Upset in Response to a Sibling's Partner's Infidelities

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Using data collected from people with at least one brother and one sister, and consistent with an evolutionary perspective, we find that older men and women (a) are more upset by a brother's partner's sexual infidelity than by her emotional infidelity and (b) are more upset by a sister's partner's emotional infidelity than by his sexual infidelity. There were no effects of participant sex or sex of in-law on upset over a sibling's partner's infidelities, but there was an effect of participant sex on reports of upset over one's own partner's infidelities. The results suggest that the key variable among older participants is the sex of the sibling or, correspondingly, the sex of the sibling's partner, as predicted from an evolutionary analysis of reproductive costs, and not the sex of the participant, as predicted from a socialization perspective. Discussion offers directions for future work on jealousy.

KEY WORDS: Evolutionary psychology; Jealousy; Siblings' partners; Socialization

E mpirical work over the past decade documents that both men and women report that they would experience high levels of upset in response to a long-term partner's real or imagined infidelity (see Buss 2000 for a review of research). This research also documents a sex difference in the psychological weighting of the aspects or content of a partner's infidelity: Men report greater upset than do women in response to a partner's sexual infidelity, and women report greater upset than do

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men in response to a partner's emotional infidelity. Additionally, when a partner is imagined or discovered to be involved in an affair that is both sexual and emotional in nature, men report greater upset in response to the sexual aspect of the infidelity, whereas women report greater upset in response to the emotional aspect of the infidelity. This sex difference in the nature of jealousy has been found by different investigators and using different methodologies (Buss et al. 1992, 1999; Harris 2000; Harris and Christenfeld 1996; Shackelford, Buss, and Bennett 2002; see Harris 2002 and Grice and Seely 2000 for partial failures to replicate the sex difference using physiological measures).

The sex difference in jealousy was first tested and confirmed by evolutionary psychologists who hypothesized that men and women would differ psychologically in the weighting given to cues that trigger jealousy (Symons 1979; Daly, Wilson, and Weghorst 1982). Both sexes, of course, are distressed by both forms of infidelity. Nonetheless, the hypothesized sex difference is anchored in the different adaptive problems that men and women recurrently faced. Because fertilization occurs internally within women, a man's partner's sexual infidelity threatened his paternity certainty. On the other hand, from a woman's perspective, a partner's emotional involvement with other women was hypothesized to predict the long-term loss of her partner's resources, which could get diverted to the rival woman and her children. Thus, the *evolved psychological design* of male and female romantic jealousy was hypothesized to differ for the sexes, with women giving relatively greater weight to signals of emotional infidelity and men giving relatively greater weight to signals of sexual infidelity.

Although much research corroborates the evolutionary psychological hypothesis of a sex difference in jealousy, there remains disagreement as to the causes of this difference. Evolutionary psychologists have argued that the sex difference in jealousy is generated by sex differences in evolved psychology. Socialization theorists have argued, in contrast, that the sex difference in jealousy is attributable to sex differences in socialization and social role training and acquisition (see, e.g., DeSteno and Salovey 1996; Eagly 1987; Eagly and Wood 1991). In effect, socialization theorists have argued that men report greater upset in response to a partner's sexual infidelity because they are taught to behave this way. Women, in contrast, report greater upset in response to a partner's emotional infidelity because they are taught to behave this way. The result is that, for every study indicating a sex difference in jealousy, both academic camps have claimed victory.

Fenigstein and Peltz (2002) offer one strategy for disentangling these two perspectives. They collected data from parents of undergraduate students to test these competing evolutionary and socialization hypotheses about sex differences in jealousy. After replicating the standard sex difference in upset over a partner's infidelity, Fenigstein and Peltz (2002) documented that both men and women report greater upset over a daughter-in-law's sexual infidelity and over a son-in-law's emotional infidelity. Shackelford, Michalski, and Schmitt (2004) replicated this result with a sample of much older adults. When the adaptive problem is a child's partner's infi-

delities, it is the sex of the child that determines whether a sexual infidelity or emotional infidelity is likely to lead to greater reproductive costs. By virtue of shared genes, in turn, greater reproductive costs for a child translate to greater reproductive costs for the parents. The current study is an extension of these results using assessments of upset about the infidelities of a *sibling's* romantic partner. Tests of the hypotheses with reference to siblings provides the opportunity to examine whether previous findings are isolated to the parent-child relationship or extend to other kin relationships, such as the sibling relationship.

One way to disentangle the evolutionary and socialization hypotheses is to ask both sexes to report the upset they would experience if their sibling's long-term partner was unfaithful to their sibling. The key to disentangling the evolutionary and socialization hypotheses is provided by the opportunity to investigate the responses of siblings to the infidelities of a brother's partner and the infidelities of a sister's partner. According to a version of the socialization perspective, the critical variable is the sex of the respondent—in this case, the sex of the participant. As a man or a woman, the participant expresses the belief system according to which he or she has been socialized. If the participant is a man, he has been taught that sexual infidelity is more upsetting. If the participant is a woman, she has been taught that emotional infidelity is more upsetting. Nothing in this socialization perspective suggests that this sex difference will be attenuated if the victim of the infidelity is one's sibling rather than oneself. This socialization perspective therefore can be used to generate the hypothesis that men will report greater upset in response to a sibling's partner's sexual infidelity, whereas women will report greater upset in response to a sibling's partner's emotional infidelity.

According to an evolutionary psychological perspective, in contrast, the sex of one's sibling is critical. Men, but not women, recurrently faced the adaptive problem of uncertain genetic relatedness to a putative offspring. If a brother's partner is sexually unfaithful, she places him at risk of cuckoldry—unwittingly investing his limited resources in a child to whom he is genetically unrelated. By virtue of shared genes, a brother's cuckoldry and the attendant reproductive losses are reproductive losses for a brother's siblings as well. Although a brother's partner's emotional infidelity also is likely to be upsetting to his siblings insofar as it may be a correlate or harbinger of sexual infidelity, an evolutionary perspective can be used to generate the hypothesis that a brother's partner's sexual infidelity will be more upsetting than her emotional infidelity, for both brothers and sisters. Of key interest here is that the same woman who reports that her own partner's emotional infidelity would be more upsetting than his sexual infidelity is hypothesized to reverse this pattern of upset when imagining a brother's partner's infidelity.

According to an evolutionary psychological perspective, mated women but not men faced the adaptive problem of a long-term partner diverting resources to another woman and to another woman's children. A man's sexual infidelity might be upsetting insofar as it predicts his eventual emotional infidelity. A man's sexual infidelity will not, however, place his partner at risk of unwittingly investing in offspring to whom his long-term partner is genetically unrelated. Maternity is always certain—or at least was during human evolutionary history. According to an evolutionary psychological perspective, therefore, a partner's emotional infidelity is a graver adaptive problem for women than a partner's sexual infidelity. Women, therefore, report greater upset in response to a partner's emotional infidelity than in response to a partner's sexual infidelity. By virtue of their shared genes, a woman's siblings are hypothesized to be more upset by their sister's partner's emotional infidelity than by his sexual infidelity. His emotional infidelity inflicts greater potential reproductive costs on a sister than does his sexual infidelity. And greater reproductive costs incurred by their sister translate into greater reproductive costs for them, as her siblings are the aunts and uncles to any children she might have now or in the future. An evolutionary perspective thus can be used to generate the hypothesis that, for both men and women, a sister's partner's emotional infidelity will be more upsetting than his sexual infidelity. Of key interest here is that the same man who reports that his own partner's sexual infidelity would be more upsetting than her emotional infidelity is hypothesized to reverse this pattern of upset when imagining a sister's partner's infidelity.

Using data collected from participants in the United States and Canada, we test two key hypotheses. First, we attempt to replicate the finding of a sex difference in response to a romantic partner's infidelity. Second, we hypothesize that greater upset will be reported in response to the sexual infidelity of a brother's partner than in response to the emotional infidelity of a brother's partner and that greater upset will be reported in response to the emotional infidelity of a sister's partner than in response to the sexual infidelity of a sister's partner, for both men and women.

We further hypothesize that the relevant psychological mechanisms will be activated in the sibling relationship context only when the sibling is of reproductive age. Fenigstein and Peltz (2002) and Shackelford et al. (2004) did not need to address this factor because both samples included parents who had at least one child of reproductive age. Not all undergraduate participants will have siblings who are of reproductive age, however. Older participants are more likely than younger participants to have siblings of reproductive age, so we included in the test of the second hypothesis the covariate of participant age. We anticipated an interaction would emerge, revealing stronger support for the second hypothesis among older participants.

METHOD

Participants

We recruited 61 men and 79 women from the United States and 10 men and 13 women from Canada. Participants received subject pool credit for participation in the study. The average age of participants was 20.9 years (s.d. = 4.8 years). The average age of participants from the United States was 20.7 years (s.d. = 4.9 years).

The average age of participants from Canada was 21.8 years (s.d. = 4.4 years). The average age of the two samples was not significantly different, $t_{161} = 1.0$, p > .05. Unfortunately, we could not conduct analyses separately for the two samples because of the small number of participants from the Canadian sample that provided responses to questions for both a male and a female sibling's partner's infidelities. All analyses are conducted on data that are collapsed across countries.

Materials

Participants first provided basic demographic information, including their sex and age. Participants responded to two sets of forced-choice questions about a sibling's partner's infidelities. Both sets of questions asked participants which aspect of a sibling's partner's infidelities would be more upsetting—sexual infidelity or emotional infidelity. One set of questions assessed upset in response to a brother's partner's infidelities. The other set of questions assessed upset in response to a sister's partner's infidelities. These questions paralleled the structure of questions designed to assess upset in response to a partner's infidelities (see, e.g., Buss et al. 1992, 1999). Participants responded to the same four forced-choice questions for a brother's partner's infidelities and a sister's partner's infidelities. The two series of questions differed only in the sex of the sibling and, correspondingly, the sex of the sibling's partner. For responses to a brother's partner's infidelities, the questions were prefaced with the following instructions:

Instructions: Please think of your <u>oldest brother</u> and a serious or committed romantic relationship that he has had in the past, that he is currently having, or that he might have in the future. Imagine that you discover that the person with whom your <u>oldest brother</u> has been seriously involved became interested in someone else (other than your brother). What would upset or distress you more (please <u>circle only one</u> answer, (A) or (B), for each question)?

The instructional set for responses to a sister's partner's infidelities was identical, with the exception of the gender-relevant substitutions. Some participants had more than one brother or more than one sister. To ensure that participants imagined the same brother or sister across the questions, we asked them to think about their oldest biological brother or their oldest biological sister. Participants that did not have a biological sibling of the relevant sex were asked to skip that set of questions. Thus, only a subset of participants responded to both sets of questions, because they had at least one biological brother and one sister.

Four different forced-choice dilemmas were presented to participants to allow for a multi-item assessment. (These dilemmas are available from the first author upon request.) In the first dilemma, for example, participants indicated which of the following two events would be more distressing: "(A) Imagining your [sibling's partner] enjoying passionate sexual intercourse with someone other than your [sib-

ling]" or "(B) Imagining your [sibling's partner] forming a deep emotional attachment to someone other than your [sibling]." In the actual items, "[sibling's partner]" appeared either as "oldest brother's partner" or "oldest sister's partner, and "[sibling]" appeared either as "brother" or "sister."

In addition to responding to the dilemmas about a sibling's partner's infidelities, participants completed the same set of dilemmas for their own partner's infidelities (see, e.g., Buss et al. 1992, 1999). This allowed us to assess the established sex difference in jealousy. Participants responded to the dilemmas about their own partner's infidelities before responding to the structurally similar dilemmas about a sibling's partner's infidelities.

RESULTS

To capitalize on the use of multiple items, and following Dijkstra et al. (2001), we created a composite Sexual Jealousy Score (SJS) based on responses to the four dilemmas, separately for responses to own partner's infidelities, a brother's partner's infidelities, and a sister's partner's infidelities. For each set of four dilemmas, a response of "emotional infidelity" was assigned a value of 0 and a response of "sexual infidelity" was assigned a value of 1. The SJS was computed as the mean of the recoded responses to the four infidelity dilemmas. The SJS could vary from 0 (if the participant selected emotional infidelity as more upsetting than sexual infidelity for all four infidelity dilemmas) to 1 (if the participant selected sexual infidelity as more upsetting than emotional infidelity for all four infidelity dilemmas). A key reason for presenting the results of analyses of the SJS is that single-item measures such as the individual infidelity dilemmas are of unknown reliability. Use of the SJS allowed us to assess differential responses to the infidelity dilemmas with a composite measure of known reliability. The across-sex reliabilities of the SJS in these data were acceptable at $\alpha = .80$ for own partner's infidelities, $\alpha = .80$ for brother's partner's infidelities, and $\alpha = .75$ for sister's partner's infidelities.

We first documented that the standard sex difference in response to one's own partner's infidelities replicated with the full sample. The mean SJS for men responding to their own partner's infidelities was significantly greater than the mean SJS for women responding to their own partner's infidelities [for men: mean = 0.65, s.d. = 0.35; for women: mean = 0.46, s.d. = 0.38; $F_{1,159} = 11.03, p < .01$]. Men were significantly more likely to cite sexual infidelity, rather than emotional infidelity, as more distressing. Having replicated the standard sex difference in jeal-ousy about a partner's infidelity, we next investigated whether upset in response to a sibling's partner's infidelity varied with participant sex, participant age, and with the sex of the sibling (and hence with the sex of the sibling's partner).

The most appropriate test of whether sex of participant and sex of sibling's partner affect upset in response to a sibling's partner's infidelities is accomplished by a within-subjects analysis. In this analysis, the upset responses of the same group of people can be compared in two conditions—when imagining a brother's partner's

infidelities and when imagining a sister's partner's infidelities. Each participant therefore serves as his or her own control. We conducted a repeated-measures analysis of variance on the composite SJS provided by these participants, with the composite SJS serving as a within-subjects variable (one SJS for a brother's partner's infidelities and a second SJS for a sister's partner's infidelities), participant sex serving as the between-subjects variable, and participant age entered as a covariate. This analysis produced a significant effect of sex of in-law (for sister's partner's infidelities, mean = .62, s.d. = .36; for brother's partner's infidelities, mean = .62, s.d. = .39; $F_{1, 164} = 8.15$, p < .01, partial $\eta^2 = .05$). There was no effect for participant sex (for women, mean = .58, s.d. = .33; for men, mean = .68, s.d. = .30; $F_{1, 164} = 3.07$, p > .05), but there was an an effect for age ($F_{1, 164} = 7.08$, p < .01, partial $H^2 = .05$). There was no interaction between sex of in-law and participant sex ($F_{1, 164} = 1.45$, p > .05), but a significant interaction between sex of in-law and age ($F_{1, 164} = 8.09$, p < .01, partial $\eta^2 = .05$).

Following a reviewer's suggestion, we reanalyzed the data with standardized values of participant age in an effort to investigate the peculiar finding of a significant within-subjects effect for sex of in-law, given the nearly identical means for brother's partner's infidelities and sister's partner's infidelities. In this second analysis, the within-subjects effect for in-law's sex was not significant ($F_{1, 164} = 0.61, p > .05$). As expected given the nature of the reanalysis, all other results were identical to those for the first analysis. As the reviewer noted, this second analysis is the appropriate analysis—that is, to appropriately include age as a covariate, age must be standardized (see Tabachnick and Fidell 2001 for additional discussion). Thus, the sex of in-law effect is not significant when effects attributable to age are controlled appropriately.

A median split was conducted on participant age to sharply illustrate the nature of the interaction between sex of sibling and age. The difference based on sibling sex predicted by an evolutionary perspective emerged only among older participants. The mean percentage of participants selecting sexual infidelity as more distressing when committed by a brother's partner is equivalent between the two age groups (for younger adults, mean = .61, s.d. = .38; for older adults, mean = .64, s.d. = .40). The mean percentage of participants selecting sexual infidelity as more distressing when committed by a sister's partner, however, is greater for younger participants (mean = .68, s.d. = .34) than for older participants (mean = .47, s.d. = .38).

DISCUSSION

Drawing from a sample of participants with both brothers and sisters, we document that the within-subjects effect of sibling's sex is not significant when age is statistically controlled, with the result that neither the evolutionary perspective nor the socialization perspective is clearly supported or refuted. The results of the current study are more consistent with an evolutionary perspective because the predicted

relationship for greater upset over a brother's partner's sexual infidelity, relative to a sister's partner's sexual infidelity, emerges only among the older participants. Older participants are more upset by a sister's partner's emotional infidelity and by a brother's partner's sexual infidelity. Taken together, these results and the results of Fenigstein and Peltz (2002) and Shackelford et al. (2004) indicate a sex difference in response to one's own partner's sexual or emotional infidelity, but no sex difference in response to a child's partner's or a sibling's partner's sexual or emotional infidelity. The results of the current study parallel those of Fenigstein and Peltz (2002) and of Shackelford et al. (2004), indicating that older men and older women are more upset by a female "in-law's" sexual infidelity, whereas older men and older women are more upset by a male "in-law's" emotional infidelity. The current study adds to this literature by highlighting that with reports of upset over a sibling's partner's infidelities, the relationship of sibling's sex with upset in response to the infidelities of a sibling's partner depends on the age of the participant and, by argument, the age of the sibling. This suggests that the hypothesized jealousy mechanisms require as input a sibling of reproductive age or a sibling in a long-term, committed relationship.

The current study has several design limitations. We used participant age as a proxy for sibling age. Future research should include assessments about specific siblings, including sibling age, to further explore the interaction identified in the current study. Future research also might investigate the developmental onset of the hypothesized mechanisms. For example, the activation of these mechanisms may occur earlier for participants with older siblings than for participants with younger siblings. The psychological mechanisms proposed in the current study are activated in the context of a sibling's romantic relationship. If entry into a relationship is a trigger of the proposed mechanism of upset in response to a sibling's partner's infidelities, then younger siblings should show the effect earlier than older siblings because the trigger occurs at an earlier age for younger siblings than for older siblings. Another potential design limitation of the current study is that we assessed responses to the imagined infidelities of a sibling's partner. Although methodologically and ethically challenging, future research could examine whether the findings obtained in the current study replicate with reactions to the actual infidelities of a sibling's partner.

Several other avenues of research can be pursued based on the results of the current study. For example, it is not known whether the mechanisms guiding upset in response to a sibling's partner's infidelities are activated only in reaction to the potential reproductive losses incurred by a full sibling. Future research could explore whether the effects found in the current study replicate when imagining the infidelities of a step-sibling's or a half-sibling's partner. Responses to a half-sibling's partner's infidelities should display a similar, although weaker, pattern of results, relative to the results of the current study.

Future research could examine whether the sibling's sex or the sibling's partner's sex is the relevant trigger using a sample of participants with homosexual siblings.

Such a sample would allow the opportunity to control naturalistically for the sex of the sibling's partner. For participants with homosexual brothers, for example, we hypothesize that, if the sex of the sibling is the relevant trigger, then participants will report greater upset in response to his partner's sexual infidelity than in response to his partner's emotional infidelity. If the sex of the sibling's partner, rather than the sibling's sex, is the relevant trigger, however, a different pattern of results will emerge. Participants would report greater upset in response to a homosexual brother's partner's emotional infidelity than in response to his partner's sexual infidelity. For participants with homosexual sisters, we hypothesize that participants will report greater upset in response to a sister's partner's emotional infidelity than in response to her partner's sexual infidelity if the sex of the sibling is the relevant trigger. If the sex of the sibling's partner is the relevant trigger, participants would report greater upset in response to a homosexual sister's partner's sexual infidelity rather than in response to her partner's emotional infidelity. An empirical examination of these hypotheses would be able to ascertain whether the sex of the sibling or the sex of the sibling's partner is the relevant trigger.

The results of the current study point to the need for an appreciation of the developmental context in which these mechanisms are situated—in other words, differential upset as a function of the sex of one's sibling held only for older participants, who likely have absolutely older siblings that are more likely to be of reproductive age and more likely to have experience in romantic relationships. The interaction between sibling sex and participant age suggests that upset in response to a sister's partner's infidelity differs more than upset in response to a brother's partner's infidelity across age groups. This interaction may be interpretable within an evolutionary psychological framework. Younger men, relative to older men, have accrued fewer resources (Buss 2003). Therefore, a younger sister's partner's threat of defection may not be as troubling as an older sister's partner's threat of defection. Greater upset in response to a sister's partner emotional infidelity might emerge only after he has accrued sufficient resources to warrant a significant threat of resource defection. This may explain why it appears that upset in response to the infidelities of sister's partner does not show the evolutionarily predicted pattern until later in the life of the sibling. This is, of course, speculative but warrants empirical examination.

The current results provide further evidence in support of an evolutionary perspective on jealousy and provide evidence of the heuristic value of an evolutionary perspective. We did not find a sex difference in upset in response to a sister's partner's infidelities or a brother's partner's infidelities and, therefore, the data reveal a limitation of the socialization hypothesis. These results, along with those of Fenigstein and Peltz (2002) and Shackelford et al. (2004), cast doubt on the hypothesis that sex-specific socialization spills over into sex-specific responses to the imagined infidelities of a sibling's partner. Humans may be socialized to take into account different aspects of a situation not only by their own sex, as tested in the current study, but by the sex of the individual with whom they are interacting. The results of the current study, in combination with those of Fenigstein and Peltz and Shackelford

et al., suggest that the socialization perspective used to generate the hypothesis of the current study needs refinement.

Fenigstein and Peltz (2002) recommend that future research examine whether the findings with regard to parental upset in response to the infidelities of a child's partner replicate in the sibling context. The results of the current study do replicate, at least among our older participants, those of Fenigstein and Peltz (2002) and Shackelford et al. (2004) using the imagined infidelities of a sibling's partner. Older women who rate their own partner's emotional infidelity as more upsetting than his sexual infidelity reverse this pattern when imagining their brother's partner's infidelity. Older men who rate their own partner's sexual infidelity as more upsetting than her emotional infidelity reverse this pattern when imagining their sister's partner's infidelity. We found little statistical support for the socialization perspective because of the failure of the emergence of an effect based on the sex of the participant. The results suggest that the key variable therefore is the sex of the sibling for older participants, or correspondingly, the sex of the sibling's partner, as predicted from an evolutionary analysis of reproductive costs.

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