The Journal of Social Psychology, 2008, *148*(4), 389–405
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Sex Differences in Subjective Distress to Unfaithfulness: Testing Competing Evolutionary and Violation of Infidelity Expectations Hypotheses

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ABSTRACT. According to an evolutionary psychology perspective, men's and women's processing of threats to their sex-linked mate selection strategies cause sex differences in infidelity distress. An alternative account assumes that the distress results from men's and women's processing of expectation violations regarding the content of an unfaithful partner's actions with a rival. Logistic regressions supported the conclusion that the participant's sex—but not the processing of expectation violations—was the best predictor of the most distressing infidelity presented in forced-choice, mutually exclusive, and combined formats. Our results also indicated that the sex differences in infidelity distress were neither limited to using data from a forced-choice response format nor caused by the distinct inferences that men and women draw about the relation between love and sex.

Keywords: distress to infidelity, infidelity expectations, jealousy, sex differences

EVOLUTIONARY PSYCHOLOGY links the mate selection strategies that men and women pursue to sex differences in the social cues that elicit jealousy (e.g., Buss, Larsen, Westen, & Semmelroth, 1992; Buss & Schmitt, 1993; Daly, Wilson, & Weghorst, 1982; Symons, 1979). In theory, women improve their reproductive success by selecting a committed partner who consistently contributes personal

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and financial resources to the task of sheltering and provisioning herself and her children. Therefore, women should be more distressed than are men by emotional infidelities because they signal threats to a partner's long-term personal and financial commitment to the relationship. Men improve their reproductive success by attending to specific partner cues signaling sexual exclusivity and the resultant increase in paternity certainty. As a result, men should be more distressed than are women by sexual infidelities because they represent threats to sexual exclusivity and paternity certainty.

Buss et al. (1992) found sex differences in the cues eliciting jealousy in a seminal study in which they asked men and women (a) to imagine a romantic partner being interested in someone else and then (b) to report whether imagining the partner "falling in love" or "trying different sexual positions" with that other person would be more distressing. The initial findings have continued to receive extensive empirical support from studies primarily of college students in the United States (Abraham, Cramer, Fernandez, & Mahler, 2001; Buss et al., 1999; Buunk, Angleitner, Oubaid, & Buss, 1996; Cramer, Abraham, Johnson, & Manning-Ryan, 2001; Cramer, Manning-Ryan, Johnson, & Barbo, 2000; Fenigstein & Peltz, 2002; Geary, Rumsey, Bow-Thomas, & Hoard, 1995; Sagarin, Becker, Guadagno, Nicastle, & Millevoi, 2003; Wiederman & Allgeier, 1993). Support has also been found across diverse cultures including China (Geary et al.), Japan and Korea (Buss et al., 1999), Germany and the Netherlands (Buunk et al.), and Sweden (Wiederman & Kendall, 1999).

Evidence for a sexually dimorphic jealousy mechanism is not limited to self-reported distress from imagined emotional and sexual infidelity. An evolutionary psychology perspective anticipates that researchers would detect sex differences in sensitivity to cues signaling emotional and sexual infidelity by using a variety of measurement techniques. Using a measure of electrodermal activity (EDA), Buss et al. (1992) found that women showed greater EDA when imagining an emotional infidelity than when imagining a sexual infidelity, and men showed greater EDA when imagining a sexual infidelity than when imagining an emotional infidelity. Harris (2000) challenged the Buss et al. findings and interpretations. Using measures of heart rate, blood pressure, and EDA, Harris found that the physiological responses in women were not consistent with evolutionary expectations. Additionally, the increased autonomic arousal in the men was due to imagining sexual activity whether or not infidelity was involved. However, Pietrzak, Laird, Stevens, and Thompson (2002) confirmed and extended Buss et al.'s initial reports of gender differences by using peak EDA, heart rate, and electromyographic (EMG) activity. As anticipated, men were more responsive to imagining a romantic partner's sexual infidelity than they were to imagining the partner's emotional infidelity, whereas women were more responsive to imagining a romantic partner's emotional infidelity than to imagining the partner's sexual infidelity.

Researchers have also observed sexual asymmetries in cognitive processing of emotional and sexual infidelity information. Schützwohl (2005) reported that

men processed cues signaling sexual infidelity faster than did women, whereas women processed cues signaling emotional infidelity faster than did men. Seven days after participants were exposed to cues signaling emotional and sexual infidelity, men recalled more sexual cues than emotional cues, whereas women recalled more emotional cues than sexual cues (Schützwohl & Koch, 2004). Taken together, the physiological and cognitive processing effects provide compelling support for a sexually dimorphic jealousy mechanism by extending previously reported findings that used forced-choice, self-reported distress from emotional and sexual infidelity. Despite a wealth of empirical support, an evolutionary psychology perspective on jealousy is not without its critics.

According to Harris (2003), self-reported distress to imagined emotional and sexual infidelity is influenced by social cognitive factors including the distinct inferences that men and women make about the opposite gender and about the co-occurrence of love and sex, the reward values that men and women place on love and sex in a close relationship, and their relationship expectations (see DeSteno & Salovey, 1996; Harris & Christenfeld, 1996; White & Mullen, 1989). Researchers have directly compared an evolutionary psychology perspective with the inferences that men and women make about the opposite gender, the co-occurrence of love and sex, and the reward values that men and women place on love and sex. As anticipated by evolutionary psychology, the sex of the participant was the best predictor of which infidelity—emotional or sexual—was the most distressing. In contrast, these particular social cognitive factors did not reliably account for sexual asymmetries in the cues eliciting jealousy (Buss et al., 1999; Cramer et al., 2001; Fenigstein & Peltz, 2002; Wiederman & Allgeier, 1993; Wiederman & Kendall, 1999). However, the self-reported distress results and the physiological and cognitive processing effects are explicable by another social cognitive account based on men's and women's processing of social expectation violations regarding an unfaithful partner's likely behavior with a rival. In the present study, we evaluated the explanatory power of relationship expectations—specifically expectation violations—for the sex differences in subjective distress from emotional and sexual infidelity.

According to an evolutionary psychology perspective, sex differences in distress result from men and women processing infidelity information that signals threats to asymmetric mate-selection strategies. The present research investigated the possibility that the sex differences result from men and women processing infidelity information that violates their expectations regarding an unfaithful romantic partner's emotional intimacy and sexual activity with a rival. Relationship expectations represent a proximal social cognitive factor implicated in the elicitation of jealousy (Harris, 2003). We did not investigate general expectations of whether a romantic partner would ever become interested in another person because men and women reportedly idealize their partners and relationships relative to their partner's own self-ratings and relative to the typical partner and relationship (see Murray & Holmes, 1997; Murray, Holmes, & Griffin, 1996).

We argue that asking men and women to imagine a romantic partner being interested in another person (e.g., Buss et al., 1992; Buss et al., 1999) activates sex-linked expectations about an unfaithful partner's likely behavior with the rival, including emotional intimacy and sexual activity. Therefore, we argue that the common practice of asking participants to indicate whether imagining a partner's emotional or sexual infidelity is more distressing involves choosing between infidelities that, in one instance, confirms and, in the other instance, violates men's and women's expectations of a partner's likely unfaithful behavior. Processing expectancy violations compared with expectancy confirmations is particularly potent in eliciting self-reported negative affective and physiological reactivity (e.g., Bartholow, Fabiani, Gratton, & Bettencourt, 2001; Olson, Roese, & Zanna, 1996; Osterhout, Bersick, & McLaughlin, 1997). For example, Osterhout et al. found that when participants processed social information, expectation violations of gender stereotypes elicited larger positive event-related potentials than did confirmations. Bartholow et al. found increased EMG activity when participants processed violations of negative social expectancies in contrast with confirmations. Cognitive processing differences have also been reported. Because expectancy violations are likely to initiate more extensive processing, violations frequently result in better recall of social information than do confirmations (Bartholow et al.; for a review, see Stangor & McMillan, 1992). Hence, the previously reported sex differences in processing cues signaling sexual and emotional infidelity as measured by self-reported distress (Buss et al., 1992; Buss et al., 1999), physiological activity (Pietrzak et al., 2002), and recall (Schützwohl & Koch, 2004) could arguably result from participants processing violations of infidelity expectations.

Our anticipating the differences between men's and women's expectations of an unfaithful partner's likely behavior was informed by previous researchers' reports of sex differences in the aspects of a close relationship deemed valuable and important to participants' self-esteem, justifications endorsed for infidelity, content of unfaithful behavior, and factors that participants assumed would motivate a romantic partner's infidelity. For example, Wiederman and Allgeier (1993) found that the sexual aspects of a close relationship are valued more by men than by women, whereas the emotional aspects are valued more by women than by men. In terms of importance to their self-esteem, men rated "having a good sex life" as more important than did women, whereas women rated "being in a committed romantic relationship" as more important than did men (Goldenberg et al., 2003). Glass and Wright (1992) reported that more married women than married men endorsed an emotional aspect of an infidelity (e.g., falling in love), whereas more married men than married women endorsed a sexual aspect (e.g., sexual excitement) as a justification for being unfaithful. Married men reported that their infidelities included a greater level of sexual involvement than did married women. In contrast, married women reported that their infidelities included a greater level of emotional involvement than did married men (Glass & Wright, 1985). Last, White (1981) asked unmarried, college-aged women and men to rate the importance of

different motives for a romantic partner becoming interested in someone else. Women gave higher ratings than did men for a sexual motive, whereas men gave higher ratings than did women for a relationship motive (e.g., desire for commitment). Taken together, these findings are consistent with evolutionary psychology expectations that in close relationships women are motivated by a desire for intimacy and commitment, whereas men are motivated by a desire for sexual opportunities and activity (Buss et al., 1992; Daly et al., 1982; Symons, 1979). We predicted on the basis of these findings that women would report higher likelihood estimates than men would for an unfaithful partner's sexual activity with a rival. In contrast, we predicted that men would report higher likelihood estimates than women would for an unfaithful partner's emotional and intimate activity with a rival.

Confirmation of our predictions would provide initial support for a violation of infidelity expectations on account of the frequently observed sex differences in distress from imagining a partner's emotional and sexual infidelity. We based our alternative hypotheses on the distress that men and women experience when processing violations of their expectations of an unfaithful partner's likely behavior. Thus, imagining a romantic partner's sexual activity with a rival would be distressing to more men than women because such an activity violates men's expectations of an unfaithful partner's likely behavior. In contrast, imagining a romantic partner's emotional involvement with a rival is distressing to more women than men because such an activity violates women's expectations of an unfaithful partner's likely behavior. The violation of infidelity expectations hypotheses stand in stark contrast with—and provide a serious challenge to—an ultimate causal explanation of the sex differences in distress on the basis of men's and women's processing of threats to their respective evolved mate-selection strategies.

Method

Participants

Participants were 189 California State University, San Bernardino undergraduate women (N = 101, M age = 24.68 years, SD = 7.29 years) and men (N = 88, M age = 25.81 years, SD = 6.19 years) who volunteered. Participants were treated in accordance with the Ethical Principles and Code of Conduct (American Psychological Association, 1992).

Materials and Procedure

Participants responded to an Infidelity Expectations Questionnaire (IEQ), a manipulation check of the IEQ, and a Relationship Dilemmas Questionnaire (RDQ) that were included in a larger test battery. We used the IEQ to measure participants' expectations of an unfaithful romantic partner's likely behavior by using 10 emotion-intimacy items and 10 sexual items. For example, the emotion-intimacy

items—adapted in part from Descutner and Thelen (1991)—described falling in love, shared intimacy, and commitment; whereas the sexual items described sexual communications and activities (see Table 1). In the initial instructions, we first asked participants, "Please think of a serious committed romantic relationship that you have had in the past or that you have currently." Then, we asked them to imagine discovering "that the person with whom you are or have been seriously involved became interested in someone else." Participants read and then used a 7-point Likert-type scale ranging from 1 (*partner definitely will not*) to 7 (*partner definitely will*) to rate the likelihood of an unfaithful partner engaging in either emotion-intimacy or sexual action with the rival. In a separate manipulation check, participants responded to each IEQ item by using two 7-point Likert-type scales ranging from 1 (*not at all emotional* [*not at all sexual*]) to 7 (*extremely emotional* [*extremely sexual*]). The similarly worded IEQ and manipulation check were counterbalanced across participants.

We used the RDQ adapted from Buss et al. (1992) and Buss et al. (1999) to measure participants' responses to hypothetical emotional and sexual infidelities that we presented in three formats: forced-choice, mutually exclusive, and combined. In the initial instructions, we asked participants, "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 discovered that the person with whom you have been seriously involved became interested in someone else." For the forced-choice and mutually exclusive formats, we then asked the participants, "What would upset or distress you more?" Participants responded to each item by circling either (a) or (b).

Forced-choice format:

(a) Imagining your partner trying different sexual positions with that person.
(b) Imagining your partner falling in love with that person.

Mutually exclusive format:

(a) Imagining your partner forming a deep emotional attachment (but not a sexual relationship) with that person.
(b) Imagining your partner enjoying a sexual relationship (but not becoming emotionally attached) with that person.

After reading the initial instructions, participants, when responding to the combined infidelity format, were asked, "Imagine that your partner both fell in love with that person and tried different sexual positions with that person. Which aspect of your partner's involvement would upset or distress you more?" Each participant responded by circling either (a) or (b).

Combined format:

(a) Trying different sexual positions with that person.
(b) Falling in love with that person.

TABLE 1. Emotional and Sexual Ratings for the Infidelity Expectations Questionnaire

Item	Emotional rating		Sexual rating	
	M	*SD*	*M*	*SD*
Emotion-intimacy				
1. Trusting another person with his/her deepest thoughts and feelings.	5.98	1.29	3.29	1.64
2. Being in situations with another person where they would cry together.	6.09	1.44	2.56	1.60
3. Falling in love with another person.	6.37	1.29	4.39	1.75
4. Being vulnerable with another person by letting his/her guard down.	5.53	1.72	3.15	1.71
5. Becoming extremely happy knowing that he/she is needed by another person.	6.19	1.11	3.41	1.68
6. Openly expressing his/her needs to another person.	6.17	1.09	3.47	2.17
7. Communicating openly and honestly with another person.	6.22	1.10	2.94	1.69
8. Feeling comfortable showing that he /she cares for another person.	6.13	1.02	3.07	1.82
9. Being more committed to another person.	5.83	1.39	3.68	1.92
10. Spending more money on another person.	4.26	1.75	2.70	1.64
Sexual				
1. Telling another person that his/her body looks and feels great.	4.49	1.63	5.30	1.52
2. Having incredible foreplay with another person using some sexual toys.	4.06	2.07	6.01	1.79
3. Trying many different sexual positions with another person.	4.25	1.89	6.14	1.61
4. Calling another person at work and talking dirty.	3.40	1.77	5.41	1.78
5. Walking into a bedroom wearing nothing but whipped cream for another person.	3.86	1.82	6.16	1.55
6. Putting on a show by undressing slowly for another person.	4.15	1.81	6.03	1.42
7. Giving or getting oral sex.	4.07	1.99	6.32	1.39
8. Showering and sharing a sensual massage with another person using warm scented oils.	4.84	1.82	5.66	1.54
9. Experimenting with rough sex, anal sex, or being tied up.	3.41	2.01	5.89	1.90
10. Fulfilling another person's kinkiest sexual fantasies.	4.47	1.92	6.02	1.65

Note. All comparisons are significant at $p < .01$.

Results

Infidelity Expectations Questionnaire

Responses to the IEQ manipulation check were internally reliable: Cronbach's alpha for the emotion-intimacy actions equals .79 and .83 for the emotional and sexual ratings, respectively, and Cronbach's alpha for the sexual actions equals .89 and .90 for the emotional and sexual ratings, respectively. Comparing pooled means indicated that the emotion-intimacy actions were rated as more emotional ($M = 5.88$, $SD = 0.79$) than sexual ($M = 3.27$, $SD = 1.12$), paired $t(185) = 25.16$, $p < .01$, $r = .88$, and the sexual actions were rated as more sexual ($M = 5.89$, $SD = 1.19$) than emotional ($M = 4.11$, $SD = 1.37$), $t(185) = 14.77$, $p < .01$, $r = .73$. Comparing the mean emotional and sexual ratings of individual IEQ items produced results consistent with the pooled mean comparisons. Each emotion-intimacy action was rated as more emotional than sexual, smallest $t(186) = 10.61$, $p < .01$, $r = .61$, and each sexual action was rated as more sexual than emotional, smallest $t(186) = 5.25$, $p < .01$, $r = .36$ (see Table 1).

Within-sex comparisons using pooled means were consistent with the general findings. Men rated the emotion-intimacy actions as more emotional ($M = 5.70$, $SD = 0.87$) than sexual ($M = 3.21$, $SD = 1.09$), paired $t(87) = 16.23$, $p < .01$, $r = .87$, and rated the sexual actions as more sexual ($M = 5.84$, $SD = 1.21$) than emotional ($M = 3.94$, $SD = 1.35$), $t(87) = 10.62$, $p < .01$, $r = .75$. Women rated the emotion-intimacy actions as more emotional ($M = 6.03$, $SD = 0.69$) than sexual ($M = 3.31$, $SD = 1.15$), $t(97) = 19.34$, $p < .01$, $r = .89$, and rated the sexual actions as more sexual ($M = 5.94$, $SD = 1.17$) than emotional ($M = 4.26$, $SD = 1.37$), $t(97) = 10.26$, $p < .01$, $r = .72$.

The IEQ likelihood ratings were internally reliable: For the emotion-intimacy items, Cronbach's $\alpha = .92$, and for the sexual items, $\alpha = .94$. Consequently, we used pooled means in the following analyses. Comparing expectations of an unfaithful partner's activity with a rival revealed that participants reported the emotion-intimacy ($M = 3.73$, $SD = 1.37$) and sexual ($M = 3.81$, $SD = 1.68$) actions as equally likely, paired $t(188) < 1.00$, $p > .05$. Our predictions of sex differences regarding an unfaithful partner's likely action with a rival were reliable. A partner's sexual activity was rated as more likely by women ($M = 4.24$, $SD = 1.63$) than by men ($M = 3.32$, $SD = 1.61$), independent $t(187) = 3.89$, $p < .01$, $r = .27$, whereas a partner's emotion-intimacy activity was rated as more likely by men ($M = 3.96$, $SD = 1.40$) than by women ($M = 3.52$, $SD = 1.31$), $t(187) = 2.19$, $p < .05$, $r = .15$. Within-sex differences were also reliable. Women expected that a partner's infidelity was more likely to include sexual activity than emotion-intimacy activity ($M = 4.24$ vs. $M = 3.52$, respectively), paired $t(100) = 4.14$, $p < .01$, $r = .38$, whereas men expected an unfaithful partner to act more emotionally than sexually ($M = 3.96$ vs. $M = 3.32$, respectively), $t(87) = 3.59$, $p < .01$, $r = .36$.

Relationship Dilemmas Questionnaire

Results that we present in Figure 1 revealed that the sex differences in subjective distress from imagined emotional and sexual infidelities that researchers have frequently observed by using a forced-choice format were validated using mutually exclusive and combined infidelity formats. Imagining a partner falling in love with another person distressed 80% of the women and 52% of the men. In contrast, imagining a partner trying different sexual positions with another person distressed 48% of the men and only 20% of the women, $\chi^2(1, N = 189) = 16.64$,

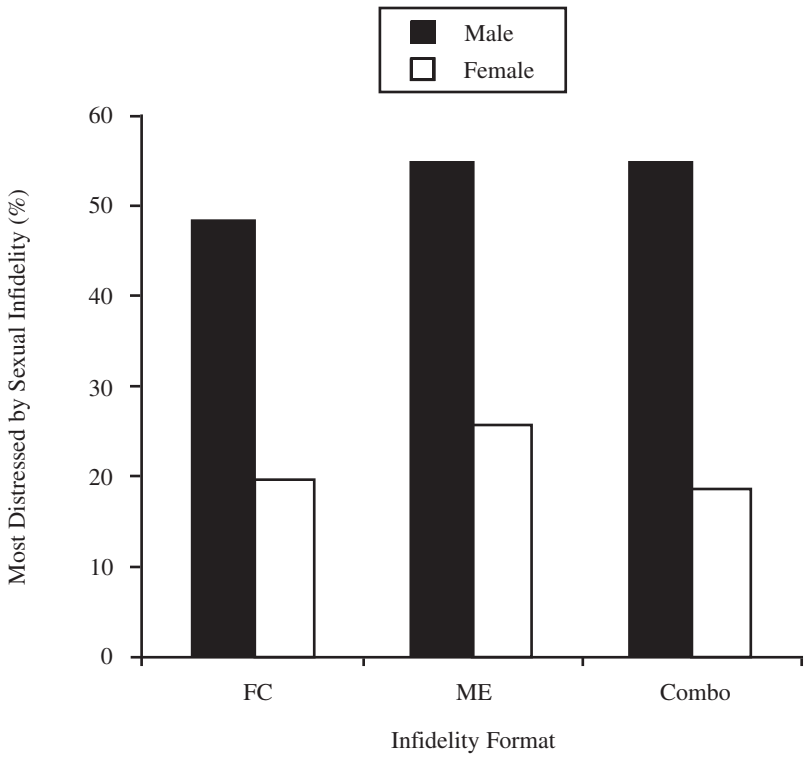

FIGURE 1. Percentage of participants selecting sexual infidelity as the most distressing as a function of participant sex and infidelity format. All effects significant at $p < .01$ using $\chi^2(1, N = 189)$. FC = forced choice (e.g., What would distress you more, sexual or emotional infidelity?). ME = mutually exclusive (e.g., What would distress you more, emotional but no sexual infidelity or sexual but no emotional infidelity?). Combo = combined format (e.g., Which aspect of partner's unfaithfulness would distress you more, sexual or emotional aspect?).

$p < .01$, $\phi = 0.29$. Imagining a partner forming a deep emotional attachment—but not a sexual relationship—with another person distressed 74% of the women and 45% of the men, whereas imagining a partner enjoying a sexual relationship—but not an emotional attachment—with another person distressed 55% of the men and only 26% of the women, $\chi^2(1, N = 189) = 16.38$, $p < .01$, $\phi = 0.29$. In the combined infidelity format, participants were asked to imagine a partner falling in love and trying different sexual positions with another person. The emotional component of the combined infidelity distressed more women (81%) than men (45%), whereas the sexual component distressed 55% of the men and only 19% of the women, $\chi^2(1, N = 189) = 26.24$, $p < .01$, $\phi = 0.37$.

The magnitudes of these sex differences for the forced-choice, mutually exclusive, and combined infidelity formats were 28%, 29%, and 36%, respectively. These magnitudes are consistent with previously reported sex differences found by using the forced-choice format exclusively (see Harris, 2005). However, the infidelities that women and men reported as most distressing stand in stark contrast with the expectations that women and men reported regarding an unfaithful partner's likely behavior with a rival. Hence, rather than being caused by evolved jealousy mechanisms, the distress that women and men reported from emotional and sexual infidelity arguably resulted from their processing of violations of their expectations of an unfaithful partner's likely behavior.

Logistic Regression Analyses

By using a series of logistic regressions, we determined the specific contributions that the processing of violations of infidelity expectations make to emotional and sexual infidelity distress (see Buss et al., 1999; Wiederman & Kendall, 1999). Separate analyses for the forced-choice, mutually exclusive, and combined infidelity formats were conducted with the infidelity type the participants chose as most distressing (emotional or sexual) as the criterion variable (see Table 2). In the initial step of each analysis, we simultaneously entered participant's sex and a measure of an unfaithful partner's expected action (EA). In the next step, we entered the interaction between participant sex and the EA measure. We calculated the EA measure by subtracting a participant's pooled IEQ sexual score from the pooled emotion-intimacy score. Hence, a positive EA score indicated that the participant expected an unfaithful partner to act more emotionally than sexually with a rival, and a negative EA score indicated that the participant expected an unfaithful partner to act more sexually than emotionally.

Our regression analysis of the forced-choice results revealed that with both variables in the equation, participant sex was reliably related to the infidelity chosen as the most distressing, $B = 1.33$, $SE\ B = 0.35$, $Wald(1) = 14.03$, $p < .01$, partial $r = .28$, whereas the EA measure was not, $B = 0.01$, $SE\ B = 0.09$, $Wald(1) = 0.02$, $p > .01$, partial $r = .01$. The interaction was not related to infidelity choice, $B = -0.09$, $SE\ B = 0.35$, $Wald(1) = 0.06$, $p > .01$, partial $r = -.02$. Correlations among the variables

TABLE 2. Correlations Among Logistic Regression Variables and Infidelity Chosen as Most Distressing in Three Formats (*N* = 189)

	Infidelity format		
Variable	Forced choice	Mutually exclusive	Combined
Participant sex	.297*	.294*	.373*
Expected action (EA)	–.100	.070	–.083
Interaction	–.096	.069	–.075

Note. EA equals participant's pooled emotion-intimacy score minus pooled sexual score from the Infidelity Expectations Questionnaire (IEQ). A positive EA score means a participant expected an unfaithful partner to act more emotionally than sexually with a rival; expecting a partner to act more sexually than emotionally with a rival yields a negative EA score. In the forced-choice format, participants indicated whether it was more distressing to imagine a romantic partner's being emotionally unfaithful or sexually unfaithful. Participants imagined that the infidelities were not co-occurring in the mutually exclusive format, and in the combined format participants imagined that a partner's unfaithfulness included both infidelities. Infidelity chosen as the most distressing was coded 1 = sexual and 2 = emotional; participant sex was coded 1 = male and 2 = female.
*$p < .001$.

and the infidelity chosen as most distressing are reported in Table 2. Regression analyses using the mutually exclusive and combined infidelity format results were consistent with the forced-choice outcomes. Again, participant sex was reliably related to the infidelity chosen as the most distressing: For the mutually exclusive format, $B = 1.32$, $SE\ B = 0.34$, $Wald(1) = 15.05$, $p < .01$, partial $r = .29$; and for the combined format, $B = 1.77$, $SE\ B = 0.37$, $Wald(1) = 23.39$, $p < .01$, partial $r = .39$. The simultaneously entered EA measure was again not predictive of infidelity choice: For the mutually exclusive format, $B = 0.06$, $SE\ B = 0.09$, $Wald(1) = 0.36$, $p > .01$, partial $r = –.04$; and for the combined format, $B = 0.09$, $SE\ B = 0.10$, $Wald(1) = 0.76$, $p > .01$, partial $r = .06$. Testing the interaction between participant sex and the EA measure did not yield reliable results: For the mutually exclusive format, $B = 0.11$, $SE\ B = 0.34$, $Wald(1) = 0.11$, $p > .01$, partial $r = .03$; and for the combined format, $B = 0.03$, $SE\ B = 0.36$, $Wald(1) = 0.01$, $p > .01$, partial $r = –.01$. Logistic regressions using absolute pooled IEQ emotion-intimacy and sexual scores were consistent with the aforementioned results using the EA measure.

Discussion

We asked women and men to estimate the likelihood that an unfaithful romantic partner would engage in a range of emotional and sexual actions with a rival. We also asked participants to imagine a romantic partner falling in love and trying different sexual positions with another person. Then we "forced" participants to

select the infidelity that upset or distressed them the most. We observed predicted sex differences. Women reported higher likelihood estimates than did men for a partner's sexual activity with a rival, and men reported higher likelihood estimates than did women for a partner's emotional activity. The content of an unfaithful partner's expected action with a rival was opposite the infidelity that women and men reported as the most distressing. That is, more women than men reported being distressed by emotional infidelity despite the women expecting a partner to act more sexually. And more men than women were distressed by sexual infidelity despite the men expecting a partner to act more emotionally.

According to an evolutionary psychology perspective, sex differences in distress from emotional and sexual infidelity are caused by real or imagined threats to sex-linked mate-selection strategies (e.g., Buss et al., 1992; Buss et al., 1999). However, the sex differences in the anticipated content of an unfaithful partner's actions with a rival are consistent with the possibility that the sexual asymmetries in the cues eliciting jealousy stem from processing the violations of infidelity expectations. That is, imagining a partner falling in love with someone else distresses more women than men because an emotional infidelity violates their expectations of a partner's likely sexual behavior. In contrast, imagining a partner having sex with someone else distresses more men than women because a sexual infidelity violates their expectations of a partner's likely emotional behavior.

We performed a series of logistic regressions to determine the contribution that processing the violations of infidelity expectations make to emotional and sexual infidelity distress. The results were unequivocal. Expectations of an unfaithful partner's likely action with a rival failed to predict distress from emotional and sexual infidelity presented in a forced-choice format. Hence, social-cognitive hypotheses based on distress resulting from the processing of violations of infidelity expectations were not supported. The regression results were not limited to participants responding to the infidelities presented in a forced-choice format. When the infidelities were presented in a mutually exclusive or combined format, the regression results were confirmed. Consistent with an evolutionary psychology perspective, the sex of the participant was the best predictor of whether emotional or sexual infidelity was the most distressing.

Support for an evolutionary perspective on the cues to jealousy is not limited to evidence from self-reports. Sex differences in sensitivity to cues signaling emotional and sexual infidelity have been observed using physiological measures including heart rate, electrodermal and electromyographic activity (Buss et al., 1992; Pietrzak et al., 2002), and cognitive measures including processing speed and recall (Schützwohl, 2005; Schützwohl & Koch, 2004). The anticipated sex differences in physiological and cognitive processing are particularly vital because they validate and extend the frequently challenged self-reported distress from emotional and sexual infidelity. However, researchers can explain the physiological and cognitive processing effects, such as the self-reported distress results, ostensibly by assuming that men and women are distressed by processing the violations of their

expectations of an unfaithful partner's likely emotional and sexual actions with a rival. For example, increased physiological reactivity has been observed when social expectancy violations were processed (e.g., Bartholow et al., 2001; Osterhout et al., 1997). Furthermore, expectancy violations initiated more extensive cognitive processing than did confirmations, and consequently produced better recall of social information (e.g., Bartholow et al., 2001). Therefore, the sex differences in processing the cues signaling sexual and emotional infidelity—as measured by physiological activity and recall, in particular—could have resulted from processing the violations of infidelity expectations. However, we argue that the unambiguous results of the present study support a strong argument against countering an evolutionary psychology perspective on the sex differences in physiological reactivity to, and cognitive processing of, cues signaling emotional and sexual infidelity with a social-cognitive explanation based on participants' processing of violations of infidelity expectations.

In the present study, women and men responded to a forced-choice infidelity format (e.g., Buss et al., 1992). Critics of the forced-choice format have argued that because falling in love and sexual activity frequently co-occur and are therefore not likely to be independent, the method is inadequate for detecting unambiguous evidence for evolved sexually dimorphic jealousy mechanisms (DeSteno & Salovey, 1996; Harris & Christenfeld, 1996). DeSteno and Salovey further argued that the sexual asymmetries in the cues to jealousy did not result from processing of threats to the different mate selection strategies that men and women pursue but from the different inferences that they have learned to draw about the opposite gender and about the relation between love and sex. Participants who are asked to imagine a romantic partner falling in love and having sex with someone else choose as most distressing the infidelity that implies a double-shot of infidelity (see Harris & Christenfeld, 1996, for the comparable two-for-one hypothesis). In theory, women assume that a man in love is likely to be having sex too. Men do not draw this inference when a woman falls in love. Hence, emotional infidelity distresses more women than men because to women it implies the co-occurrence of sexual infidelity. Men assume that a woman having sex is also likely to be in love. Women do not draw this inference if a man is having sex. Therefore, imagining a partner having sex with someone else distresses more men than women because to men it implies the co-occurrence of emotional infidelity.

The development and use of creative self-report formats can validate both the sex differences in distress from emotional and sexual infidelity that researchers have found by using forced-choice procedures and an evolutionary psychology explanation of those differences (e.g., Buss et al., 1999). As Buss et al. argued, wording variations that either render the infidelities mutually exclusive or combine the infidelities should not challenge an evolutionary psychology perspective. However, observing sex differences by using these formats should effectively counter the criticism that the differences merely represented procedural artifacts of the frequently used forced-choice format. In the present study, we used

conceptually relevant, mutually exclusive, and combined infidelity response formats. Participants were asked either to imagine that emotional infidelities and sexual infidelities were not co-occurring or to imagine that both infidelities were in fact taking place. As predicted, more women than men were distressed by imagining a partner forming a deep emotional attachment—but not a sexual relationship—with someone else, and more men than women were distressed by imagining a partner enjoying a sexual relationship with—but not becoming emotionally attached to—someone else. Furthermore, when asked to imagine a partner falling in love and trying different sexual positions with another person, more women than men were distressed by the emotional component of the combined infidelity and more men than women were distressed by the sexual component. Despite the differences in framing the infidelities, these findings are in accordance with an evolutionary psychology perspective on the origins of sexual jealousy (e.g., Buss et al., 1999; Cramer et al., 2001; Fenigstein & Peltz, 2002; Wiederman & Allgeier, 1993; Wiederman & Kendall, 1999).

However, the results are beyond the predictive and explanatory boundaries of the double-shot and two-for-one hypotheses (DeSteno & Salovey, 1996; Harris & Christenfeld, 1996). Both alternative explanations assume that the sex differences in the cues eliciting jealousy result from the inferences that men and women have learned to draw about the opposite gender and about the relation between love and sex. The requirement that men and women draw these particular inferences before selecting the most distressing form of unfaithfulness is effectively eliminated by rendering the emotional and sexual infidelities as mutually exclusive or by combining the infidelities. The double-shot hypothesis, the two-for-one hypothesis, and an evolutionary psychology perspective—albeit based on different assumptions—predict sex differences in distress from emotional and sexual infidelity. In the present study and in previous studies whose researchers evaluated these proximate and ultimate causal mechanisms together, the evidence has consistently favored an evolutionary psychology perspective on the cues to jealousy (e.g., Buss et al., 1999; Cramer et al., 2001).

As in much of the previously reported research, we measured the subjective distress of undergraduate men and women who had been asked to imagine a romantic partner's emotional and sexual infidelity. The observed sex differences in distress from a partner's unfaithfulness were consistent with findings from other studies using culturally diverse samples of college-aged men and women (e.g., Abraham et al., 2001; Buss et al., 1999) or men and women averaging 67.1 years of age (Shackelford et al., 2004) who responded to a variety of infidelity formats. Participants in the present study were also asked to estimate the likelihood that an unfaithful partner's actions with a rival would include specific emotional and sexual behaviors. The predicted expectations were informed by evolutionary psychology and by related research that included samples of men and women, students and nonstudents, and married and unmarried older participants (e.g., Glass & Wright, 1985, 1992; White, 1981; Wiederman & Allgeier, 1993). Although it is reasonable to assume that a majority of undergraduate men and women possess only limited experience with

long-term romantic relationships and with the content of an unfaithful partner's actions, the sex-linked expectations observed in the present study were consistent with the related findings from diverse samples. As predicted, women reported higher likelihood estimates than did men for a partner's sexual activity with a rival, and men reported higher estimates than did women for a partner's emotional activity. However, these expectations were not reliably related to the infidelity—emotional or sexual—that men and women reported as most distressing.

As we noted, participants' expectations regarding the emotional and sexual content of an unfaithful partner's likely actions with a rival were informed by evolutionary psychology and by related research. These theoretical and empirical sources were both consistent with and appropriate to achieving our specific research goals. Nevertheless, a more complete understanding of the role that an individual's processing of infidelity expectations plays in distress from a partner's unfaithfulness awaits researchers who investigate sources of relationship expectations not included in the present study. An illustrative list of credible sources of expectations of a partner's faithful and unfaithful behaviors includes a participant's own actions, personal experiences in long-term relationships and with a partner's fidelity and infidelity, and personal and religious convictions.

Conclusion

According to an evolutionary psychology perspective, sex differences in subjective distress to emotional and sexual infidelity are caused by an individual's processing of threats to sex-linked mate-selection strategies. An alternative account links the sex differences to the distress that men and women experience in processing of violations of expectations regarding the emotional and sexual content of an unfaithful partner's likely actions with a rival. The results of a series of logistic regressions revealed no support for the violation of infidelity expectations hypotheses. An evolutionary psychology perspective on the cues to jealousy was further strengthened by the use of procedures designed to rule out another social-cognitive account of the sex differences on the basis of the learned inferences that men and women draw about the opposite gender and about the relation between love and sex. Sex of the participant was the most reliable predictor of whether emotional infidelity or sexual infidelity—regardless of whether we presented it in a forced-choice, mutually exclusive, or combined format—was more distressing.

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REFERENCES

Abraham, W. T., Cramer, R. E., Fernandez, A. M., & Mahler, E. (2001). Infidelity, race, and gender: An evolutionary perspective on asymmetries in subjective distress to violations-of-trust. *Current Psychology, 20,* 337–348.

American Psychological Association. (1992). Ethical principles of psychologists and code of conduct. *American Psychologist, 47,* 1597–1611.

Bartholow, B. D., Fabiani, M., Gratton, G., & Bettencourt, B. A. (2001). A psychophysiological examination of cognitive processing of and affective responses to social expectancy violations. *Psychological Science, 12,* 197–204.

Buss, D. M., Larsen, R. J., Westen, D., & Semmelroth, J. (1992). Sex differences in jealousy: Evolution, physiology, and psychology. *Psychological Science, 3,* 251–255.

Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100,* 204–232.

Buss, D. M., Shackelford, T. K., Kirkpatrick, L. A., Choe, J. C., Lim, H. K., Hasegawa, M., et al. (1999). Jealousy and the nature of beliefs about infidelity: Tests of competing hypotheses about sex differences in the United States, Korea, and Japan. *Personal Relationships, 6,* 125–150.

Buunk, B. P., Angleitner, A., Oubaid, V., & Buss, D. M. (1996). Sex differences in jealousy in evolutionary and cultural perspective: Tests from the Netherlands, Germany, and the United States. *Psychological Science, 7,* 359–363.

Cramer, R. E., Abraham, W. T., Johnson, L. M., & Manning-Ryan, B. (2001). Gender differences in subjective distress to emotional and sexual infidelity: Evolutionary or logical inference explanation? *Current Psychology, 20,* 327–336.

Cramer, R. E., Manning-Ryan, B., Johnson, L. M., & Barbo, E. (2000). Sex differences in subjective distress to violations of trust: Extending an evolutionary perspective. *Basic and Applied Social Psychology, 22,* 101–109.

Daly, M., Wilson, M., & Weghorst, S. J. (1982). Male sexual jealousy. *Ethology and Sociobiology, 3,* 11–27.

Descutner, C. J., & Thelen, M. H. (1991). Development and validation of a fear-of-intimacy scale. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 3,* 218–225.

DeSteno, D. A., & Salovey, P. (1996). Evolutionary origins of sex differences in jealousy? Questioning the "fitness" of the model. *Psychological Science, 7,* 367–372.

Fenigstein, A., & Peltz, R. (2002). Distress over the infidelity of a child's spouse: A crucial test of evolutionary and socialization hypotheses. *Personal Relationships, 9,* 301–312.

Geary, D. C., Rumsey, M., Bow-Thomas, C. C., & Hoard, M. K. (1995). Sexual jealousy as a facultative trait: Evidence from the pattern of sex differences in adults from China and the United States. *Ethology and Sociobiology, 16,* 355–383.

Glass, S. P., & Wright, T. L. (1985). Sex differences in type of extramarital involvement and marital dissatisfaction. *Sex Roles, 12,* 1101–1120.

Glass, S. P., & Wright, T. L. (1992). Justifications for extramarital relationships: The association between attitudes, behaviors, and gender. *Journal of Sex Research, 29,* 361–387.

Goldenberg, J. L., Landau, M. J., Pyszczynski, T., Cox, C. R., Greenberg, J., Solomon, S., et al. (2003). Gender-typical responses to sexual and emotional infidelity as a function of mortality salience induced self-esteem striving. *Personality and Social Psychology Bulletin, 29,* 1585–1595.

Harris, C. R. (2000). Psychophysiological responses to imagined infidelity: The specific innate modular view of jealousy reconsidered. *Journal of Personality and Social Psychology, 78,* 1082–1091.

Harris, C. R. (2003). A review of sex differences in sexual jealousy, including self-report data, psychophysiological responses, interpersonal violence, and morbid jealousy. *Personality and Social Psychology Review, 7,* 102–128.

Harris, C. R. (2005). Male and female jealousy, still more similar than different: Reply to Sagarin (2005). *Personality and Social Psychology Review, 9,* 76–86.

Harris, C. R., & Christenfeld, N. (1996). Gender, jealousy, and reason. *Psychological Science, 7,* 364–366.

Murray, S. L., & Holmes, J. G. (1997). A leap of faith? Positive illusions in romantic relationships. *Personality and Social Psychology Bulletin, 23,* 586–604.

Murray, S. L., Holmes, J. G., & Griffin, D. W. (1996). The benefits of positive illusions: Idealization and the construction of satisfaction in close relationships. *Journal of Personality and Social Psychology, 70,* 79–98.

Olson, J. M., Roese, N. J., & Zanna, M. P. (1996). Expectancies. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 211–238). New York: Guilford.

Osterhout, L., Bersick, M., & McLaughlin, J. (1997). Brain potentials reflect violations of gender stereotypes. *Memory & Cognition, 25,* 273–285.

Pietrzak, R. H., Laird, J. D., Stevens, D. A., & Thompson, N. S. (2002). Sex differences in human jealousy: A coordinated study of forced-choice, continuous rating-scale, and physiological responses on the same subjects. *Evolution and Human Behavior, 23,* 83–94.

Sagarin, B. J., Becker, D. V., Guadagno, R. E., Nicastle, L. D., & Millevoi, A. (2003). Sex differences (and similarities) in jealousy: The moderating influence of infidelity experience and sexual orientation of the infidelity. *Evolution and Human Behavior, 24,* 17–23.

Schützwohl, A. (2005). Sex differences in jealousy: The processing of cues to infidelity. *Evolution and Human Behavior, 26,* 288–299.

Schützwohl, A., & Koch, S. (2004). Sex differences in jealousy: The recall of cues to sexual and emotional infidelity in personally more and less threatening context conditions. *Evolution and Human Behavior, 25,* 249–257.

Shackelford, T. K., Voracek, M., Schmitt, D. P., Buss, D. M., Weekes-Shackelford, V. A., & Michalski, R. L. (2004). Romantic jealousy in early adulthood and in later life. *Human Nature, 15,* 283–300.

Stangor, C., & McMillan, D. (1992). Memory for expectancy-congruent and expectancy-incongruent information: A review of the social and social developmental literatures. *Psychological Bulletin, 111,* 42–61.

Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.

White, G. L. (1981). Jealousy and partner's perceived motives for attraction to a rival. *Social Psychology Quarterly, 44,* 24–30.

White, G. L., & Mullen, P. E. (1989). *Jealousy*: *Theory, research, and clinical strategies*. New York: Guilford.

Wiederman, M. W., & Allgeier, E. R. (1993). Gender differences in sexual jealousy: Adaptionist or social learning explanation? *Ethology and Sociobiology, 14,* 115–140.

Wiederman, M. W., & Kendall, E. (1999). Evolution, sex, and jealousy: Investigation with a sample from Sweden. *Evolution and Human Behavior, 20,* 121–128.

Received August 21, 2006
Accepted March 8, 2007

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