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Sociosexuality and Romantic Partner Choice

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In three studies, we explored how individual differences in sociosexual orientation systematically relate to the types of attributes people prefer in romantic partners. In Investigation 1, individuals rated the importance of 15 partner attributes. Two factors emerged: personal/parenting qualities and attractiveness/social visibility. Individuals who possessed a restricted sociosexual orientation rated attributes that loaded highly on the former factor as being more important than those that loaded highly on the second one, whereas the reverse was true for unrestricted individuals. In Investigation 2, individuals evaluated two prospective romantic partners, one who was described as highly attractive and socially visible but less desirable in terms of personal/parenting qualities and one who had the opposite set of attributes. Unrestricted individuals tended to select the former partner, whereas restricted individuals chose the latter one. Investigation 3 examined the attributes actually possessed by their romantic partners. Unrestricted individuals were dating partners who were more socially visible and attractive, whereas restricted individuals were dating partners who were more responsible, faithful/loyal, and affectionate. Results are discussed in terms of an evolutionary model that links sociosexuality to mate selection.

Past research on mate preference can be classified into three areas of study: consensually desired attributes; attributes on which men and women place differential emphasis; and attributes that certain kinds of people find differentially attractive. Research examining consensually preferred characteristics has revealed that most individuals desire partners who are physically attractive (Buss & Barnes, 1986; Green, Buchanan, & Heuer, 1984; Walster, Aronson, Abrahams, & Rottmann, 1966), possess attitudes, values, and beliefs similar to their own (Byrne, 1971; Hill, Rubin, & Peplau, 1976), and have pleasant personality characteristics (Buss & Barnes, 1986; Kaplan & Anderson, 1973). These findings have been qualified by research on sex differences, which has shown that men tend to place greater emphasis on physical attractiveness, whereas women tend to stress personal characteristics such as kindness, considerateness, and earning capacity (Buss, 1989; Buss & Barnes, 1986; Hill, 1945; Hudson & Henze, 1969; McGinnis, 1958).

Given that men and women should have differed in level of parental investment in offspring during evolutionary history (Trivers, 1972), evolutionary theorists (e.g., Buss, 1985; Kenrick & Trost, 1987; Symons, 1979; Wilson, 1978) have suggested that

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these sex differences may reflect different reproductive strategies. Specifically, males in our ancestral past should have been selected to be more sexually permissive and to prefer mates who possessed attributes presumably indicative of youth and high fertility/reproductive value (e.g., physical attractiveness; see Buss, 1989). Females, on the other hand, should have been selected to be less permissive (demanding considerable paternal investment prior to mating) and to desire mates who possessed abundant resources and/or offered evidence of high paternal investment.

Considerably less theoretical and empirical attention has been devoted to studying *within-sex* individual differences underlying romantic partner preference (for an exception, see Buss & Barnes, 1986). This is surprising for several reasons. First, even though certain characteristics tend to be consensually valued, individuals exhibit substantial variability in the specific attributes they find most and least important when choosing a romantic partner. Second, since most people do not have the kind of attributes necessary to attract a partner who possesses the entire array of consensually desired attributes, individuals typically must place greater importance on some attributes than others. And third, for any given attribute (e.g., physical attractiveness), the variability in responses which exists within the sexes typically is larger than that which exists between them (see Buss & Barnes, 1986).

What individual difference dimension might serve as a good candidate for exploring individual differences in romantic partner preference? One strong candidate is suggested by the newly developed theoretical model (Gangestad & Simpson, 1990a, 1990b; Simpson & Gangestad, 1991a) and measure (Simpson & Gangestad, 1991b) of sociosexuality. Sociosexuality refers to individual differences in willingness to engage in sexual relations without closeness, commitment, and other indicators of emotional bonding. Individuals who have demonstrated an *unrestricted sociosexual orientation* tend to engage in sex in the absence of such indicators, whereas those who have demonstrated a *restricted sociosexual orientation* typically do not.

The origins of mate preference can be considered at proximal as well as distal levels of explanation. Proximal accounts focus on more immediate, contemporaneous influences on behavior (e.g., current or recent environmental influences). Distal explanations seek to understand behavior in terms of events that may have transpired in our more distant past (e.g., evolutionary pressures). Focusing on possible distal influences, Gangestad and Simpson (1990a, 1990b) have proposed that individual differences in sociosexuality may reflect evolutionarily selected alternate sexual strategies (i.e., reproductive orientations that, in past evolutionary environments, enhanced inclusive fitness). At least three features of a mate should influence an individual's inclusive fitness: (a) a mate's ability or willingness to invest in one's offspring; (b) the extent to which a mate possesses either adaptive traits *or* resources that could be passed on to offspring (either genetically or socially) to enhance their fitness; and (c) for males who invest heavily in offspring, a mate's sexual exclusivity (see Trivers, 1972). During evolutionary history, all three features probably were difficult to obtain in a single mate (Buss, 1985). Therefore, individuals could have enhanced their inclusive fitness by preferentially focusing on one feature.

According to this perspective, some women may have come to prefer romantic partners who were willing to invest in their offspring, as revealed by the partner's pro-

nounced faithfulness and proficient caregiving qualities. Other women may have preferred partners who possessed characteristics associated with fitness in our evolutionary past, particularly those that could be genetically or culturally transmitted to their offspring. Although it is not clear precisely what these characteristics were, physical attractiveness (an attribute that might have possessed additive genetic variance associated with fitness in the past; Hamilton & Zuk, 1982) and dominance/social status (Sadalla, Kenrick, & Vershure, 1987) are two viable candidates.

These patterns of mate choice should covary with female sociosexuality. Women who choose mates based on males' willingness to invest in offspring should require relatively greater evidence of paternal investment (and, therefore, more time) before engaging in sex. By definition, such women ought to exhibit a restricted sociosexual orientation. Women who choose mates according to attributes historically associated with male fitness (e.g., attractiveness), however, should require less time to evaluate these features. Consequently, they ought to adopt an unrestricted sociosexual orientation.

Males in evolutionary history who invested heavily in a mate's offspring should have desired long-term partners who demonstrated sexual exclusivity to the relationship, as revealed by resolute faithfulness and commitment. Conversely, men who did not invest exclusively should have preferred partners who possessed attributes associated with better fitness, such as greater physical attractiveness and/or social status. As with women, these choice patterns also should correlate with sociosexuality. Those men who invested exclusively in offspring should have required greater time to demonstrate and evaluate exclusivity to long-term relationships, thereby adopting a restricted sociosexual orientation. On the other hand, men who did not invest exclusively should have exhibited an unrestricted orientation.

Speculations based on evolutionary considerations concern behaviors shaped by and functional in past evolutionary environments (Symons, 1979; Tooby & Cosmides, 1990). Current environments may depart substantially from past ones. For example, while sex and reproduction were inextricably linked with one another during evolutionary history, they are not as closely associated today. Although behavioral propensities shaped in past environments no longer may be relevant to and functional in the current environment, the effects of such propensities still may be witnessed in certain forms of social behavior, particularly behavior pertaining to mate selection (Buss, 1985, 1989).

In view of contemporary social sanctions against sex outside of long-term, committed relationships (e.g., marriages), we examined our evolutionary speculations within premarital romantic relationships across three investigations.¹

INVESTIGATION 1

METHOD

Participants

Two hundred and twenty-one male and 252 female Texas A&M University undergraduates participated for course credit in introductory psychology.

Procedure

Participants completed an anonymous questionnaire survey in large, same-sex groups. Two indices were embedded in the survey: the Romantic Partner Attribute Index and the Sociosexual Orientation Inventory (SOI). Once participants completed the survey, they were thanked and debriefed.

Measures

Romantic Partner Attribute Index. This index was composed of 15 attributes (listed in Table 1), all of which have been used in previous research (e.g., Buss & Barnes, 1986; Hill, 1945; McGinnis, 1958). Participants rated each attribute from 1 (not at all important) to 9 (extremely important) according to how much it influenced their selection of a romantic partner.

Sociosexual Orientation Inventory. Sociosexual orientation was assessed by the SOI, which consists of five self-report indices (Simpson & Gangestad, 1991b): (a) number of different sex partners in the past year; (b) number of different sex partners foreseen in the next five years; (c) number of times having engaged in sex with someone on one and only one occasion; (d) frequency of sexual fantasy involving partners other than the current one (responded to on an 8-point scale, where 1 = never and 8 = at least once a day); and (e) three aggregated items tapping attitudes toward engaging in casual, uncommitted sex (e.g., "I can imagine myself being comfortable and enjoying casual sex with different partners"; answered on 9-point scales, where 1 = strongly disagree and 9 = strongly agree). The five indices were standardized (through z -score transformation) separately for men and women and then aggregated (Cronbach $\alpha = .74$). Higher scores indicate an unrestricted sociosexual orientation.

The SOI has been validated against both Q data (self-reports) and L data (independent reports provided by current romantic partners; Simpson & Gangestad, 1991b). Convergent validation evidence indicates that unrestricted individuals, relative to restricted ones, typically engage in sex earlier in their dating relationships, require less love, investment, commitment, and emotional bonding prior to engaging in sex, and are more likely to engage in concurrent sexual affairs. Discriminant validation evidence reveals that sociosexuality does not correlate highly with sex drive, sexual satisfaction, sex-related anxiety, or sex-related guilt. The SOI correlates approximately .40 with gender, with men typically scoring higher than women.

RESULTS AND DISCUSSION

Past research has shown that men and women emphasize different attributes when evaluating romantic partners (e.g., Buss & Barnes, 1986; Hudson & Henze, 1969). Thus, we first correlated biological sex (coded 1 if male, 0 if female) with each of the 15 attributes. In accord with previous findings, men rated physical attractiveness, $r(219) = .26$, and sex appeal, $r(219) = .18$, higher than did women. Women rated kindness and understanding, $r(250) = -.31$, financial resources, $r(250) = -.23$, responsibility, $r(250) = -.29$, similarity of values, $r(250) = -.23$, faithfulness and loyalty, $r(250) = -.25$, fun and exciting personality, $r(250) = -.17$, and stability of personality, $r(250) =$

-.15, higher than did men. Because we primarily were concerned with examining *within-sex* variation on these attributes, all subsequent analyses were conducted separately on men and women.

To determine whether one or more global dimensions might underlie participants' ratings on the 15 attributes, we first subjected these ratings to principal axis factor analyses (SPSSX PA2) in which communalities were iterated within the subsamples of men and women. Based on eigenvalue scree (Cattell, 1966) and factor interpretability, two factors accounting for over 40% of the variance were extracted in each subsample and rotated according to varimax criteria. Factor loadings are presented in Table 1.

Seven attributes loaded highly (.35 or greater within both subsamples) on the first factor, which we label *personal/parenting qualities*: qualities of a good parent, responsibility, kindness and understanding, sense of humor, stability of personality, similar values and beliefs, and faithfulness/loyalty. Four attributes loaded highly on the second factor, which we label *attractiveness/social visibility*: physical attractiveness, sex appeal, financial resources, and social status. Tucker's (1951) coefficient of factor congruence revealed that men and women had very similar loadings on the two factors (Tucker's coefficient = .96 and .97 for the two factors, respectively).

Factor scores were computed for both factors by summing the 11 respective factor score coefficients (one for each attribute) associated with each factor (see Harman, 1976). Both factors were then correlated with the SOI within each sex. For both men and women, the SOI correlated significantly with the personal/parenting qualities factor, $r_s = -.21$ and $-.24$, respectively, $p_s < .01$. Furthermore, within both sexes, the SOI correlated significantly with the attractiveness/social visibility factor, $r_s = .43$ and $.16$

TABLE 1 Factor Loadings for the 15 Romantic Partner Attributes

Variable	Females		Males	
	Factor 1	Factor 2	Factor 1	Factor 2
Kindness and understanding	.53	-.09	.65	-.09
Faithfulness and loyalty	.40	-.13	.46	.10
Stable personality	.47	.20	.52	.10
Responsibility	.60	.03	.69	-.10
Sense of humor	.41	.25	.61	.10
Similar values and beliefs	.53	.07	.35	.06
Qualities of a good parent	.73	.10	.64	.03
Sex appeal	-.03	.59	.14	.68
Physical attractiveness	-.15	.73	.07	.59
Social status	.09	.56	.11	.51
Financial resources	.00	.62	-.15	.55
Fun and exciting personality	.31	.35	.43	.13
Desire for children	.46	.06	.28	.05
Quality of health	.28	.42	.37	.33
Intelligence	.32	.33	.32	.27

Note. $N = 252$ females and 221 males. For both sexes, Factor 1 corresponds to personal/parenting qualities; Factor 2 corresponds to attractiveness/social status.

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respectively, $ps < .001$ and $.05$. As predicted, unrestricted individuals rated attributes pertaining to attractiveness and social visibility as relatively more important than did restricted individuals, whereas restricted individuals rated attributes dealing with personal/parenting qualities as more important than did unrestricted ones.

As reported in Table 2, correlations between the SOI and individual attributes revealed that most of the seven attributes which loaded on the personal/parenting qualities factor were reliably associated with the SOI within each sex. All four attributes loading on the attractiveness/social visibility factor significantly correlated with the SOI among men. Among women, two attributes carried the overall effect for the attractiveness/social visibility factor: physical attractiveness and sex appeal. That is, unrestricted females, relative to restricted ones, did not indicate a stronger preference for men possessing higher social status or greater financial resources. These results suggest that unrestricted women may place greater emphasis on potentially adaptive traits than partner resources when choosing romantic partners, at least during the college years.²

INVESTIGATION 2

Based on these preliminary findings, we next developed two vignettes. The first vignette depicted a potential romantic partner who possessed attributes that loaded highly on the attractiveness/social visibility factor as well as attributes that were the

TABLE 2 Correlations between Individuals' Sociosexual Orientation and Self-Rated Attributes

Attribute	Females	Males
Physical attractiveness	.18**	.36***
Social status	-.01	.16*
Kindness and understanding	-.17*	-.16*
Faithfulness and loyalty	-.16*	-.12 ⁺
Financial resources	.06	.19**
Responsibility	-.07	-.19**
Fun and exciting personality	-.10	.12 ⁺
Sense of humor	-.12 ⁺	-.03
Similar values and beliefs	-.26***	-.16*
Intelligence	.05	.10
Qualities of a good parent	-.18**	-.20**
Sex appeal	.22***	.43***
Stable personality	-.15*	-.01
Desire for children	-.17*	-.12 ⁺
Quality of health	.04	.10

Note. $N_s = 252$ females and 221 males. All tests are two-tailed.

⁺ $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$.

opposite of those that loaded highly on the personal/parenting factor. The second vignette described a potential partner who possessed the reverse pattern of attributes. Restricted and unrestricted individuals were asked to indicate which partner (a) most closely resembled their most recent one; (b) represented the type of individual they ideally would prefer to date; and (c) was most attractive to them. We hypothesized that unrestricted individuals would be more likely to select the romantic partner represented in the first vignette, while restricted individuals would choose the partner represented in the second.

METHOD

Participants

One hundred and ninety-eight male and 200 female Texas A&M University undergraduates participated for course credit in introductory psychology.

Procedure

Participants were recruited to complete a questionnaire survey in which the SOI was embedded. A purportedly ancillary part of the survey involved reading and evaluating two vignettes. The first vignette depicted a potential romantic partner who exhibited attributes that defined the attractiveness/social visibility factor as well as the *opposite* of those that characterized the personal/parenting factor:

Description/Person A: Person A is considered physically attractive and “sexy.” He/she has a sort of charisma that attracts the attention of those around him/her. Although some might consider him/her arrogant, A possesses a kind of self-confidence that others admire. A is not known, however, for living a responsible life-style. In the past, he/she has had a series of relatively short-term relationships. Some have ended because of questionable faithfulness on the part of A.

The second vignette described a potential partner who displayed the opposite set of attributes:

Description/Person B: Person B is an average-looking person, someone most people wouldn't consider “sexy.” He/she is sufficiently socially skilled but does not possess the kind of magnetic personality that draws the attention of others. Rather, B has a stable and responsible personality. In a relationship, B is caring, dependable, and faithful. He/she would like very much to have a family, likes children, and would probably be good with them.

After reading both vignettes, participants responded to three dependent measures: (a) “Which of these two descriptions is more similar to the sort of person you are currently involved with (or have been involved with in the past)?” (b) “Which of these descriptions represents the sort of person you would ideally prefer (either now or in the future) to be involved with?” and (c) “Which of the persons just described (Person A or Person B) do you typically find yourself attracted to, regardless of what kind of person you believe is best for you?” Participants were then thanked and debriefed.

RESULTS AND DISCUSSION

To determine whether restricted and unrestricted individuals expressed a differential preference for one of the two prospective romantic partners, we constructed an index reflecting the total number of choices allotted to each vignette. For each dependent measure, choice of the first vignette was coded as 1 and choice of the second was coded as 0. Participants' answers to all three dependent measures were aggregated to form a global partner choice index. We then conducted a hierarchical regression analysis, treating the partner choice index as the criterion measure and participants' gender, sociosexuality, and their interaction as predictors (entered in this order). This order of entry was chosen for two reasons. First, we wanted to partial out the effects of gender from scores on the SOI. Second, we needed to partial out main effects associated with gender and sociosexuality prior to testing for their interaction (see Cohen & Cohen, 1983).

Gender was not reliably associated with scores on this index, $\beta = .07, t < 1.5, ns$. However, after controlling for the effects of gender, the SOI was associated with scores on this index, $\beta = -.30, t = -6.43, p < .001$. Unrestricted individuals, relative to restricted ones, allotted a significantly larger number of their total choices to the attractive, charismatic, less dependable partner, whereas restricted individuals, compared to unrestricted ones, allotted a reliably larger number of their choices to the less attractive, less charismatic, more dependable one. A reliable Gender \times SOI interaction did not emerge, $\beta = -.07, t < 1, ns$.³

INVESTIGATION 3

Investigation 3 examined the attributes actually possessed by the romantic partners of restricted and unrestricted individuals. Based on the results of Investigations 1 and 2, we identified three attributes that broadly tapped the personal/parenting factor (faithfulness/loyalty, kindness/understanding, and responsibility) and three that tapped the attractiveness/social visibility factor (social visibility, physical attractiveness, and sex appeal).⁴ Faithfulness/loyalty was assessed by an index that measured partners' expectations of remaining in or leaving the current relationship (see Kelley, 1983). Kindness/understanding was indexed by Rubin's Love Scale (Rubin, 1970), given that the amount of kindness, understanding, and affection one displays toward one's partner should be reflected in higher scores on this index (Rubin, 1973). Responsibility was tapped by Zuckerman's Disinhibition Scale (Zuckerman, 1971) in view of the fact that disinhibited persons are known to behave in less dependable ways than inhibited ones (Zuckerman, 1983). Social visibility was tapped by Eysenck's Introversion/Extraversion Scale (S. G. B. Eysenck & H. J. Eysenck, 1975) since extraverts tend to be more socially visible than introverts (see H. J. Eysenck, 1967).⁵ Physical and sexual attractiveness were assessed by ratings made by three independent observers.

We hypothesized that unrestricted individuals, relative to restricted ones, would be dating partners who (a) did not expect the relationship to last; (b) possessed lower scores (indicative of less love for the partner) on Rubin's Love Scale; (c) possessed higher scores (indicative of greater disinhibition) on Zuckerman's Disinhibition Scale; (d) possessed higher scores (indicative of greater extraversion) on Eysenck's

Introversion/Extraversion Scale; and (*e*) were more physically and sexually attractive, as rated by independent judges.

Factors other than sociosexuality could generate these hypothesized effects. Two alternate explanations seem most viable. First, these effects might stem from assortative dating/mating processes whereby individuals are attracted to similar others independent of their standing on sociosexuality. Unrestricted individuals, for instance, may value attractiveness because they themselves are more attractive. Second, individual differences in general risk tolerance or harm avoidance might underlie these effects. If restricted individuals are more inclined to avoid risky or potentially threatening situations, whereas unrestricted individuals are more disposed to seek them out, these different inclinations might explain their contrasting patterns of romantic partner preferences. To address these alternate interpretations, we conducted partial correlations controlling for these potential confounds.

METHOD

Participants

Ninety-seven dating couples (97 men and 97 women), all of whom were Texas A&M University undergraduates, participated for course credit.

Procedure

Couples reported to a large experimental room in groups of 10 to 20. Upon arrival, the experimenter distributed number-coded questionnaire packets to each couple so that partners could respond anonymously yet both could be later identified as a couple for data analysis. The experimenter physically separated couples to ensure that partners could not communicate during the study. Participants then completed the questionnaire survey. As they returned their questionnaire packet, three raters, blind to who was dating whom, unobtrusively rated them on measures of physical and sexual attractiveness. When participants left the room, they were debriefed.

Measures

Participants completed the SOI, Rubin's Love Scale, Eysenck's extraversion measure (the EPQ; S. B. G. Eysenck & H. J. Eysenck, 1975), the Disinhibition Scale, and the MPQ Harm Avoidance Scale (Tellegen, 1982). They also responded to a three-item index that assessed the likelihood their current relationship would endure over time (e.g., "What is the likelihood that you will be dating your current dating partner 1 year from now?"). All three items were answered on 7-point Likert-type scales (where 1 = very low likelihood and 7 = very high likelihood) and aggregated to form a single index (Cronbach $\alpha = .90$).

Participants then rated their partner on 33 attributes that tap the 11 traits underlying the MPQ (Tellegen & Waller, in press). Three attributes assessed their partner's level of harm avoidance: safety-conscious, thrill-seeking (reverse keyed), and adventurous (reverse keyed). All attributes were rated on 5-point Likert-type scales and aggregated.

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As participants returned their packets, three independent observers rated them according to their physical and sexual attractiveness. Evaluations were made on two 7-point scales, where 1 = very unattractive and 7 = very attractive. Raters' evaluations for each item were then aggregated, resulting in a three-item physical attractiveness index and a three-item sexual attractiveness index. Because the two indices were highly correlated ($r_s = .72$ and $.80$ for females and males, respectively), they were combined to form a global index of physical/sexual attractiveness (Cronbach α 's = $.68$ and $.78$ for ratings of females and males across the three judges, respectively).

RESULTS AND DISCUSSION

To perform an overall test of our predictions, we first transformed the five attributes into z scores separately for each sex. Each attribute was keyed so that higher scores should have correlated positively with partner SOI. Following this, the five attributes were aggregated within each sex. We then correlated each male's SOI with his female partner's composite of the five attributes, and each female's SOI with her male partner's composite. As revealed in Table 3, each correlation was substantial, $r_s = .40$ and $.46$, respectively, $ps < .001$. Follow-up analyses on individual attributes revealed that the SOI correlated significantly with all but two partner attributes (absolute r_s ranged from $.15$ to $.38$ and averaged $.25$). The two nonsignificant correlations (between female SOI and male attractiveness and male extraversion) were marginally significant.

To ascertain whether these effects might be attributable to assortative dating or harm avoidance, partial correlations were performed. Specifically, we correlated each female's SOI with her male partner's composite, partialling out her self-reported standing on each attribute, her self-reported harm avoidance, and her harm avoidance as reported by her partner. We then conducted a parallel set of analyses for males. Results revealed that when each female's standing on these dimensions was partialled out, a significant relation between female SOI and the composite of her male partner's

TABLE 3 Correlation Analyses: Partner's Attributes Correlated with Sociosexual Orientation

Attribute	Male Partner Attributes with Female SOI	Female Partner Attributes with Male SOI
Composite	.46***	.40***
Disinhibition	.36***	.30**
Likelihood of Remaining in Relationship Index	-.38***	-.22*
Physical and Sexual Attractiveness Index	.15 ⁺	.26**
Extraversion	.15 ⁺	.17*
Love Scale	-.34***	-.18*

Note. $N = 93$ to 97 . Tests on all effects are one-tailed. SOI = Sociosexual Orientation Inventory.

⁺ $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$.

attributes still emerged, partial $r = .30, p < .01$. Once the effects of each male's standing on all attributes were partialled out, a marginally significant relation emerged between male SOI and the composite of his female partner's attributes, partial $r = .15, p < .10$. Generally speaking, then, systematic differences in assortative mating and harm avoidance do not appear to account for these effects, particularly among women.

GENERAL DISCUSSION

These three investigations provide converging evidence that restricted and unrestricted individuals desire (Investigation 1), choose (Investigation 2), and actually acquire (Investigation 3) romantic partners who manifest different sets of attributes. Unrestricted individuals seek out romantic partners who are more physically and sexually attractive and who possess higher social visibility. Restricted individuals prefer romantic partners who are more kind/affectionate, responsible, and loyal/faithful.

One major issue that many researchers who adopt evolutionary perspectives have not addressed is how to account for *why* more variability typically exists within the sexes than between them on most mate choice attributes. To date, theoretical and empirical attention has been devoted mainly to examining sex differences in mate selection. Yet sex differences explain only a portion of the variance underlying mate preferences. Many of the sociosexuality effects reported in these studies, in fact, were larger than gender effects. Given the present findings, how might one arrive at a more comprehensive evolutionary understanding of mate selection phenomena?

Gangestad and Simpson (1990a, 1990b) have suggested that variation in both mate choice preferences and sociosexual orientation might exist for two reasons. First, intrasexual competition should have produced differential reproductive success. Individuals who were not successful at an "all else equal" preferred strategy may have reproduced more successfully by adopting an *alternate* one. Selection, therefore, could have generated more than one reproductive strategy within each sex. Second, paternal investment is not all a male can offer a female; he also can offer "good genes" (Trivers, 1972).

Consider first the case of females. All else being equal, females should have been selected to mate with males who (a) possessed adaptive attributes or resources that could have been transmitted—either genetically or socially—to their offspring (e.g., adaptive traits with additive genetic variance); and (b) invested heavily in their offspring. All else should not have been equal, however. Those males most sought after for their adaptive attributes could have afforded to invest less in any one female's offspring. Hence, males should have been selected to invest less exclusively when they possessed adaptive attributes or resources (Gangestad & Simpson, 1990a, 1990b; Simpson & Gangestad, 1991a). As a result, the genetic fitness of a male should have covaried negatively with his willingness to invest exclusively. Given these circumstances, both a female strategy geared toward mating with males who had high fitness (and, by default, relatively unrestricted sociosexuality) and a female strategy geared toward mating with males who would invest exclusively (and, therefore, who demonstrated relatively restricted sociosexuality) could have been maintained through frequency-dependent selection (see Gangestad & Simpson, 1990a, 1990b; Simpson & Gangestad, 1991a).

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Now consider males. Certain males—most likely those who possessed either adaptive traits (e.g., physical attractiveness) or important resources that would confer a reproductive advantage to their offspring—may have been able to enact an unrestricted strategy more successfully than others. By possessing valued attributes and/or resources, these males may have been able to attract mates without having to grant high paternal investment (see Gangestad & Simpson, 1990a, 1990b; Simpson & Gangestad, 1991a). Such males, therefore, might have been selected to adopt an unrestricted sociosexual orientation and seek out attractive mates who, at the same time, did not require pronounced commitment, loyalty, and investment prior to mating. Males who did not possess adaptive traits or resources may have been unable to successfully compete for mates without granting paternal investment. Hence, selection pressures may have produced a mechanism whereby these males switched to a restricted sociosexual orientation, offering long-term investment, commitment, and loyalty to their romantic partners and expecting the same in return (see Gangestad & Simpson, 1990a, 1990b; Simpson & Gangestad, 1991a).

What characteristics should have been related to male fitness in past environments? Recent analyses suggest that physical attractiveness ought to have been one. Hamilton and Zuk (1982) have argued that attractive features should have been related to pathogen resistance during evolutionary history. Through host-parasite coevolution, heritable differences in pathogen resistance (and, hence, male fitness) could have been maintained. Female choice based on male attractiveness, therefore, could have been selected for in view of the advantages it conferred to her offspring (Trivers, 1972).

According to our model, then, individual differences in male and female sociosexuality might reflect genetically influenced or ecologically contingent reproductive strategies that fostered inclusive fitness in *both* restricted and unrestricted individuals during evolutionary history (see Tooby & Cosmides, 1990). Needless to say, this model is speculative. Empirical evidence from several different sources, however, supports some of its major premises. First, as anticipated by the model, scores on the SOI are positively and significantly correlated within romantic dyads (Simpson & Gangestad, 1991b). Second, as revealed by ratings of independent observers in Investigation 3, unrestricted males are significantly more physically attractive than their restricted counterparts.

Perhaps the most compelling evidence, however, comes from a study examining offspring sex ratios (Gangestad & Simpson, 1990a). In evolutionary history, male and female offspring should have been of differential reproductive value to restricted and unrestricted females. Unrestricted females should have been selected to mate with attractive males whose evolutionarily adaptive characteristics would have been passed on to their own offspring. Sons, however, should have profited more by possessing these characteristics than daughters since men probably varied more than did women in total number of offspring produced during our evolutionary past (Alexander, Hoogland, Howard, Noonan, & Sherman, 1979; Clutton-Brock & Iason, 1986). As a result, unrestricted females should have been selected to have relatively more sons (Weatherhead & Robertson, 1979). Restricted females, on the other hand, should have been selected to have relatively more daughters because their sons would have been at a disadvantage competing with the reproductively successful sons of unrestricted females.

A new analysis of the original Kinsey data (Kinsey, Pomeroy, Martin, & Gebhard, 1953) has, in fact, revealed that the number of premarital sexual partners significantly predicts offspring sex ratio (see Gangestad & Simpson, 1990a). Women who have engaged in sex with a larger number of premarital partners tend to have more sons, relative to their more restricted counterparts. Conversely, women who have had fewer premarital partners are more likely to have daughters, compared to more unrestricted women.

Additional support for this evolutionary perspective is provided by the present findings. Both unrestricted men and women prefer partners who are attractive, while restricted men and women desire partners who are more likely to demonstrate exclusivity and investment. Although the results of Investigation 3 suggest that female preferences may have a stronger impact on actual behavior than male preferences, even this finding is consistent with an evolutionary account. Women tend to be the “choosier” sex in most mammalian species (Trivers, 1972). Hence, female preference patterns should exert more influence over actual mate choice outcomes than male preference patterns.

It might be suggested that individual differences in sociosexuality reflect differences in *r*- versus *K*-selected reproductive strategies (see Rushton, 1985; Kenrick & Trost, 1987). According to the *r*-*K* model, more promiscuous people have adopted an *r*-strategy characterized by early and plentiful reproduction coupled with less parental care for offspring. Less promiscuous people subscribe to a *K*-strategy in which reproduction is delayed and less frequent but greater parental care is provided. A variety of disparate physical and reproductive attributes purportedly differentiate these two strategies. For example, *r*-strategists should mature more rapidly, reproduce earlier, have more offspring, exhibit less parental care, have a shorter life span, be smaller in size, have higher metabolisms, and have higher rates of infant mortality (see Rushton, 1990). *K*-strategists should display the opposite tendencies.

The *r*-*K* model does share one major feature in common with ours: Both models suggest that restricted individuals—and particularly restricted women—may have been selected for gaining paternal investment. However, the two models differ in several critical respects. Our model does *not* predict that sociosexuality should covary with the entire constellation of physical and reproductive attributes presumed to underlie *r*- and *K*-strategies. Within our model, for instance, there is no reason to expect that restricted individuals, relative to unrestricted ones, should necessarily mature more slowly, reproduce later, have a longer life span, be larger in size, have lower metabolisms, produce less offspring, or have lower rates of infant mortality. In accord with this position, recent evidence indicates that unrestricted women reproduce neither earlier nor at a higher rate than do restricted ones (Gangestad & Simpson, 1990a). Moreover, neither unrestricted men nor women become sexually active at an earlier age than their restricted counterparts (Simpson & Gangestad, 1989).

The two models also differ with respect to what types of selection pressures might have generated unrestricted sociosexuality. The *r*-*K* model assumes that unrestricted sociosexuality was selected to promote early and plentiful reproduction as a result of prolonged exposure to variable or unstable environments. By contrast, our model suggests that—at least for women—unrestricted sociosexuality may have evolved to secure mates who possessed attributes or resources that would enhance

the inclusive fitness of subsequent offspring, particularly sons. Moreover, both restricted and unrestricted sociosexuality could have emerged and been maintained by frequency-dependent selection (see Gangestad & Simpson, 1990a, 1990b). r-K theory does not address these novel aspects of our model.

Perspectives other than evolutionary ones, of course, may account for the mate choice patterns discovered in these investigations. Two important points, however, must be kept in mind. First, any explanation must account for the total pattern of evidence we have marshaled, including the offspring sex ratio findings. Second, if evolutionary forces have operated on *any* form of human social behavior, they should have operated on behaviors pertaining to sociosexuality and the patterns of mate preference that covary with it. Future research should examine this model in the context of committed marital relationships.

ENDNOTES

1. Among college students, attributes deemed important in dating partners and marital partners tend to be very similar within individuals (Simpson & Gangestad, 1988). Thus, even though these investigations focus on what kinds of attributes individuals seek in dating partners, they should be a fairly accurate reflection of what they look for in marital ones.
2. Additional analyses revealed reliable or marginally reliable sex differences in correlations between the SOI and four attributes—physical attractiveness ($z = 2.10, p < .05$), sex appeal ($z = 2.54, p < .05$), fun and exciting personality ($z = 2.38, p < .05$), and social status ($z = 1.84, p < .10$). Although physical attractiveness and sex appeal correlated reliably with sociosexuality for both men and women, the relations between these two attributes and sociosexuality were significantly stronger among males.
3. We also conducted three Probit analyses, one for each dichotomous dependent measure. Reliable effects for sociosexuality emerged on each dependent measure: “Which . . . description is more similar to the sort of person you are currently involved with . . . ?” ($\beta = -.19, t = -3.52, p < .001$); “Which . . . description represents the sort of person you would ideally prefer . . . ?” ($\beta = -.31, t = -5.95, p < .001$); and “Which of the persons . . . do you typically find yourself attracted to . . . ?” ($\beta = -.27, t = -5.13, p < .001$).
4. The attribute “qualities of a good parent” was not included for two reasons. First, it does not reflect a single attribute but rather a conglomeration of several different attributes. Second, some features of good parental qualities should be reflected in the three attributes chosen to assess the personal/parenting factor.
5. We used extraversion as a marker of social visibility because it is a widely used, highly reliable, and well-validated measure that assesses individual differences in social visibility (see Tellegen, 1982). Extraverted persons typically are the center of attention in social settings, often assuming roles (e.g., leadership) that heighten their social prominence and visibility (see H. J. Eysenck, 1967).

REFERENCES

- Alexander, R. D., Hoogland, J. L., Howard, R. D., Noonan, K. M., & Sherman, P. W. (1979). Sexual dimorphisms and breeding systems in pinnepeds, ungulates, primates, and humans. In N. Chagnon & W. Irons (Eds.), *Evolutionary biology and human social behavior: An anthropological perspective* (pp. 402–435). North Scituate, MA: Duxbury.
- Buss, D. M. (1985). Human mate selection. *American Scientist*, **73**, 47–51.
- Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences*, **12**, 1–14.
- Buss, D. M., & Barnes, M. (1986). Preferences in human mate selection. *Journal of Personality and Social Psychology*, **50**, 559–570.
- Byrne, D. (1971). *The attraction paradigm*. New York: Academic Press.
- Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, **1**, 245–276.
- Clutton-Brock, T. H., & Iason, G. R. (1986). Sex ratio variation in mammals. *Quarterly Review of Biology*, **61**, 339–374.
- Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum.

- Eysenck, H. J. (1967). *The biological basis of personality*. Springfield, IL: Thomas.
- Eysenck, S. B. G., & Eysenck, H. J. (1975). *Manual of the Eysenck Personality Questionnaire*. London: Hodder & Stoughton.
- Gangestad, S. W., & Simpson, J. A. (1990a). Toward an evolutionary history of female sociosexual variation. *Journal of Personality*, **58**, 69–96.
- Gangestad, S. W., & Simpson, J. A. (1990b). *On human sociosexual variation: An evolutionary model of mating propensities*. Manuscript submitted for publication.
- Green, S. K., Buchanan, D. R., & Heuer, S. K. (1984). Winners, losers, and choosers: A field investigation of dating initiation. *Personality and Social Psychology Bulletin*, **10**, 502–511.
- Hamilton, W. D., & Zuk, M. (1982). Heritable true fitness and bright birds: A role for parasites. *Science*, **218**, 384–387.
- Harman, H. H. (1976). *Modern factor analysis* (3rd ed.). Chicago: University of Chicago Press.
- Hill, C. T., Rubin, Z., & Peplau, L. A. (1976). Break-ups before marriage: The end of 103 affairs. *Journal of Social Issues*, **32**, 147–167.
- Hill, R. (1945). Campus values in mate selection. *Journal of Home Economics*, **37**, 554–558.
- Hudson, J. W., & Henze, L. P. (1969). Campus values in mate selection: A replication. *Journal of Marriage and the Family*, **31**, 772–778.
- Kaplan, M. R., & Anderson, N. H. (1973). Information integration theory and reinforcement theory as approaches to interpersonal attraction. *Journal of Personality and Social Psychology*, **28**, 301–312.
- Kelley, H. H. (1983). Love and commitment. In H. H. Kelley, E. Berscheid, A. Christensen, J. H. Harvey, T. L. Huston, G. Levinger, E. McClintock, L. A. Peplau, & D. R. Peterson (Eds.), *Close relationships* (pp. 265–314). San Francisco: Freeman.
- Kenrick, D. T., & Trost, M. R. (1987). A biosocial theory of heterosexual relationships. In K. Kelley (Ed.), *Females, males, and sexuality: Theories and research* (pp. 59–100). Albany: SUNY Press.
- Kinsey, A. C., Pomeroy, W. B., Martin, C. E., & Gebhard, P. H. (1953). *Sexual behavior in the human female*. Philadelphia: Saunders.
- McGinnis, R. (1958). Campus values and mate selection. *Social Forces*, **36**, 368–373.
- Rubin, Z. (1970). Measurement of romantic love. *Journal of Personality and Social Psychology*, **16**, 265–273.
- Rubin, Z. (1973). *Liking and loving: An invitation to social psychology*. New York: Holt, Rinehart, & Winston.
- Rushton, J. P. (1985). Differential K theory: The sociology of individual and group differences. *Personality and Individual Differences*, **6**, 441–452.
- Rushton, J. P. (1990). Sir Francis Galton, epigenetic rules, genetic similarity theory, and human life-history analysis. *Journal of Personality*, **58**, 117–140.
- Sadalla, E. K., Kenrick, D. T., & Vershure, B. (1987). Dominance and heterosexual attraction. *Journal of Personality and Social Psychology*, **52**, 730–738.
- Simpson, J. A., & Gangestad, S. W. (1988). [Date versus mate preferences]. Unpublished raw data, Texas A&M University.
- Simpson, J. A., & Gangestad, S. W. (1989). [Correlates of sociosexuality]. Unpublished raw data, Texas A&M University.
- Simpson, J. A., & Gangestad, S. W. (1991a). Personality and sexuality: Empirical relations and an integrative theoretical model. In K. McKinney & S. Sprecher (Eds.), *Sexuality in close relationships* (pp. 71–92). Hillsdale, NJ: Lawrence Erlbaum.
- Simpson, J. A., & Gangestad, S. W. (1991b). Individual differences in sociosexuality: Evidence for convergent and discriminant validity. *Journal of Personality and Social Psychology*, **60**, 870–883.
- Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
- Tellegen, A. (1982). *A short manual for the Differential Personality Questionnaire*. Unpublished manuscript, University of Minnesota.
- Tellegen, A., & Waller, N. (in press). Exploring personality through test construction: Development of the Multidimensional Personality Questionnaire. In S.R. Briggs & J. M. Cheek (Eds.), *Personality measures: Development and evaluation* (Vol. 1). Greenwich, CT: JAI Press.
- Tooby, J., & Cosmides, L. (1990). On the universality of human nature and the uniqueness of the individual: The role of genetics and adaptation. *Journal of Personality*, **58**, 17–67.
- Trivers, R. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man, 1871–1971* (pp. 136–179). Chicago: Aldine.
- Tucker, L. R. (1951). A method for synthesis of factor analysis studies (Personnel Research Section Report No. 984). Washington, DC: Department of the Army.
- Walster, E., Aronson, V., Abrahams, D., & Rottmann, L. (1966). Importance of physical attractiveness in dating behavior. *Journal of Personality and Social Psychology*, **4**, 508–516.
- Weatherhead, P. J., & Robertson, R. J. (1979). Offspring quality and the polygyny threshold: The “sexy son” hypothesis. *American Naturalist*, **113**, 201–208.
- Wilson, E. O. (1978). *On human nature*. Cambridge, MA: Harvard University Press.
- Zuckerman, M. (1971). Dimensions of sensation seeking. *Journal of Consulting and Clinical Psychology*, **36**, 45–52.
- Zuckerman, M. (1983). A biological theory of sensation seeking. In M. Zuckerman (Ed.), *Biological bases of sensation seeking, impulsivity, and anxiety* (pp. 37–76). Hillsdale, NJ: Lawrence Erlbaum.

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Sex Differences in Jealousy Evolution, Physiology, and Psychology

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In species with internal female fertilization, males risk both lowered paternity probability and investment in rival gametes if their mates have sexual contact with other males. Females of such species do not risk lowered maternity probability through partner infidelity, but they do risk the diversion of their mates' commitment and resources to rival females. Three studies tested the hypothesis that sex differences in jealousy emerged in humans as solutions to the respective adaptive problems faced by each sex. In Study 1, men and women selected which event would upset them more—a partner's sexual infidelity or emotional infidelity. Study 2 recorded physiological responses (heart rate, electrodermal response, corrugator supercilii contraction) while subjects imagined separately the two types of partner infidelity. Study 3 tested the effect of being in a committed sexual relationship on the activation of jealousy. All studies showed large sex differences, confirming hypothesized sex linkages in jealousy activation.

In species with internal female fertilization and gestation, features of reproductive biology characteristic of all 4,000 species of mammals, including humans, males face an adaptive problem not confronted by females—uncertainty in their paternity of offspring. Maternity probability in mammals rarely or never deviates from 100%. Compromises in paternity probability come at substantial reproductive cost to the male—the loss of mating effort expended, including time, energy, risk, nuptial gifts, and mating opportunity costs. A cuckolded male also loses the female's parental effort, which becomes channeled to a competitor's gametes. The adaptive problem of paternity uncertainty is exacerbated in species in which males engage in some postzygotic parental investment (Trivers, 1972). Males risk investing resources in putative offspring that are genetically unrelated.

These multiple and severe reproductive costs should have imposed strong selection pressure on males to defend against cuckoldry. Indeed, the literature is replete with examples of evolved anticuckoldry mechanisms in lions (Bertram, 1975), bluebirds (Power, 1975), doves (Erickson & Zenone, 1976), numerous insect species (Thornhill & Alcock, 1983), and nonhuman primates (Hrdy, 1979). Since humans arguably show more paternal investment than any other of the 200 species of primates (Alexander & Noonan, 1979), this selection pressure should have operated especially

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intensely on human males. Symons (1979); Daly, Wilson, and Weghorst (1982); and Wilson and Daly (in press) have hypothesized that male sexual jealousy evolved as a solution to this adaptive problem (but see Hupka, 1991, for an alternative view). Men who were indifferent to sexual contact between their mates and other men presumably experienced lower paternity certainty, greater investment in competitors' gametes, and lower reproductive success than did men who were motivated to attend to cues of infidelity and to act on those cues to increase paternity probability.

Although females do not risk maternity uncertainty, in species with biparental care they do risk the potential loss of time, resources, and commitment from a male if he deserts or channels investment to alternative mates (Buss, 1988; Thornhill & Alcock, 1983; Trivers, 1972). The redirection of a mate's investment to another female and her offspring is reproductively costly for a female, especially in environments where offspring suffer in survival and reproductive currencies without investment from both parents.

In human evolutionary history, there were likely to have been at least two situations in which a woman risked losing a man's investment. First, in a monogamous marriage, a woman risked having her mate invest in an alternative woman with whom he was having an affair (partial loss of investment) or risked his departure for an alternative woman (large or total loss of investment). Second, in polygynous marriages, a woman was at risk of having her mate invest to a larger degree in other wives and their offspring at the expense of his investment in her and her offspring. Following Buss (1988) and Mellon (1981), we hypothesize that cues to the development of a deep emotional attachment have been reliable leading indicators to women of potential reduction or loss of their mate's investment.

Jealousy is defined as an emotional "state that is aroused by a perceived threat to a valued relationship or position and motivates behavior aimed at countering the threat. Jealousy is 'sexual' if the valued relationship is sexual" (Daly et al., 1982, p. 11; see also Salovey, 1991; White & Mullen, 1989). It is reasonable to hypothesize that jealousy involves physiological reactions (autonomic arousal) to perceived threat and motivated action to reduce the threat, although this hypothesis has not been examined. Following Symons (1979) and Daly et al. (1982), our central hypothesis is that the events that activate jealousy physiologically and psychologically differ for men and women because of the different adaptive problems they have faced over human evolutionary history in mating contexts. Both sexes are hypothesized to be distressed over both sexual and emotional infidelity, and previous findings bear this out (Buss, 1989). However, these two kinds of infidelity should be weighted differently by men and women. Despite the importance of these hypothesized sex differences, no systematic scientific work has been directed toward verifying or falsifying their existence (but for suggestive data, see Francis, 1977; Teismann & Mosher, 1978; White & Mullen, 1989).

STUDY 1: SUBJECTIVE DISTRESS OVER A PARTNER'S EXTERNAL INVOLVEMENT

This study was designed to test the hypothesis that men and women differ in which form of infidelity—sexual versus emotional—triggers more upset and subjective distress, following the adaptive logic just described.

Method

After reporting age and sex, subjects ($N = 202$ undergraduate students) were presented with the following dilemma:

Please think of a serious committed romantic relationship that you have had in the past, that you currently have, or that you would like to have. Imagine that you discover that the person with whom you've been seriously involved became interested in someone else. What would distress or upset you more (*please circle only one*):

(A) Imagining your partner forming a deep emotional attachment to that person.

(B) Imagining your partner enjoying passionate sexual intercourse with that other person.

Subjects completed additional questions, and then encountered the next dilemma, with the same instructional set, but followed by a different, but parallel, choice:

(A) Imagining your partner trying different sexual positions with that other person.

(B) Imagining your partner falling in love with that other person.

Results

Shown in Figure 1 (upper panel) are the percentages of men and women reporting more distress in response to sexual infidelity than emotional infidelity. The first empirical probe, contrasting distress over a partner's sexual involvement with distress over a partner's deep emotional attachment, yielded a large and highly significant sex difference ($\chi^2 = 47.56$, $df = 3$, $p < .001$). Fully 60% of the male sample reported greater distress over their partner's potential sexual infidelity; in contrast, only 17% of the female sample chose that option, with 83% reporting that they would experience greater distress over a partner's emotional attachment to a rival.

This pattern was replicated with the contrast between sex and love. The magnitude of the sex difference was large, with 32% more men than women reporting greater distress over a partner's sexual involvement with someone else, and the majority of women reporting greater distress over a partner's falling in love with a rival ($\chi^2 = 59.20$, $df = 3$, $p < .001$).

STUDY 2: PHYSIOLOGICAL RESPONSES TO A PARTNER'S EXTERNAL INVOLVEMENT

Given the strong confirmation of jealousy sex linkage from Study 1, we sought next to test the hypotheses using physiological measures. Our central measures of autonomic arousal were electrodermal activity (EDA), assessed via skin conductance, and pulse rate (PR). Electrodermal activity and pulse rate are indicators of autonomic nervous system activation (Levenson, 1988). Because distress is an unpleasant subjective state, we also included a measure of muscle activity in the brow region of the face—electromyographic (EMG) activity of the *corrugator supercilii* muscle. This muscle is responsible for the furrowing of the brow often seen in facial displays of unpleasant

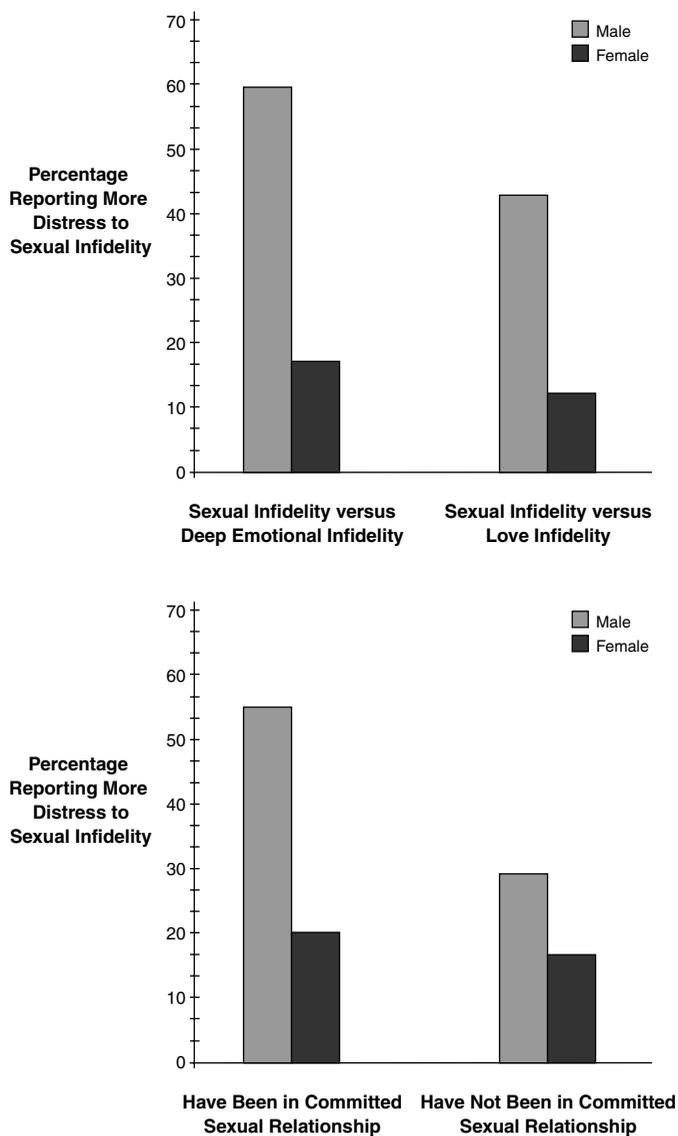


FIGURE 1 Reported comparisons of distress in response to imagining a partner's sexual or emotional infidelity. The upper panel shows results of Study 1—the percentage of subjects reporting more distress to the sexual infidelity scenario than to the emotional infidelity (left) and the love infidelity (right) scenarios. The lower panel shows the results of Study 3—the percentage of subjects reporting more distress to the sexual infidelity scenario than to the emotional infidelity scenario, presented separately for those who have experienced a committed sexual relationship (left) and those who have not experienced a committed sexual relationship (right).

emotion or affect (Fridlund, Ekman, & Oster, 1987). Subjects were asked to image two scenarios in which a partner became involved with someone else—one sexual intercourse scenario and one emotional attachment scenario. Physiological responses were recorded during the imagery trials.

Subjects

Subjects were 55 undergraduate students, 32 males and 23 females, each completing a 2-hr laboratory session.

Physiological Measures

Physiological activity was monitored on the running strip chart of a Grass Model 7D polygraph and digitized on a laboratory computer at a 10-Hz rate, following principles recommended in Cacioppo and Tassinary (1990).

Electrodermal Activity. Standard Beckman Ag/AgCl surface electrodes, filled with a .05 molar NaCl solution in a Unibase paste, were placed over the middle segments of the first and third fingers of the right hand. A Wheatstone bridge applied a 0.5-V voltage to one electrode.

Pulse Rate. A photoplethysmograph was attached to the subject's right thumb to monitor the pulse wave. The signal from this pulse transducer was fed into a Grass Model 7P4 cardiometer to detect the rising slope of each pulse wave, with the internal circuitry of the Schmitt trigger individually adjusted for each subject to output PR in beats per minute.

Electromyographic Activity. Bipolar EMG recordings were obtained over the *corrugator supercilii* muscle. The EMG signal was relayed to a wide-band AC-preamplifier (Grass Model 7P3), where it was band-pass filtered, full-wave rectified, and integrated with a time constant of 0.2 s.

Procedure

After electrode attachment, the subject was made comfortable in a reclining chair and asked to relax. After a 5-min waiting period, the experiment began. The subject was alone in the room during the imagery session, with an intercom on for verbal communication. The instructions for the imagery task were written on a form which the subject was requested to read and follow.

Each subject was instructed to engage in three separate images. The first image was designed to be emotionally neutral: "Imagine a time when you were walking to class, feeling neither good nor bad, just neutral." The subject was instructed to press a button when he or she had the image clearly in mind, and to sustain the image until the experimenter said to stop. The button triggered the computer to begin collecting physiological data for 20 s, after which the experimenter instructed the subject to "stop and relax."

The next two images were infidelity images, one sexual and one emotional. The order of presentation of these two images was counterbalanced. The instructions for sexual jealousy imagery were as follows: "Please think of a serious romantic relationship that you have had in the past, that you currently have, or that you would like to have. Now imagine that the person with whom you're seriously involved becomes interested in someone else. *Imagine you find out that your partner is having sexual intercourse with this other person.* Try to feel the feelings you would have if this happened to you."

The instructions for emotional infidelity imagery were identical to the above, except the italicized sentence was replaced with "*Imagine that your partner is falling in love and forming an emotional attachment to that person.*" Physiological data were

collected for 20 s following the subject's button press indicating that he or she had achieved the image. Subjects were told to "stop and relax" for 30 s between imagery trials.

Results

Physiological Scores. The following scores were obtained: (a) the amplitude of the largest EDA response occurring during each 20-s trial; (b) PR in beats per minute averaged over each 20-s trial; and (c) amplitude of EMG activity over the *corrugator supercilii* averaged over each 20-s trial. Difference scores were computed between the neutral imagery trial and the jealousy induction trials. Within-sex *t* tests revealed no effects for order of presentation of the sexual jealousy image, so data were collapsed over this factor.

Jealousy Induction Effects. Table 1 shows the mean scores for the physiological measures for men and women in each of the two imagery conditions. Differences in physiological responses to the two jealousy images were examined using paired-comparison *t* tests for each sex separately for EDA, PR, and EMG. The men showed significant increases in EDA during the sexual imagery compared with the emotional imagery ($t = 2.00$, $df = 29$, $p < .05$). Women showed significantly greater EDA to the emotional infidelity image than to the sexual infidelity image ($t = 2.42$, $df = 19$, $p < .05$). A similar pattern was observed with PR. Men showed a substantial increase in PR to both images, but significantly more so in response to the sexual infidelity image ($t = 2.29$, $df = 31$, $p < .05$). Women showed elevated PR to both images, but not

TABLE 1 Means and standard deviations on physiological measures during two imagery conditions

Measure	Imagery Type	Mean	SD
Males			
EDA	Sexual	1.30	3.64
	Emotional	-0.11	0.76
Pulse rate	Sexual	4.76	7.80
	Emotional	3.00	5.24
Brow EMG	Sexual	6.75	32.96
	Emotional	1.16	6.60
Females			
EDA	Sexual	-0.07	0.49
	Emotional	0.21	0.78
Pulse rate	Sexual	2.25	4.68
	Emotional	2.57	4.37
Brow EMG	Sexual	3.03	8.38
	Emotional	8.12	25.60

Note. Measures are expressed as changes from the neutral image condition. EDA is in microsiemen units, pulse rate is in beats per minute, and EMG is in microvolt units.

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differentially so. The results of the *corrugator* EMG were similar, although less strong. Men showed greater brow contraction to the sexual infidelity image, and women showed the opposite pattern, although results with this nonautonomic measure did not reach significance ($t = 1.12$, $df = 30$, $p < .14$, for males; $t = -1.24$, $df = 22$, $p < .12$, for females). The elevated EMG contractions for both jealousy induction trials in both sexes support the hypothesis that the effect experienced is negative.

STUDY 3: CONTEXTS THAT ACTIVATE THE JEALOUSY MECHANISM

The goal of Study 3 was to replicate and extend the results of Studies 1 and 2 using a larger sample. Specifically, we sought to examine the effects of having been in a committed sexual relationship versus not having been in such a relationship on the activation of jealousy. We hypothesized that men who had actually experienced a committed sexual relationship would report greater subjective distress in response to the sexual infidelity imagery than would men who had not experienced a high-investing sexual relationship, and that women who had experienced a committed sexual relationship would report greater distress to the emotional infidelity image than women who had not been in a committed sexual relationship. The rationale was that direct experience of the relevant context during development may be necessary for the activation of the sex-linked weighting of jealousy activation.

Subjects

Subjects for Study 3 were 309 undergraduate students, 133 men and 176 women.

Procedure

Subjects read the following instructions:

Please think of a serious or committed romantic relationship that you have had in the past, that you currently have, or that you would like to have. Imagine that you discover that the person with whom you've been seriously involved became interested in someone else. What would distress or upset you more (*please circle only one*):

(A) Imagining your partner falling in love and forming a deep emotional attachment to that person.

(B) Imagining your partner having sexual intercourse with that other person.

Alternatives were presented in standard forced-choice format, with the order counterbalanced across subjects. Following their responses, subjects were asked: "Have you ever been in a serious or committed romantic relationship? (yes or no)" and "If yes, was this a sexual relationship? (yes or no)."

Results

The results for the total sample replicate closely the results of Study 1. A much larger proportion of men (49%) than women (19%) reported that they would be more distressed by their partner's sexual involvement with someone else than by their partner's emotional attachment to, or love for, someone else ($\chi^2 = 38.48$, $df = 3$, $p < .001$).

The two pairs of columns in the bottom panel of Figure 1 show the results separately for those subjects who had experienced a committed sexual relationship in the past and those who had not. For women, the difference is small and not significant: Women reported that they would experience more distress about a partner's emotional infidelity than a partner's sexual infidelity, regardless of whether or not they had experienced a committed sexual relationship ($\chi^2 = 0.80$, $df = 1$, ns).

For men, the difference between those who had been in a sexual relationship and those who had not is large and highly significant. Whereas 55% of the men who had experienced committed sexual relationships reported that they would be more distressed by a partner's sexual than emotional infidelity, this figure drops to 29% for men who had never experienced a committed sexual relationship ($\chi^2 = 12.29$, $df = 1$, $p < .001$). Sexual jealousy in men apparently becomes increasingly activated upon experience of the relevant relationship.

DISCUSSION

The results of the three empirical studies support the hypothesized sex linkages in the activators of jealousy. Study 1 found large sex differences in reports of the subjective distress individuals would experience upon exposure to a partner's sexual infidelity versus emotional infidelity. Study 2 found a sex linkage in autonomic arousal to imagined sexual infidelity versus emotional infidelity; the results were particularly strong for the EDA and PR. Study 3 replicated the large sex differences in reported distress to sexual versus emotional infidelity, and found a strong effect for men of actually having experienced a committed sexual relationship.

These studies are limited in ways that call for additional research. First, they pertain to a single age group and culture. Future studies could explore the degree to which these sex differences transcend different cultures and age groups. Two clear evolutionary psychological predictions are (a) that male sexual jealousy and female commitment jealousy will be greater in cultures where males invest heavily in children, and (b) that male sexual jealousy will diminish as the age of the male's mate increases because her reproductive value decreases. Second, future studies could test the alternative hypotheses that the current findings reflect (a) domain-specific psychological adaptations to cuckoldry versus potential investment loss or (b) a more domain-general mechanism such that any thoughts of sex are more interesting, arousing, and perhaps disturbing to men whereas any thoughts of love are more interesting, arousing, and perhaps disturbing to women, and hence that such responses are not specific to jealousy or infidelity. Third, emotional and sexual infidelity are clearly correlated, albeit imperfectly, and a sizable percentage of men in Studies 1 and 3 reported greater distress to a partner's emotional infidelity. Emotional infidelity may signal sexual infidelity and vice versa, and hence both sexes should become distressed at both forms (see Buss, 1989). Future research could profitably explore in greater detail the correlation of these forms of infidelity as well as the sources of within-sex variation. Finally, the intriguing finding that men who have experienced a committed sexual relationship differ dramatically from those who have not, whereas for women such experiences appear to be irrelevant to their selection of emotional infidelity as the more distressing event, should be examined. Why do such ontogenetic experiences matter for men, and why do they appear to be irrelevant for women?

Within the constraints of the current studies, we can conclude that the sex differences found here generalize across both psychological and physiological methods—demonstrating an empirical robustness in the observed effect. The degree to which these sex-linked elicitors correspond to the hypothesized sex-linked adaptive problems lends support to the evolutionary psychological framework from which they were derived. Alternative theoretical frameworks, including those that invoke culture, social construction, deconstruction, arbitrary parental socialization, and structural powerlessness, undoubtedly could be molded post hoc to fit the findings—something perhaps true of any set of findings. None but the Symons (1979) and Daly et al. (1982) evolutionary psychological frameworks, however, generated the sex-differentiated predictions in advance and on the basis of sound evolutionary reasoning. The recent finding that male sexual jealousy is the leading cause of spouse battering and homicide across cultures worldwide (Daly & Wilson, 1988a, 1988b) offers suggestive evidence that these sex differences have large social import and may be species-wide.

REFERENCES

- Alexander, R.D., & Noonan, K.M. (1979). Concealment of ovulation, parental care, and human social evolution. In N. Chagnon & W. Irons (Eds.), *Evolutionary biology and human social behavior* (pp. 436–453). North Scituate, MA: Duxbury.
- Bertram, B.C.R. (1975). Social factors influencing reproduction in wild lions. *Journal of Zoology*, *177*, 463–482.
- Buss, D.M. (1988). From vigilance to violence: Tactics of mate retention. *Ethology and Sociobiology*, *9*, 291–317.
- Buss, D.M. (1989). Conflict between the sexes: Strategic interference and the evocation of anger and upset. *Journal of Personality and Social Psychology*, *56*, 735–747.
- Cacioppo, J.T., & Tassinari, L.G. (Eds.). (1990). *Principles of psychophysiology: Physical, social, and inferential elements*. Cambridge, England: Cambridge University Press.
- Daly, M., & Wilson, M. (1988a). Evolutionary social psychology and family violence. *Science*, *242*, 519–524.
- Daly, M., & Wilson, M. (1988b). *Homicide*. Hawthorne, NY: Aldine.
- Daly, M., Wilson, M., & Weghorst, S.J. (1982). Male sexual jealousy. *Ethology and Sociobiology*, *3*, 11–27.
- Erickson, C.J., & Zenone, P.G. (1976). Courtship differences in male ring doves: Avoidance of cuckoldry? *Science*, *192*, 1353–1354.
- Francis, J.L. (1977). Toward the management of heterosexual jealousy. *Journal of Marriage and Family Counseling*, *10*, 61–69.
- Fridlund, A., Ekman, P., & Oster, J. (1987). Facial expressions of emotion. In A. Siegman & S. Feldstein (Eds.), *Nonverbal behavior and communication* (pp. 143–224). Hillsdale, NJ: Erlbaum.
- Hrdy, S.B.G. (1979). Infanticide among animals: A review, classification, and examination of the implications for the reproductive strategies of females. *Ethology and Sociobiology*, *1*, 14–40.
- Hupka, R.B. (1991). The motive for the arousal of romantic jealousy: Its cultural origin. In P. Salovey (Ed.), *The psychology of jealousy and envy* (pp. 252–270). New York: Guilford Press.
- Levenson, R.W. (1988). Emotion and the autonomic nervous system: A prospectus for research on autonomic specificity. In H. Wagner (Ed.), *Social psychophysiology: Theory and clinical applications* (pp. 17–42). London: Wiley.
- Mellon, L.W. (1981). *The evolution of love*. San Francisco: W.H. Freeman.
- Power, H.W. (1975). Mountain bluebirds: Experimental evidence against altruism. *Science*, *189*, 142–143.
- Salovey, P. (Ed.). (1991). *The psychology of jealousy and envy*. New York: Guilford Press.
- Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
- Teisman, M.W., & Mosher, D.L. (1978). Jealous conflict in dating couples. *Psychological Reports*, *42*, 1211–1216.
- Thornhill, R., & Alcock, J. (1983). *The evolution of insect mating systems*. Cambridge, MA: Harvard University Press.
- Trivers, R. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man, 1871–1971* (pp. 136–179). Chicago: Aldine.
- White, G.L., & Mullen, P.E. (1989). *Jealousy: Theory, research, and clinical strategies*. New York: Guilford Press.
- Wilson, M., & Daly, M. (in press). The man who mistook his wife for a chattel. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture*. New York: Oxford University Press.

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Evolution and Social Cognition Contrast Effects as a Function of Sex, Dominance, and Physical Attractiveness

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Previous research indicates that males, compared with females, evaluate their relationships less favorably after exposure to physically attractive members of the other sex. An evolutionary model predicts a converse effect after exposure to opposite-sex individuals high in dominance, which should lead females to evaluate their current relationships less favorably than males. Women and men rated their current relationships after being exposed to opposite-sex targets varying in both dominance and physical attractiveness. Consistent with earlier research, males exposed to physically attractive, as compared with average, targets rated their current relationships less favorably. Males' relationship evaluations were not directly influenced by the targets' dominance, although the effect of physical attractiveness was significant only for men exposed to women low in dominance. However, females' evaluations of their relationships were unaffected by exposure to physically attractive males but were lower after exposure to targets high in dominance. These data support predictions derived from an evolutionary model and suggest that such models can be used to generate testable hypotheses about ongoing social cognition.

Does exposure to attractive members of the other sex undermine satisfaction with a person's current relationship? The answer may depend on how one defines *attractive* and on whether the person in question is male or female. Research and theory arising from an evolutionary perspective suggest that exposure to a physically attractive woman might have a selective effect on men's judgments of their wives or girlfriends. In contrast, that same literature suggests that physical attractiveness will have less effect on women's judgments but that their judgments may be undermined by exposure to men who are highly dominant. We briefly review relevant theory and research below and then present a study examining the possibility of sex-differentiated contrast effects.

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SEX DIFFERENCES IN REPRODUCTIVE STRATEGIES

Evolutionary biologists have noted that animals vary widely in their reproductive patterns and that such variation is found within, as well as between, species (Daly & Wilson, 1983; Trivers, 1985). The most important division of reproductive strategy within a species is often related to sex. Darwin (1859) noted that, within a species, the two sexes might differ because of the process of *sexual selection*. As part of that process, the members of one sex mate differentially with members of the other sex who possess certain characteristics (such as the brilliant feathers of the male peacock). Presumably, the more an animal invests in the offspring, the more selective that animal will be about its partners (Trivers, 1972), because a careless choice is more costly.

As human males and females both invest heavily in their offspring, they will both be selective (Daly & Wilson, 1983; Kenrick & Keefe, 1992). However, males and females invest different resources and are therefore expected to value different characteristics in a mate (Kenrick, Groth, Trost, & Sadalla, 1993). Females invest relatively more direct physiological resources (contributing their own bodily nutrients to the fetus and nursing child), whereas males invest relatively more indirect resources (such as food, money, protection, and security). For this reason, females who are choosing mates are assumed to pay particular attention to a male's level of social dominance, which is presumably related to his ability to provide indirect resources. Males, in contrast, are assumed to pay special attention to signs of a female's apparent health and reproductive potential (Buss, 1989; Symons, 1979).

A number of researchers have found support for the assumption that women value men who show characteristics related to status or resource acquisition. For instance, Sadalla, Kenrick, and Vershure (1987) manipulated a target person's social dominance in several ways across several experiments. In each case, dominance enhanced a man's attractiveness to women but had no influence on a woman's attractiveness to men. In a similar vein, Buss (1989) found that a potential mate's social status was more important to women than to men across a number of cultures (see also Hill, 1984; Mealey, 1985; Turke & Betzig, 1985). Likewise, Kenrick, Sadalla, Groth, and Trost (1990) found that characteristics related to dominance were more central criteria in a woman's than in a man's choice of dates, sexual partners, and long-term mates. However, both Buss and Barnes (1986) and Kenrick et al. (1990) found that males valued a potential partner's physical attractiveness more highly than females. Several authors have suggested that physical attractiveness might be important to males as an indirect means of assessing age and physical condition (e.g., Buss & Barnes, 1986; Kenrick & Keefe, 1992; Symons, 1979), and there is some evidence supporting this reasoning (Cunningham, 1986; Mathes, Brennan, Haugen, & Rice, 1985). Presumably, age and physical condition are related to fertility (Kenrick & Keefe, 1992; Symons, 1979).

Females also report that physical attractiveness is important to them (Kenrick et al., 1993). However, it is important to note that females' and males' judgments of "attractiveness" are linked to different features. Females base their judgments on physical characteristics linked to dominance (such as a large jaw and a few day's growth of beard), not to the same complex of youthful prettiness and smooth skin that males find attractive in females (Cunningham, Barbee, & Pike, 1990; Keating, 1985). Further,

when Townsend and Levy (1990) gave subjects a choice between photographically depicted males varying in physical attractiveness and clothing status, females were more interested in a high-status, low-attractiveness male than in a low-status, high-attractiveness male, whereas males showed the reverse pattern of preferences.

Findings such as these, it might be argued, could be explained in terms of theoretical models based on the sex role norms of American or Western society. The predictions tested in the following pages were *derived* from work done within an evolutionary framework but not intended to test the entire nexus of “evolutionary theory” against the idea that humans are socialized. For reasons we discuss below, however, we believe that there is abundant evidence suggesting the utility of considering the comparative and evolutionary bases of gender differences in human mating behavior. In sum, evolutionary theorists assume that human females will select males on the basis of their position in a dominance hierarchy. Human males are also expected to be selective but to choose females on the basis of physical attractiveness. Extrapolating from these findings, a woman’s satisfaction in a relationship with a man might be expected to depend on the dominance of the other men with whom she compares him, whereas a man’s satisfaction in a relationship with a woman might be influenced less by dominance and more by the physical attractiveness of the women with whom he compares her.

PREVIOUS STUDIES OF CONTRAST AND ATTRACTIVENESS

Several studies have indicated that exposure to physically attractive people results in diminished ratings of the attractiveness of a target person of the same sex (Kenrick & Gutierrez, 1980; Kenrick, Gutierrez, & Goldberg, 1989; Kernis & Wheeler, 1981). A similar effect has been found in several studies in which subjects were asked to rate their attraction to their partners (Kenrick et al., 1989; Weaver, Masland, & Zillman, 1984). After exposure to physically attractive centerfold photographs, men rated themselves as less attracted to their partners. However, a parallel effect was not found for women exposed to male centerfolds—those women did not show significant decreases in attraction to their male partners (Kenrick et al., 1989). This sex difference is consistent with the theory and research discussed above. As we noted, women’s judgments of their partners are, compared with men’s, based less on facial and bodily attractiveness and more on features related to social status and dominance. Although men and women depicted in centerfolds are undoubtedly chosen for their attractiveness, it is unclear that males who pose for nude photographs are perceived as especially high in social status or social dominance.

A PREDICTION

Given the findings that females, compared with males, place greater emphasis on dominance when evaluating a member of the other sex and that males place greater emphasis on physical attractiveness, we predict a sex-differentiated pattern of contrast effects. Consistent with previous findings, we would expect that males, compared with females, will show lower ratings of their relationships with a particular woman after exposure to physically attractive members of the other sex. Consistent

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with findings indicating that females value dominance more than physical attractiveness in a partner, we expect that females will rate their current relationships less favorably after exposure to dominant members of the other sex and will show less influence of exposure to physically attractive males. Males are expected to be uninfluenced by the dominance of the females to whom they are exposed.

METHOD

Overview

Men and women involved in heterosexual relationships were exposed to profiles of opposite-sex others, ostensibly as part of an attempt to develop a university-sponsored dating service. The profiles depicted individuals of either high or average physical attractiveness and of either high or low dominance. After perusing the profiles, subjects rated both their present relationships and their partners.

Subjects

Subjects were 407 Arizona State University undergraduate students, 217 women and 190 men, who completed the study in partial fulfillment of an introductory psychology class requirement. The sign-up sheets specified the requirement that subjects be in a heterosexual relationship, and all subjects used in the experiment reported being currently involved in a relationship, ranging from dating to marriage. Subjects participated in mixed-sex group sessions of 10 or fewer and were run by one of two female experimenters (who were dressed in lab coats and glasses and had their hair pulled back, in an attempt to minimize any differences in attractiveness). Forty-four subjects were discarded either because of possible suspicions regarding the cover story or because of missing data, leaving 363 remaining subjects (198 women and 165 men).

Design

The experiment followed a 2 (Subject Sex: male/female) \times 2 (Target Physical Attractiveness: high/average) \times 2 (Target Dominance: high/low) between-subjects design. Male and female subjects were randomly assigned to the four target profile conditions.

Target Profiles

Each subject received a folder containing seven bogus target profiles. Four such profile sets were created, each representing one cell of the Target Physical Attractiveness \times Target Dominance design. Thus, each subject viewed seven opposite-sex targets who were either (a) highly physically attractive and highly dominant, (b) highly physically attractive and low in dominance, (c) average in physical attractiveness and highly dominant, or (d) average in physical attractiveness and low in dominance.

Each profile contained the following target information: a name, a 3-in. \times 4.5-in. photograph, home town, several hobbies (e.g., "tennis, being with friends, reading novels," "travel, camping"), and three bogus personality scores ("Social Facility/Likability," "Conscientiousness/ Task Orientation," and "Dominance/Ascendance").

Each of the personality scores was represented in the profiles both as a percentile score and as a point on a scale continuum, with the continuum anchored at each end by traits descriptive of people at that extreme. The profiles varied slightly, and randomly, in hobbies and Social Facility and Conscientiousness scores (i.e., all targets were presented as likable and of average conscientiousness); profiles differed substantially only in the physical attractiveness of the photographs and the targets' scores on the Dominance scale.

In the high-physical-attractiveness conditions, photographs were of professional models; in the average-physical-attractiveness conditions, photographs were of average-looking students taken from a yearbook of a large midwestern university. In the high-dominance conditions, dominance scores varied within the high range (ostensibly from the 80th to the 99th percentile of the student population); in the low-dominance conditions, dominance scores varied within the low range (from the 1st to the 20th percentile).

Procedure

Subjects were recruited for a study allegedly researching ways to implement a university-run dating service. They were informed that they were participating in the second phase of the study. In the initial phase, they were told, romantically unattached students interested in meeting others had completed a variety of personality questionnaires and had provided background information and photographs of themselves. The purpose of the phase in which they were involved, subjects were led to believe, was to determine the best format for presenting the information provided. Because romantically unattached students "did not tend to focus on the kind of information that will help them develop and sustain a relationship" and "were often too anxious about meeting others to provide reliable and valid data," subjects were told that the second phase of the study required the feedback of students who were already romantically involved and who had demonstrated the ability to relate to members of the opposite sex.

Subjects were further informed that they would view profiles—containing photographs and personality descriptions of several romantically unattached students who were interested in meeting others through this program—and subsequently evaluate the information in them. The experimenter then described the three personality dimensions present in the profiles and discussed how to interpret the percentile scores derived from them. For example, the Dominance/Ascendance scale was said to assess one's natural leadership abilities. High scores on this scale indicated that the respondent was powerful, authoritative, high in control, and masterful. The experimenter stressed that high scores indicated a natural leader, *not* someone who is hostile, domineering, dictatorial, or arrogant. Someone who would score low on this scale was described as obedient, yielding, and submissive.

After subjects indicated that they understood how to interpret the profile information, they were given a folder containing profiles of seven members of the other sex who had ostensibly participated in the first phase of the study. Subjects were given 7 min to look through the profiles carefully.

After perusing the profiles, subjects were given a questionnaire asking them to evaluate the proposed "dating program." It was noted that because the nature of their

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current relationship could affect these types of judgments, they would also be asked several questions about their current relationship. Subjects were reminded that all the information they provided would be kept strictly confidential.

Subjects then completed the dependent measures (see below). Finally, they were probed for suspicion, thoroughly debriefed, and dismissed.

Dependent Measures

Subjects rated their present relationship on 15 dimensions. The items assessed, on 7-point Likert-type scales, the following dimensions: permanence, satisfaction, stability, supportiveness, goodness, closeness, emotional intimacy, excitement, seriousness, commitment, importance, passion, how personally inspiring and how rewarding the relationship was, and how happy subjects were with the relationship.

Additionally, subjects rated their partners on the following 20 dimensions, again on 7-point scales: interesting, romantic, dominant, intelligent, physically attractive, warm, commanding, understanding, likable, passionate, powerful, desirable to the opposite sex, conscientiousness, masterful, sexually attractive, high in control, pleasant, emotionally expressive, natural leader, and sociable. Most of these items were selected because of their conceptual relevance to the dimensions of attractiveness, dominance, and likability.

Finally, subjects provided demographic information regarding their present relationship status, completed three open-ended questions dealing with their opinions about the profile format (in keeping with the cover story), and completed a manipulation check assessing the average attractiveness, sociability, conscientiousness, and dominance of the seven targets whose profiles they had seen.

RESULTS

Manipulation Checks

A Subject Sex \times Target Physical Attractiveness \times Target Dominance ANOVA on the dominance manipulation check revealed only the predicted main effect of target dominance, indicating that subjects viewed targets as more dominant in the high-dominance condition (average recalled percentile score = 83.42%) than in the low-dominance condition (average recalled percentile score = 12.87%), $F(1, 357) = 7656.90, p < .0001$. A similar ANOVA on the attractiveness manipulation check revealed the expected main effect of target physical attractiveness, indicating that subjects viewed targets as more physically attractive in the high-attractiveness condition (mean rating on a 7-point scale = 6.04) than in the average-attractiveness condition ($M = 3.51$), $F(1, 357) = 568.02, p < .0001$. There was also an interaction of Subject Sex \times Target Physical Attractiveness, $F(1, 357) = 15.84, p < .001$, indicating that the attractiveness manipulation had a somewhat larger influence on male subjects (6.17 vs. 3.19) than on female subjects (5.93 vs. 3.79). However, simple effects tests indicated that the physical attractiveness manipulations worked powerfully for *both* female ($p < .0001$) and male ($p < .0001$) subjects. These data thus indicate that both the dominance and physical attractiveness manipulations worked sufficiently well to warrant investigation of our hypotheses of interest.

Evaluations of Own Relationship

We created a composite measure of relationship evaluation by averaging the 15 relationship items ($\alpha = .95$). As predicted, there was a significant main effect of target physical attractiveness on the male subjects' evaluations of their present relationships, $F(1, 161) = 4.85, p < .05$. This effect was somewhat qualified, however, by an unexpected trend toward a Target Physical Attractiveness \times Target Dominance interaction, $F(1, 161) = 3.11, p < .08$ (see Figure 1).

Specifically, as the means presented in Figure 1 indicate, the physical attractiveness of the female targets influenced male subjects' evaluations only when the women were of low dominance, $F(1, 84) = 8.47, p < .005$. When the women were of high dominance, no significant effect of physical attractiveness was found ($F < 1$). Finally, there was no main effect of target dominance on male subjects' ratings of their relationships ($F < 1$).

In contrast, women were, as expected, somewhat more influenced by the manipulated dominance of the male targets than by physical attractiveness (see Figure 1). Women exposed to highly dominant men tended to evaluate their present relationships less favorably ($M = 5.74$) than women exposed to low-dominance men ($M = 6.00$), $F(1, 194) = 3.54, p = .061$. There were no effects on women's relationship evaluation for either target physical attractiveness or the Target Dominance \times Target Physical Attractiveness interaction ($F_s < .14, n.s.$).

Thus, with respect to the relationship evaluation composite measure, our hypotheses received generally favorable support. First, as predicted, females' judgments were more influenced by the dominance of the male targets than by their physical attractiveness (which had no effect). Second, also as predicted, male subjects were influenced by the physical attractiveness of the female targets. Third, and unexpectedly, male subjects were influenced by female physical attractiveness only when the women were of low dominance.¹

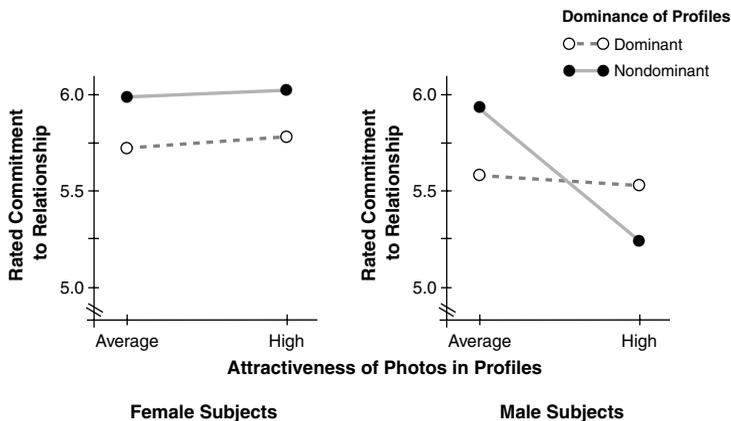


FIGURE 1 Evaluation of present relationship as a function of subject sex and the dominance and physical attractiveness of opposite-sex targets.

Evaluations of Present Partner

We created a composite measure of partner evaluation by averaging the 20 partner items ($\alpha = .86$). For female subjects, unlike the pattern present for the relationship evaluation measure, there were no significant effects of the manipulated variables (all F s $< .20$, n.s.). For male subjects, however, there was a marginally significant Target Physical Attractiveness \times Target Dominance interaction, $F(1, 161) = 3.19, p < .08$. Simple effects tests revealed that male subjects rated their present partners less favorably when the female targets were highly attractive, but again the effect of attractiveness obtained *only* when the women were of low dominance, $F(1, 84) = 6.33, p < .02$; when the female targets were highly dominant, target physical attractiveness had no such influence.²

To explore the possible effects of the manipulations on specific partner ratings, we created two other composite partner ratings. *Partner physical desirability* was composed of the items physically attractive, desirable to the opposite sex, and sexually attractive. *Partner dominance* was composed of the items dominant, commanding, powerful, masterful, high in control, and natural leader. These analyses did not suggest that differences in relationship evaluations could be explained as due to changes in the perceived dominance or sexual attractiveness of the partner. Both males and females showed a similar nonsignificant tendency to rate their partners as less physically desirable after being exposed to attractive targets, $F(1, 162) = 2.62, p < .11$, for males, and $F(1, 196) = 1.98, p < .17$, for females.³ All other effects yielded F s less than 1 on ratings of partner physical attractiveness, except for a similarly weak tendency for males to show the same Attractiveness \times Dominance interaction shown for ratings of relationship commitment, $F(1, 162) = 1.81, p < .18$. On the partner dominance composite, the partner ratings were quite different from ratings of commitment. The effect of the dominance manipulation was significant only for males, $F(1, 162) = 4.47, p < .05$, and it indicated that males exposed to high dominant females rated their partners as more dominant (suggesting an assimilation effect here, opposite to the contrast pattern obtained for females' ratings of commitment). No other effects for either sex approached significance (F s < 1), with the exception of the Dominance \times Attractiveness effect for male subjects, which yielded an $F(1, 162) = 2.22, p < .14$. The direction of that interaction was that the dominance effect was more pronounced among males exposed to high-attractive targets. That is, male subjects perceived their partners as least dominant after being exposed to the low-dominance, high-attractive targets.⁴

DISCUSSION

The findings of the present investigation provided reasonable support for our predictions. Women's judgments of their relationships with a particular man did appear to depend more on comparisons with other men who were dominant than with men who were good-looking—women who were exposed to dominant men, but not to physically attractive men, tended to rate themselves as less satisfied with their current relationships. Conversely, there was no main effect of dominance on men's evaluations of their relationships. For the men, physical attractiveness did make a difference—men evaluated their present relationships less favorably after viewing highly physically attractive women. Unexpectedly, that effect occurred only when the target females were

low in dominance. Note that these findings were obtained despite the likely existence of psychological pressures to evaluate one's relationship and partner in a favorable manner.

Implications of the Current Findings

These main findings are generally consistent with a number of prior studies of mate evaluation criteria, which suggest that (a) women value dominance in a potential partner more than men (Buss, 1989; Kenrick et al., 1990; Sadalla et al., 1987; Townsend, 1989) and (b) men value physical attractiveness in a potential mate more than women (Buss, 1989; Kenrick et al., 1989; Kenrick et al., 1990). The results of these previous studies, however, could conceivably be explained as due to differential social desirability of males' and females' *self-reports*. That is, it could be argued that subjects who are asked directly about their criteria for a mate simply say the socially appropriate thing: Women report more interest in dominance than men do, and men report relatively more interest in physical attractiveness (while their implicit reactions to actual members of the other sex may be unrelated to such reports). The advantage of the current method is that the indirect undermining of relationship satisfaction suggests a process much less directly amenable to normative self-presentation demands. Our results therefore suggest that males and females may indeed process different information when evaluating different features of partners. Manipulation checks indicated that men registered the dominance levels of the women in the profiles and that women registered the attractiveness of the men. However, those features did not directly affect their satisfaction with their current relationships.

What specific cognitive processes underlie the findings of sex-differentiated contrast in the present investigation? One possibility would parallel findings of color contrast, in which, for instance, a white circle appears red after exposure to a green circle. Analogously, the males' female partners might have actually appeared less attractive in contrast to the attractive women in the profiles, or the females' partners might have actually appeared less dominant in contrast to the dominant men. Such an explanation does not seem to apply well here. For females, the dominance manipulation influenced their relationship evaluations but did not influence their ratings of partner dominance. For males, their judgments of partner desirability did parallel their relationship evaluations, but the partner ratings were decidedly weaker than the relationship ratings. Thus, the changes in relationship ratings did not appear to be caused by the mediating effects of domain-specific decrements in partner ratings.

Alternatively, the ratings of relationships might have been mediated by perceptions of the availability of other desirable members of the other sex. That is, females exposed to a series of highly dominant men could have left their estimations of their current partner's dominance unchanged but reduced their commitment to him in the face of a seemingly abundant population of desirable alternatives who were more dominant. Likewise, males exposed to a series of highly attractive nondominant females might rate themselves as less committed to their partners, not because their partners suddenly appeared unattractive and domineering, but simply because they might have inferred that the population of available attractive submissive alternative partners was higher than they would otherwise have estimated. Future research to ex-

amine the specific proximate mechanisms for these findings would be of some interest. In particular, it would be of interest to conduct research examining how exposure to attractive and dominant targets affects subjective estimates of the population of available alternatives and of the partner's position in that distribution.

The tendency for men's ratings of relationship satisfaction to be lowest after exposure to attractive females who were also submissive might indicate a more complicated relationship between dominance and attractiveness than found in previous research. Sadalla and his colleagues (1987) found, in a series of three studies, that dominance was irrelevant to males' judgments of females. However, Sadalla et al. did not examine physical attractiveness as a variable. The present research raises the possibility that dominance may have effects on males' ratings of the attractiveness of females but that those effects interact with the target's attractiveness. In particular, females who are both dominant and attractive may be regarded as inaccessible to most males.

Heuristic Value of Evolutionary Models of Social Cognition

We view the specific empirical findings of this investigation as somewhat secondary to their general value as an indication that evolutionary models can serve as a useful heuristic, suggesting interesting hypotheses about ongoing processes of social cognition. Most experimental social psychologists are not directly interested in conducting gene-mapping studies, in digging up stone implements from the Paleolithic Age, or in tracking baboons across the plains of the Serengeti. However, the modern multidisciplinary evolutionary approach, incorporating findings from anthropology, ethology, behavior genetics, and psychology, has already proved useful in understanding and expanding on a number of existing phenomena in social psychology (Kenrick & Keefe, 1992; Kenrick & Trost, 1989). More important, the perspective has a number of implications for ongoing cognitive processes (Hansen & Hansen, 1988; Kenrick & Hogan, 1991; Lumsden & Wilson, 1981; Tooby & Cosmides, 1989). A consideration of human evolutionary history, in fact, suggests that the evolution of the human brain has been driven at least as much by the need to solve problems in social group living as by the sorts of problems with which modern cognitive scientists concern themselves (such as letter recognition).

Cognitive approaches to behavior have tended to focus on processes and have often ignored content (cf. Baron & Boudreau, 1987; McArthur & Baron, 1983). From an evolutionary perspective, the content of cognition is crucial, and it is, moreover, social content about which some of the most interesting hypotheses can be advanced. From an evolutionary perspective, the choice of a reproductive partner was a crucial one for our ancestors. The importance of such a decision leads to specific expectations about processes of social cognition ranging from attention and perception to memory and retrieval. For instance, our discussion above would lead to the expectation that males are likely to selectively attend to, encode, and recall information about a woman's youth and physical attractiveness whereas women are likely to selectively attend to, encode, and recall information about a man's dominance. Thus, the preliminary findings of the present investigation suggest that an evolutionary perspective can yield a wealth of testable hypotheses about ongoing social cognition.

To what extent is an evolutionary framework necessary to explain these and other findings on gender differences in mating strategies? As we indicated earlier, sex differences in mate preferences and related behaviors are commonly explained in terms of the norms of American or Western society. However, such explanations are often advanced without the necessary evidence that other societies possess different norms and correspondingly different behaviors. Recent findings suggest that an evolutionary model can explain a number of gender differences in mate selection that are difficult to explain with a "tabula rasa" cultural relativist position. For instance, a similar relative female preference for characteristics related to social dominance and a similar relative male preference for characteristics related to youth and attractiveness are found across widely divergent societies in widely divergent geographical areas (Buss, 1989; Kenrick & Keefe, 1992). Regarding dominance, research conducted with numerous other animal species suggests that when one sex shows a preference for dominance, it is females that more strongly prefer dominance in males (Daly & Wilson, 1983; Trivers, 1985). Other findings suggest that these differences are not parsimoniously explained in terms of differential social power of males and females, as even females who attain high levels of social power and wealth continue to indicate a preference for men who are older and more socially powerful than themselves (Kenrick & Keefe, 1992; Townsend, 1989; Wiederman & Allgeier, 1992). Of course, social norms do not operate outside the domain of human evolutionary history, and one would expect social norms to reflect and interact with biological constraints (Lumsden & Wilson, 1981). Models based solely on cultural norms can explain isolated findings but have difficulty incorporating the emerging nomological network of findings. Such models also have difficulty explaining where the cultural norms came from or why the norms are so similar across different societies. An evolutionary perspective is useful in placing current norms and ongoing social behavior in a wider context of cross-cultural, comparative, and physiological findings.

NOTES

1. Given the nature of our predictions, our analyses are appropriately focused. We should note, however, that the three-way Subject Sex \times Target Physical Attractiveness \times Target Dominance ANOVA on relationship evaluation revealed several overall effects of interest. First, there was a main effect of subject sex, revealing that our female subjects were generally more satisfied with their present relationships than our male subjects, $F(1, 355) = 9.26, p < .005$. Second, there was an interaction between subject sex and target physical attractiveness, $F(1, 355) = 3.56, p < .06$, such that our male subjects evaluated their present relationships less favorably when exposed to the highly attractive female targets whereas our female subjects showed no such influence of target physical attractiveness. This interaction is reflected in the more focused analyses above.
2. In addition, the overall three-way Subject Sex \times Target Physical Attractiveness \times Target Dominance ANOVA revealed a significant subject sex main effect, $F(1, 355) = 7.72, p < .006$: female subjects evaluated their partners more favorably than male subjects.
3. When subject sex was included as a factor in a $2 \times 2 \times 2$ ANOVA on physical desirability, there was only a main effect of the attractiveness of the target stimuli, $F(1, 358) = 4.68, p < .05$. There were no effects of dominance and no significant interactions involving the partner physical desirability ratings.
4. Analyzing the partner dominance composite with the $2 \times 2 \times 2$ ANOVA, there was a significant effect of subject sex, $F(1, 358) = 13.63, p < .001$, indicating that females rated their partners as more dominant than males did. There was also a marginal effect of the dominance manipulation, $F(1, 358) = 3.35, p < .07$ —partners were rated as more dominant when subjects had been exposed to the high-dominance targets. No interactions approached significance.

REFERENCES

- Baron, R. M., & Boudreau, L. A. (1987). An ecological perspective on integrating personality and social psychology. *Journal of Personality and Social Psychology*, *53*, 1222–1228.
- Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences*, *12*, 1–49.
- Buss, D. M., & Barnes, M. F. (1986). Preferences in human mate selection. *Journal of Personality and Social Psychology*, *50*, 559–570.
- Cunningham, M. R. (1986). Measuring the physical in physical attractiveness: Quasi-experiments on the sociobiology of female beauty. *Journal of Personality and Social Psychology*, *50*, 925–935.
- Cunningham, M. R., Barbee, A. P., & Pike, C. L. (1990). What do women want? Facial metric assessment of multiple motives in the perception of male physical attractiveness. *Journal of Personality and Social Psychology*, *59*, 61–72.
- Daly, M., & Wilson, M. (1983). *Sex, evolution, and human behavior* (2nd ed.). Boston: Willard Grant.
- Darwin, C. (1859). *On the origin of species*. London: Murray.
- Hansen, C. H., & Hansen, R. D. (1988). Finding the face in the crowd: The anger superiority effect. *Journal of Personality and Social Psychology*, *54*, 917–924.
- Hill, J. (1984). Prestige and reproductive success in man. *Ethology and Sociobiology*, *5*, 77–95.
- Keating, C. F. (1985). Gender and the physiognomy of dominance and attractiveness. *Social Psychology Quarterly*, *48*, 61–70.
- Kenrick, D. T., Groth, G. R., Trost, M. R., & Sadalla, E. K. (1993). Integrating evolutionary and social exchange perspectives on relationships: Effects of gender, self-appraisal, and involvement level on mate selection. *Journal of Personality and Social Psychology*, *64*, 951–969.
- Kenrick, D. T., & Gutierrez, S. E. (1980). Contrast effects and judgments of physical attractiveness: When beauty becomes a social problem. *Journal of Personality and Social Psychology*, *38*, 131–140.
- Kenrick, D. T., Gutierrez, S. E., & Goldberg, L. (1989). Influence of erotica on ratings of strangers and mates. *Journal of Experimental Social Psychology*, *25*, 159–167.
- Kenrick, D. T., & Hogan, R. (1991). Cognitive psychology. In M. Maxwell (Ed.), *The sociobiological imagination*. Albany: State University of New York.
- Kenrick, D. T., & Keefe, R. C. (1992). Age preferences in mates reflect sex differences in human reproductive strategies. *Behavioral and Brain Sciences*, *15*, 75–133.
- Kenrick, D. T., Sadalla, E. K., Groth, G., & Trost, M. R. (1990). Evolution, traits, and the stages of human courtship: Qualifying the parental investment model. *Journal of Personality*, *58*, 97–117.
- Kenrick, D. T., & Trost, M. R. (1989). A reproductive exchange model of heterosexual relationships: Putting proximate economics in ultimate perspective. *Review of Personality and Social Psychology*, *10*, 92–118.
- Kernis, M. H., & Wheeler, L. (1981). Beautiful friends and ugly strangers: Radiation and contrast effects in perceptions of same-sex pairs. *Personality and Social Psychology Bulletin*, *7*, 617–620.
- Lumsden C. J., & Wilson, E. O. (1981). *Genes, mind, and culture: The coevolutionary process*. Cambridge, MA: Harvard University Press.
- Mathes, E. W., Brennan, S. M., Haugen, P. M., & Rice, H. B. (1985). Ratings of physical attractiveness as a function of age. *Journal of Social Psychology*, *125*, 157–168.
- McArthur, L. Z., & Baron, R. M. (1983). Toward an ecological theory of social perception. *Psychological Review*, *90*, 215–238.
- Mealey, L. (1985). The relationship between social status and biological success: A case study of the Mormon religious hierarchy. *Ethology and Sociobiology*, *6*, 249–257.
- Sadalla, E. K., Kenrick, D. T., & Vershure, B. (1987). Dominance and heterosexual attraction. *Journal of Personality and Social Psychology*, *52*, 730–738.
- Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
- Tooby J., & Cosmides, L. (1989). Evolutionary psychology and the generation of culture. *Ethology and Sociobiology*, *10*, 29–49.
- Townsend, J. M. (1989). Mate-selection criteria: A pilot study. *Ethology and Sociobiology*, *10*, 241–252.
- Townsend, J. M., & Levy, G. D. (1990). Effects of potential partner's costume and physical attractiveness on sexuality and partner selection: Sex differences in reported preferences of university students. *Journal of Psychology*, *124*, 371–376.
- Trivers, R. L. (1985). *Social evolution*. Menlo Park, CA: Benjamin/Cummings.
- Turke, P. W., & Betzig, L. L. (1985). Those who can do: Wealth, status, and reproductive success on Ifaluk. *Ethology and Sociobiology*, *6*, 79–87.
- Weaver, J. B., Masland, J. L., & Zillman, D. (1984). Effect of erotica on young men's aesthetic perception of their female sexual partners. *Perceptual and Motor Skills*, *58*, 929–930.
- Wiederman, M. W., & Allgeier, E. R. (1992). Gender differences in mate selection criteria: Sociobiological or socioeconomic explanation? *Ethology and Sociobiology*, *13*, 115–124.