings provide evidence for the validity of women's perceived trait ratings.

Multilevel Analyses of Women's Attractiveness Ratings

Relations between women's ratings of men's attractiveness and perceived mate quality were analyzed with multilevel regression in the SPSS 12.0 Mixed program. For each analysis, the particular male trait was treated as a Level 1 predictor. Women's conception risk was treated as a Level 2 predictor, which could moderate the slope of individual women's ratings of men on male characteristics. Two additional variables were entered as Level 2 predictors to control for extraneous variance associated with the specific stimulus tapes that women rated: Segment (the 1st min of the interview vs. the statement to the competitor) and set (the first 40 men vs. the second 36 men; see the Method section). Two primary dependent variables were tested: (a) the combined sum of women's short-term and the long-term mating attractiveness ratings of each man

[3] We also correlated these ratings with men's fluctuating asymmetry, also measured in this sample (see Simpson et al., 1999). Few associations emerged. With men's weight controlled (symmetrical men tended to be lighter in this sample), more symmetrical men were rated by women as being more muscular ($r = -.17$, $p < .10$), an effect that became significant when men's physical attractiveness was controlled ($r = .22$, $p < .05$). With men's weight (or weight and physical attractiveness) controlled, men's symmetry also correlated with their SOI ($r = -.22$, $p < .05$); as expected, more symmetrical men were more unrestricted. No other significant associations of symmetry with either women's ratings or men's personality emerged (all $|rs| < .15$). As discussed by Gangestad and Thornhill (1999; see also Gangestad, Bennett, & Thornhill, 2001), fluctuating asymmetry is a modestly valid measure of developmental instability, and hence, reasonable power to detect effects requires large sample sizes. Full results are available upon request.

Table 2
Regression Analyses of Men's Self-Report Measures Predicted by Women's Trait Ratings

Rating	*R*	Standardized regression weight: Good investing mate qualities	Standardized regression weight: Intrasexual competitiveness
Trait			
Neuroticism	**.37**	−.13	**−.36**
Agreeableness	*.30*	**.25**	−.15
Openness	.18	.18	.03
Conscientiousness	**.37**	**.32**	−.13
Extraversion	*.28*	.09	**.28**
Athleticism	**.34**	−.06	**.33**
SOI	**.45**	**−.35**	**.23**
Narcissism	**.35**	−.08	**.33**
Intellectual ability	**.31**	**.30**	−.04
Factor			
Assertion	**.40**	**−.30**	*.22*
Self-confidence	**.40**	.10	**.41**

Note. Bold values are significant at $p < .05$; Italicized values are significant at $p < .10$.
SOI = Sociosexual Orientation Inventory.

and (b) the difference between the short-term and long-term attractiveness ratings for each man. Analyses of the combined measure tested for changes in women's overall attraction to men as a function of perceived traits. Analyses of the difference scores tested for how women's attraction differentially related to men's characteristics as a function of the mating context (short-term vs. long-term). Effects from the analyses involving difference scores capture statistical interactions associated with mating context. The predicted effects were tested using directed tests (where .04 of an overall alpha level was allocated to the predicted tail and .01 to the unpredicted tail; see Rice & Gaines, 1994). All Level 1 variables were zero-centered so that Level 2 main effects represent the effects on mean attractiveness ratings. Conception risk was treated as a quantitative random variable, but results were nearly identical when it was treated simply as a fixed variable. Table 3 shows the results of the multilevel analyses. The two sets of effects of primary interest are the Male Trait × Mating Context interactions and the Male Trait × Mating Context × Conception Risk interactions. We first tested these effects using each of the 10 individual traits separately. We then conducted analyses on the higher order factors of these perceived traits.

Male Trait × Mating Context interactions. These interactions reflect the extent to which a male trait was preferred by women in one mating context over the other (i.e., the degree to which the regression slopes of attraction as a function of a male trait differed, on average, across short-term vs. long-term mating contexts). As shown in Table 3, 9 of the 10 traits were more preferred in one context than the other. As predicted, men's perceived arrogance, confrontativeness, muscularity, and physical attractiveness better predicted their attractiveness as short-term mates than their attractiveness as long-term mates. Men's perceived faithfulness, warmth, intelligence, potential to be a good father, and potential for financial success better predicted men's attractiveness as long-term mates versus short-term mates. Men's perceived social respect did not significantly differ in relation to short-term and long-term mate attractiveness.

Male Trait × Mating Context × Conception Risk interactions. Across the 10 traits, analyses yielded six significant Male Trait × Mating Context × Conception Risk interactions (see Table 3). Relative to women low in conception risk, those high in conception risk particularly preferred as short-term mates men who appeared more confrontative, arrogant, muscular, socially respected, and physically attractive. When high in conception risk, women were also more attracted to men who were viewed as lower on faithfulness as short-term mates. Viewed together, these effects parallel those reported by Penton-Voak et al. (1999), Gangestad et al. (2004), Haselton and Miller (2006), and Puts (2005). Women's mate preferences predictably shift across the reproductive cycle to favor male traits that may signal a man's good genes, particularly in short-term mating contexts.

Table 3
Results of the Multilevel Analyses: t Values and *p Values*

Trait	Trait: ±	Trait: *p*	Trait × Mating Context: ±	Trait × Mating Context: *p*	Trait × Context × Conception Risk: ±	Trait × Context × Conception Risk: *p*	Trait × Conception Risk: ±	Trait × Conception Risk: *p*
Physically attractive	38.09	<.001	7.22	<.001	2.15	.020	0.26	*ns*
Muscular	28.82	<.001	7.33	<.001	2.69	.004	0.40	*ns*
Intelligent	1.77	.077	−14.43	<.001	−0.14	*ns*	−0.79	*ns*
Good father	6.30	<.001	−10.98	<.001	−0.25	*ns*	0.00	*ns*
Confrontative	14.77	<.001	11.16	<.001	3.07	.001	1.11	*ns*
Socially respected	29.00	<.001	0.29	*ns*	2.46	.009	−0.31	*ns*
Faithful	−11.54	<.001	−15.62	<.001	−2.65	.006	−0.92	*ns*
Arrogant	17.72	<.001	12.45	<.001	3.06	.001	−0.67	*ns*
Warm	0.45	*ns*	−13.89	<.001	−1.38	*ns*	0.34	*ns*
Financially successful	4.32	<.001	−12.99	<.001	.06	*ns*	−0.49	*ns*

Note. *df*s = 8701–8793. For the Trait × Mating Context interactions, positive values reflect men's greater attractiveness in the short-term mating context. For the Trait × Mating Context × Conception Risk interactions, positive values reflect men's greater attractiveness in the short-term mating context among women high in conception risk. For the Trait × Conception Risk interactions, positive values reflect men's greater attractiveness among women high in conception risk.

As anticipated, no significant Male Trait × Mating Context × Conception Risk interactions were found for four traits purportedly valued more highly in long-term mates. Indeed, there was no hint of interactions for intelligence, potential for financial success, potential to be a good father, or warmth.

We also tested these effects while statistically controlling for the two behavioral display indicators examined by Gangestad et al. (2004), Social Presence and Direct Intrasexual Competitiveness. In most instances, interactions remained significant or neared significance, indicating that the effects reported here are not redundant with the effects reported previously. For confrontativeness, arrogance, faithfulness, and muscularity, *t*s = 3.13 (*df* = 7986), 2.64 (*df* = 8081), –2.27 (*df* = 8057), and 1.85 (*df* = 7957), respectively, all *ps* < .041. For social respect, $t(7927) = 1.51$ ($p = .081$). For physical attractiveness, the effect dropped to nonsignificance, $t(7925) = 1.09$, *ns*. Women rely on behavioral information when evaluating the attractiveness of men (Graziano, Jensen-Campbell, Shebliske, & Lundgren, 1993). The results suggest that fertile women are particularly attracted to these components of physical attractiveness.

Male Trait × Conception Risk interactions. As expected, there were no significant effects of conception risk on women's preferences for male traits overall across both mating contexts (see Table 3). These results are also consistent with the findings of Penton-Voak et al. (1999) and Gangestad et al. (2004).

We also found main effects for conception risk and interactions between conception risk and mating context. These analyses revealed that, as women's conception risk increased, their general mean ratings of men tended to increase (all *ts* > 1.94, *ps* < .06). Ratings of men's short-term mate attractiveness, however, tended to increase with conception risk less than did ratings of men's long-term attractiveness (all *ts* > 2.33, *ps* < .023). Relative to their long-term ratings, fertile women's ratings of men's short-term attractiveness were more discriminating than those of nonfertile women. These changes in mean ratings, however, do not indicate changes in preferences.

Characterizing the Male Trait × Mating Context × Conception Risk interactions. Women's standards of attractiveness do not change across the cycle in general for all mate traits. Standards associated with particular traits perceived in men systematically change. This pattern is consistent with the good genes hypothesis. This hypothesis, however, makes an even more specific prediction about which male traits should be most attractive to fertile women. Fertile women should be especially drawn to men who possess traits typically valued in short-term mates.

To test this prediction, we examined the relation between the size of the Male Trait × Mating Context interactions (scaled to reflect the extent to which traits were relatively more attractive in short-term mating contexts) and the Male Trait × Mating Context × Conception Risk interactions (scaled to reflect the extent to which this was particularly true for fertile women). Figure 1 shows the results of these tests. As can be seen, the extent to which male traits were preferred in short-term mating contexts strongly predicted the extent to which this was particularly true of fertile versus infertile women. Indeed, the correlation is close to perfect: .93.[4] This outcome also supports the good genes hypothesis.

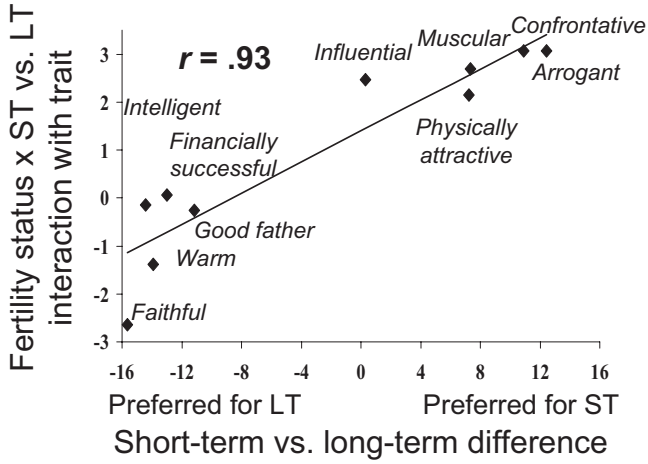

Figure 1. Effects of the three-way interactions between trait factor, mating context, and conception risk as a function of the effects of mating context (short-term vs. long-term) on the trait preferences across the 10 perceived traits. Values on the axes are *t* values (which, given equal sample sizes, covary perfectly with standardized effect sizes). ST = short-term; LT = long-term.

Multilevel Regression Analyses of the Factors

We conducted another multilevel regression analysis, this time using the two factors (Good Investing Mate Qualities and Intrasexual Competitiveness) as Level 1 predictors. Given that these factors were virtually uncorrelated, they are nearly independent predictors of women's attractiveness ratings of men. Because some evidence indicates that favored traits may multiplicatively interact to affect the attractiveness of mates (e.g., Singh, 1995), we also entered the interaction term of the two factors as a predictor. Of key interest were the interactions between each predictor, mating context, and conception risk.

The results are displayed in Table 4. As expected, both factors predicted women's general attraction ratings. However, the factors also interacted. That is, as ratings on one factor increased, the positive effects of the other factor were amplified. Thus, the combination of *both* positive traits, Good Investing Mate Qualities and Intrasexual Competitiveness, was more attractive than would be expected from knowledge of the simple main effects alone. As predicted, both factors differentially predicted long-term and short-term mate attractiveness. Whereas the Good Investing Mate Qualities factor was more valued in long-term mating contexts than in short-term ones, the Intrasexual Competitiveness factor was more valued in short-term mating contexts. Furthermore, the interaction between the two factors differentially predicted long-term versus short-term attractiveness ratings. That is, the amplification effect of one positive feature (factor) on the other was greater in a long-term mating context.

Also as predicted, analyses revealed that the critical Mate Factor × Mating Context × Conception Risk interaction emerged

[4] No significance test can be performed because data points are not independent, given that they are all based on the same sample.

Table 4
Results of the Multilevel Analysis Involving the Two Male Trait Factors Predicting Women's Attractiveness Ratings

Value	Effect		
	B	*t*	*p*
Good investing mate qualities (GIMQ)	.201	3.41	.001
Intrasexual competitiveness (IC)	.668	28.19	<.001
GIMQ × IC	.087	4.20	<.001
Mating Context × GIMQ	−.163	−16.21	<.001
Mating Context × IC	.142	8.20	<.001
Mating Context × GIMQ × IC	−.051	−4.97	<.001
Conception Risk × GIMQ	−.019	−0.88	*ns*
Conception Risk × IC	.011	0.51	*ns*
Conception Risk × GIMQ × IC	.018	−0.88	*ns*
Mating Context × Conception Risk × GIMQ	−.004	−0.40	*ns*
Mating Context × Conception Risk × × IC	.031	2.76	.004
Mating Context Conception Risk × GIMQ × IC	−.008	0.80	*ns*

Note. *df*s = 8701–8793. Positive interactions with mating context indicate more positive effects in short-term mating contexts; negative interactions indicate more positive effects in long-term contexts.

only for Intrasexual Competitiveness, $t(8786) = 2.76$, $p < .004$. It was not found for either Good Investing Mate Qualities, $t(8786) = -0.40$, *ns*, or the interaction between the two factors, $t(8786) = 0.80$, *ns*. Moreover, in line with expectations, there were no overall Mate Factor × Conception Risk interactions (all $|ts| < 1$, *ns*). The regression weight of the Intrasexual Competitiveness × Mating Context × Conception Risk interaction was .031, indicating that the difference in effect of a four standard deviation change in Intrasexual Competitiveness on the difference between short-term and long-term attractiveness changed approximately .5 points from zero conception risk to the top few percentage points in conception risk. Given that 88% of the differences between short-term and long-term mating attractiveness were no more than ±1, this effect is a meaningful one.

Multilevel Regression Analyses Conducted on Short-Term and Long-Term Preferences Separately

Finally, we conducted analyses on women's ratings of short-term mate attractiveness and long-term mate attractiveness separately. As shown in Table 5, Intrasexual Competitiveness predicted short-term attractiveness positively and strongly, whereas Good Investing Mate Qualities predicted short-term attractiveness negatively and much more weakly. The two factors did not multiplicatively predict women's short-term attractiveness ratings of men.

Also as expected, Intrasexual Competitiveness interacted with conception risk to predict short-term attractiveness ratings. That is, with increasing fertility, women are more attracted to men who appear to have traits that signal greater intrasexual competitiveness. By contrast, there was no evidence that women differentially prefer Good Investing Mate Qualities in short-term mates as a function of their fertility status. There also was no evidence that women varying in fertility status differentially respond to combinations of the two factors. Though the interaction effect for Intrasexual Competitiveness fell just shy of significance, additional analyses revealed that this effect was significantly different from the interaction effect of Good Investing Mate Qualities, $t(8634) = 1.91$, $p = .035$. Moreover, without the nonsignificant factor of Good Investing Mate Qualities in the model, Intrasexual Competitiveness significantly interacted with conception risk to predict short-term attraction, $t(8582) = 1.83$, $p = .042$.

Intrasexual Competitiveness, Good Investing Mate Qualities, and their interaction all positively predicted long-term mate attrac-

Table 5
Results of the Multilevel Analyses of Short-Term and Long-Term Mate Attractiveness

Effect	Short-term attractiveness		Long-term attractiveness	
	t	*p*	*t*	*p*
Good Investing Mate Qualities (GIMQ)	−4.23	<.001	10.03	<.001
Intrasexual Competitiveness (IC)	29.55	<.001	21.17	<.001
GIMQ × IC	1.22	*ns*	2.67	.010
Conception Risk × Good Investing Mate Qualities	−0.97	*ns*	−0.60	*ns*
Conception Risk × Intrasexual Competitiveness	1.72	.054	−0.75	*ns*
Conception Risk × GIMQ × IC	−0.45	*ns*	−1.12	*ns*

Note. *df*s = 8560–8663.

tiveness (see Table 5). Hence, women were particularly attracted to men who displayed both sets of qualities (above and beyond that expected from main effects alone). Analyses yielded no evidence, however, that women's attraction to these traits in long-term mate changed across the cycle (all $| ts | \leq 1.12$, *ns*; see Table 5).

Discussion

The good genes hypothesis makes specific predictions that can be derived directly from good genes models but are much more difficult to derive a priori from other theories. Specifically, the hypothesis predicts that women should particularly prefer purported indicators of male genetic benefits when they are fertile and evaluating men as potential short-term mates. These trait indicators—physical attractiveness, muscularity, being socially respected, and being confrontative—should also be traits that most women value more in short-term than in long-term mates. Accordingly, this hypothesis anticipates that women's short-term mate preferences for these particular male traits should be enhanced when women are fertile. A possible pattern of preference shifts never before tested by research, however, is that nearly all diagnostic male mate traits might be valued more when women are fertile, regardless of whether traits are preferentially valued in short-term or in long-term mates. If it emerged, that pattern would seriously challenge the good genes hypothesis.

The results of this study support the good genes hypothesis. When women are fertile and rating men's attractiveness as short-term partners, they are particularly attracted to traits that tend to be valued in short-term mates. No preference shifts in favor of traits deemed more valuable in long-term mates (e.g., good father, faithful, warm, financially successful) were found (although men perceived as less faithful were rated as particularly attractive as short-term mates by fertile women, perhaps because such men possess other traits that women find attractive in short-term mates). Consistent with past research (Gangestad et al., 2004; Haselton & Miller, 2006; Johnston et al., 2001; Penton-Voak et al., 1999; Puts, 2005), we did not find shifts in mate preferences over the reproductive cycle in both long-term and short-term mating contexts. Rather, mating context interacted with fertility status to predict women's specific mate preferences. Near ovulation, traits indicative of greater intrasexual competitiveness were viewed as particularly attractive in short-term compared with long-term mates.

These findings are consistent with a recent study by Haselton and Miller (2006), who found that women especially value creative talent over wealth when they are ovulating and evaluating men as short-term mates. Given the way in which mate traits were assessed in that study, however, it was difficult to discern whether increases in the value of talent, decreases in the value of wealth, or both drove this effect. The current study circumvents these interpretational ambiguities and assesses a wider range of traits valued in short-term and/or long-term relationships.

These findings are also consistent with a number of recent studies examining patterns of women's sexual attraction across the cycle. Two studies found that when women are fertile they report greater attraction to men other than their partners, but not greater attraction to their partners (Gangestad, Thornhill, & Garver, 2002; Gangestad, Thornhill, & Garver-Apgar, 2005; cf. Pillsworth, Haselton, & Buss, 2004). These effects, however, are more pronounced in women whose partners are asymmetrical (Gangestad et al., 2005) or are not viewed as particularly attractive short-term mates (Haselton & Gangestad, 2006; Pillsworth & Haselton, in press). A straightforward interpretation of these findings follows from the variations in preferences documented in our study: Women are attracted to features attractive in short-term mates (but not long-term mates) when fertile and, when their partners do not possess these features, they are particularly drawn to men other than their partners. As most of these studies do not find changes in sexual desire across the cycle, sexual desire per se is probably not responsible for these effects.

The Trait of Perceived Intelligence

Intelligence has been viewed as both a trait valuable in long-term mates (e.g., Buss, 1989) and as a "fitness indicator," a costly signal of good genes (Miller, 2000). Based on good genes hypothesis, then, this theory should anticipate that women would find men perceived to be intelligent especially more attractive as short-term mates when they are fertile. We found no such pattern. Indeed, men perceived to be particularly intelligent were more valued as long-term mates than as short-term mates. The interaction between intelligence, mating context, and conception risk was close to zero.

We cannot draw any strong conclusions from these findings. Men perceived to be intelligent reported that they had greater intellectual ability. Women's ratings of men's intelligence, therefore, appear to have some validity, but it may be modest. Men perceived as intelligent were also perceived to be conscientious and perhaps "studious," a trait that need not imply intelligence. Though we found no support for the idea that women respond to intelligence as an indicator of good genes, we cannot conclude on the basis of this lone study that men who are more intelligent (as assessed by intelligence tests) are not preferred as short-term mates by women who are fertile.

Perceived Factors of Personality and Mate Preferences

The results of this study also speak to differences in long-term and short-term mate preferences of women. Some theories of human mating have emphasized that women may partly use short-term mating to acquire long-term mates (e.g., Buss & Schmitt, 1993). Others have emphasized that women may have distinct short-term and long-term preferences, with short-term mating functioning ancestrally as a way for women to acquire good genes for offspring (e.g., Gangestad & Simpson, 2000). The current research supports the idea that women have distinct short-term and long-term mating preferences (see also Li & Kenrick, 2006; Regan, 1998). Indeed, nearly every perceived trait we examined was more preferred in one context or the other. Only social respect was not preferred in one mating context versus the other. These findings do not imply that women never use short-term mating as a means to obtain long-term mates; they almost surely do (e.g., Buss & Schmitt, 1993). The results do strongly imply, however, that women's short-term mating has functions (or ancestrally had functions) distinct from functions of long-term mating. The ovulatory cycle shifts in short-term mate preferences also suggest that these functions included acquisition of good genes for offspring.

What constrains most women from obtaining mates who are high on both desired short-term (e.g., Intrasexual Competitiveness) and desired long-term (e.g., Good Investing Mate Qualities) traits is that most men who are high on both dimensions should be highly valued by most women and have many options, making them very difficult to attract and retain (Simpson & Gangestad, 1992). Nevertheless, women should still be strongly attracted to such men, which is exactly what we found. Men in our study who were perceived as being higher on the Good Investing Mate Qualities factor and the Intrasexual Competitiveness factor were especially attractive to women as long-term mates, above and beyond the main effects of each factor. Because such men are difficult to attract and retain as long-term mates, however, women may remain willing to pursue flexible, ecologically contingent mating strategies, selectively engaging in short-term affairs with men who show signs of good genes (particularly when women are ovulating) and preferentially engaging in long-term mating with men who reveal evidence of good paternal investment (Gangestad & Simpson, 2000). In short-term mating contexts, women appear to be less focused on "having it all"; in that context, women strongly prefer traits associated with intrasexual competitiveness.

One point worth emphasizing is that, even though this framework assumes that female extrapair mating most likely occurred in ancestral environments, it does not assume that women engaged in extrapair mating frequently. Extrapair mating has clear costs as well as potential benefits, partly because of the fact that mates often leave unfaithful partners. Indeed, men appear to be particularly vigilant of their partners' whereabouts when their partners are fertile (Gangestad et al., 2002; Haselton & Gangestad, 2006). Although women may be most attracted to men other than their primary partners particularly when fertile, they may act on that attraction only on rare occasions.

One unanticipated finding was that women's attractiveness ratings of men increased overall when they were fertile, though we found effects only for their ratings of men as long-term partners. This change, however, does not by itself indicate a shift in relative importance of mate traits; it merely reflects a change in the mean ratings of men. One possible explanation of the findings is that if women focus more on short-term matings when fertile but focus more on long-term matings when infertile, they may become harsher critics of men's potential within the context on which they are focused relative to the other context. For instance, though women may be more likely to engage in short-term mating when fertile, they may be even less receptive and attracted to men lacking cues of genetic fitness when fertile.

Finally, the current findings not only shed light on women's preferences and mating strategies but also speak to male personality traits in relation to mating strategies. Because men who display different kinds of traits are particularly preferred by women for particular relationship contexts, it makes sense that they would pursue different kinds of relationships. In particular, men who are perceived by women as confrontative, arrogant, and muscular are attractive to women as short-term mates and, hence, might be expected to pursue short-term mates (in addition to long-term mates). Men perceived to be warm, intelligent, and likely to succeed financially should be expected to more often exclusively pursue long-term relationships. It is interesting that men's self-reported SOI scores correlated significantly with eight of the nine perceived features that women valued more in either short-term or long-term relationships, despite the fact that women observed men being interviewed for merely 1 or 2 min.

Caveats and Conclusions

This research extends our understanding of how variation in a wide range of fundamental male mate traits and women's perceptions of them are associated with what women find attractive in men, contingent on both personal (ovulation status) and social context (type of mating relationship) factors. In doing so, it provides some of the clearest support to date for the good genes hypothesis.

The results of this study must be interpreted in light of some caveats. One limitation is that we do not—and most likely cannot—know for certain whether the traits of short-term mates that were most strongly preferred by fertile women are ancestral markers of genetic benefits that actually shaped the observed preference shifts. Nonetheless, it seems reasonable to suspect that male intrasexual competitiveness, muscularity, physical attractiveness, and related traits probably did covary with reproductive success in ancestral men. It also seems plausible that these traits had additive genetic variance that was tied to reproductive fitness, generating not only the ovulatory cycle preference shifts documented in this study but also the general preferences for these traits in short-term mates. At present, there is no clear alternative explanation for the patterns of findings reported above. Given that no current alternative model has the explanatory power and coherence that the good genes hypothesis has, this hypothesis is favored by the method of "inference to the best explanation" (Haig & Durrant, 2002), even in the absence of direct observations pertaining to ancestral genetic benefits.

A second limitation is that women's perceptions of what each man was like as a potential mate might not have been completely accurate given the short segments of interview behavior that women observed. The correlations between women's ratings of men and men's self-reported traits (see Table 1) nevertheless indicate that women's perceptions were moderately accurate across most, if not all, of the 10 male traits.

In conclusion, this study is the first to test for systematic shifts in mate preferences across the ovulatory cycle involving a full range of long-term and short-term male traits and traits. It provides some of the best and most direct evidence thus far that patterned shifts in women's mate preferences across the ovulatory cycle may reflect adaptations to garner the genetic benefits of men who may possess good genes. The fact that these patterns are *not* witnessed for mate preferences associated with markers of good paternal investment offers compelling support for the specificity and precision of this effect.

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