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Special Section

SEX DIFFERENCES IN JEALOUSY IN EVOLUTIONARY AND CULTURAL PERSPECTIVE:

Tests From the Netherlands, Germany, and the United States

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Abstract—As predicted by models derived from evolutionary psychology, men within the United States have been shown to exhibit greater psychological and physiological distress to sexual than to emotional infidelity of their partner, and women have been shown to exhibit more distress to emotional than to sexual infidelity. Because cross-cultural tests are critical for evolutionary hypotheses, we examined these sex differences in three parallel studies conducted in the Netherlands (N = 207), Germany (N = 200), and the United States (N = 224). Two key findings emerged. First, the sex differences in sexual jealousy are robust across these cultures, providing support for the evolutionary psychological model. Second, the magnitude of the sex differences varies somewhat across cultures—large for the United States, medium for Germany and the Netherlands. Discussion focuses on the evolutionary psychology of jealousy and on the sensitivity of sex differences in the sexual sphere to cultural input.

Social scientists have frequently¹ observed that sexual jealousy can be a strikingly strong emotion. In his classic work on the natives of the Trobriand Islands, for example, Malinowski (1932) noted that "jealousy, with or without adequate reason, and adultery are the two factors in tribal life which put most strain on the marriage tie" (p. 97). The sociologist Davis (1948) noted that jealousy is a "fear and rage reaction fitted to protect, maintain, and prolong the intimate association of love" (p. 183). Despite the potentially powerful impact of sexual jealousy, emotion researchers have devoted relatively little attention to it. According to most emotion researchers, jealousy is not a primary emotion. Instead, it is considered a derivative or blend of the more basic, central, primary emotions (Frank, 1988; Hupka, 1984; Plutchik, 1980). As a consequence, it has been relatively ignored by mainstream emotion researchers, who focus their efforts on emotions deemed more basic, such as fear, disgust, and sadness.

Recently, however, jealousy has received increasing attention (e.g., Buss, 1994; Buunk & Hupka, 1987; Salovey, 1991; White & Mullen, 1989). For example, cumulating evidence indicates that male sexual jealousy is a major cause of wife battering and homicide across a large number of cultures (e.g., Daly & Wilson, 1988; Daly, Wilson, & Weghorst, 1982). The two times when a woman faces the greatest risk of harm from a husband or boyfriend are when he suspects her of a sexual infidelity and when the woman decides to terminate the rela-

tionship (Daly & Wilson, 1988). Given an emotion powerful enough to provoke violent and sometimes lethal reactions, sexual jealousy can hardly be considered to be a peripheral emotion from the perspectives of the magnitude of arousal, the coherence of events that trigger its activation, and the magnitude of impact on people's lives. Indeed, from these perspectives, a compelling case can be made for the primacy of sexual jealousy as a basic human emotion and for the urgency of understanding its nature and functioning.

Although in anthropological records, most acts of violent sexual jealousy are committed by men (Daly et al., 1982), studies in Western cultures find few sex differences in sexual jealousy (Salovey, 1991; White & Mullen, 1989). When researchers have asked global questions such as "Do you consider yourself a jealous person?" or "How often do you get jealous?" men and women have typically responded identically (Bringle & Buunk, 1985). Moreover, research has thus far not convincingly shown that either sex responds more negatively than the other when confronted with the possibility of the partner's sexual involvement with someone else. When differences are found, women usually report more negative feelings than men in response to extradyadic involvement of the partner (Buunk, 1986, 1995; Guerrero, Eloy, Jorgensen, & Andersen, 1993; de Weerth & Kalma, 1993).

Until recently, there was not a theory that could predict or explain sex differences in jealousy. Fifteen years ago, however, evolutionary psychologists predicted that, psychologically, the cues that trigger sexual jealousy should be weighted differently in men and women (Daly et al., 1982; Symons, 1979). The evolutionary rationale stems from an asymmetry between the sexes in a fundamental aspect of their reproductive biology: Fertilization occurs internally within the woman. This is not a biological law. There is nothing in evolutionary theory that dictates that fertilization must occur internally within the woman. Although it is a widespread trait, occurring in all 220 species of primates, 4,000 species of mammals, and countless insect species, it is not universal. Fertilization occurs internally within the male in some species (females literally implant their eggs within the male), and it occurs external to both sexes in some species, notably certain fish (Trivers, 1985).

The fact that fertilization occurs internally within women, however, means that over human evolutionary history, men have faced a profound adaptive problem that has not been faced by women: uncertainty in their parenthood of children. Some cultures have sayings to describe this phenomenon, such as "mama's baby, papa's maybe." Studies using blood samples or DNA fingerprinting are rare, but estimates based on existing evidence suggest that approximately 9% to 13% of children today have putative fathers that are not their genetic fathers

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(Baker & Bellis, 1995). Paternity uncertainty, in short, is not just a hypothetical possibility. It is a reality and probably has been throughout human evolutionary history.

From a man's perspective, in the evolutionary past, a sexual infidelity on the part of his mate would have been tremendously damaging in reproductive currencies because of compromises in paternity certainty. First, the man would risk losing the mating effort he expended, including time, energy, risk, and nuptial gifts devoted to attracting and courting the woman. Second, he would suffer mating opportunity costs lost through foregone chances to attract and court other women. Third, the man would risk losing the woman's parental effort because it might be channeled to a competitor's child and not his own. Fourth, and perhaps most important, if the man would invest in the child, he would risk investing resources in a genetic vehicle that did not contain his genes. Because of the large costs linked with compromises in paternity, evolutionary psychologists have predicted that men's sexual jealousy will be triggered centrally by cues to sexual infidelity.

Women have faced a different set of adaptive challenges. A mate's sexual infidelity does not jeopardize a woman's certainty in parenthood. The child is her own regardless of her mate's sexual philandering. Nonetheless, if her mate becomes interested in another woman, she risks losing his time, energy, resources, parental investment, protection, and commitment—all of which could get diverted to a rival woman and her children. Because the emotional involvement of a man with another woman is a reliable leading indicator of the potential diversion and loss of the man's investment, evolutionary researchers have proposed that cues to emotional infidelity would be central triggers of women's jealousy (Buss, Larsen, Westen, & Semmelroth, 1992).

The predicted sex differences have been found within the United States. In a series of forced-choice experiments, men indicated greater distress to a partner's sexual than emotional infidelity, whereas women indicated greater distress to a partner's emotional than sexual infidelity (Buss et al., 1992). These findings have been replicated by other researchers within the United States (Wiederman & Allgeier, 1993), and show up in measures of physiological distress as reflected by increased electromyographic activity, increased electrodermal response, and elevated heart rate (Buss et al., 1992). In addition, some earlier studies offered findings in line with the evolutionary perspective. Francis (1977), for example, found that among men, sexual involvement with a third person was the most mentioned situation evoking jealousy, whereas among women, the partner spending time or talking with a third person turned out to be the most frequently mentioned triggers of jealousy.

Cross-cultural data, however, are crucial for testing this evolution-based hypothesis. First, because the sex-linked triggers are hypothesized to be species-typical characteristics of evolved human psychology, data from other cultures are required for adequate testing (see, e.g., Symons, 1979). Second, it is well documented that cultures differ tremendously in their attitudes toward aspects of sexuality such as premarital sex and extramarital affairs (see, e.g., Buss, 1989; Frayser, 1985). For example, whereas over 75% of the U.S. population unequivocally disapproves of extramarital sex, the comparable percentage in the Netherlands is less than 45% (Buunk & van Driel,

1989). Furthermore, cultures differ in their emphasis on sexual equality (Frayser, 1985). Cultures that emphasize sexual equality and have particularly liberal attitudes about sexuality for both women and men should provide an especially rigorous challenge for testing the hypothesized sex differences in sexual jealousy. Thus, we sought to conduct parallel studies in three countries with different cultures—the Netherlands, Germany, and the United States. In particular, including the Netherlands seems appropriate because the Dutch appear to downplay sex differences and emphasize equality between the sexes more than people from virtually any other culture for which reliable data exist (Hofstede, 1994).

STUDY 1: THE UNITED STATES

Subjects and Method

After reporting age (mean = 18.6, $SD = 0.92$) and sex ($N = 115$ men and 109 women), subjects at a large Midwestern university were presented with the following dilemmas, interspersed at different locations within a larger instrument:

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 upset or distress 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 are the percentages of women and men reporting more distress in response to sexual infidelity than to emotional infidelity for the first empirical probe. The first empirical probe, contrasting deep emotional attachment with passionate sexual intercourse, yielded a large and highly significant sex difference ($t = 6.96$, $p < .0001$). Furthermore, the effect size (gamma), signified by the difference between means in standard deviation units, was large ($\gamma = .98$), with the sexes differing by 43% in the responses to which infidelity scenario was more distressing. Cohen (1977) defined effect sizes as small if they are .20, medium if they are .50, and large if they are .80 or greater.

Shown in Figure 2 are the responses to the contrast between a partner trying different sexual positions with someone else versus falling in love with that other person. The sex difference again was highly significant ($t = 5.45$, $p < .0001$). The sexes

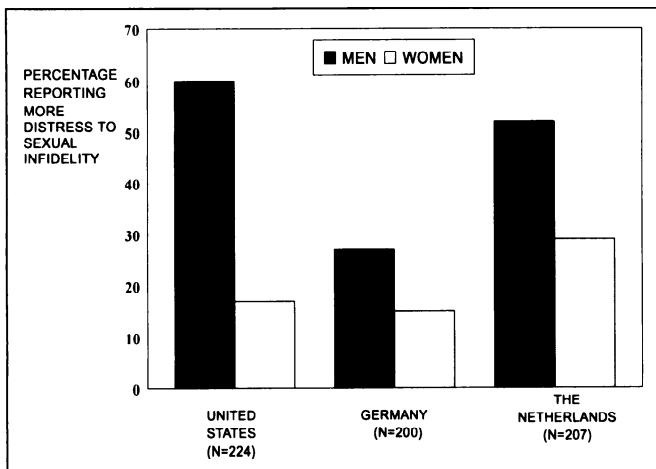


Fig. 1. Percentage of subjects reporting that they would be more distressed by imagining their partner enjoying passionate sexual intercourse with another person than by imagining their partner forming a deep emotional attachment to that person. Results are shown separately for men and women from the United States, Germany, and the Netherlands.

differed by 32% in their responses, with an effect size of .78, which is also considered large based on Cohen's (1977) criteria.

STUDY 2: GERMANY

Subjects and Method

A sample of 200 Germans from the city of Bielefeld participated in a parallel study. After reporting age (mean = 26.07, $SD = 3.67$) and sex ($N = 100$ men and 100 women), they responded to the same dilemmas as in the U.S. study. The Ger-

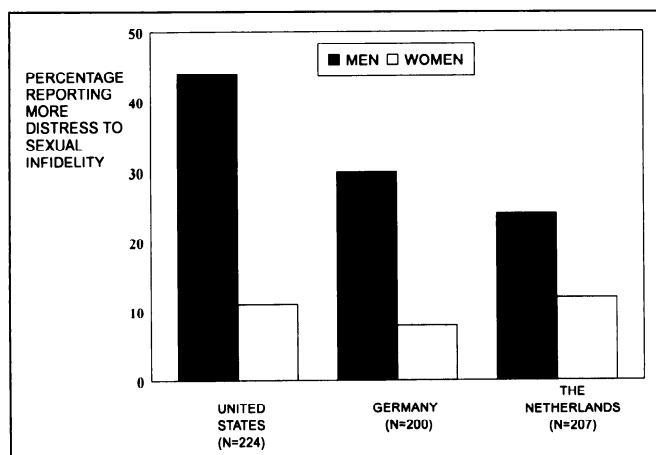


Fig. 2. Percentage of subjects reporting that they would be more distressed by imagining their partner trying different sexual positions with another person than by imagining their partner falling in love with that person. Results are shown separately for men and women from the United States, Germany, and the Netherlands.

man instructions for the first infidelity dilemma were as follows (female version):

Bitte denken Sie an eine ernsthafte oder feste romantische Beziehung, die Sie in der Vergangenheit gehabt haben, die Sie gegenwärtig haben oder die Sie gerne hätten. Stellen Sie sich weiter vor, Sie würden entdecken, dass diese Person, mit der Sie eine solche ernsthafte Beziehung führen, beginnt, sich für jemand anderen zu interessieren. Was würde Sie mehr verletzen oder aufregen? Bitte kreuzen Sie eine der Alternativen an:

(A) Die Vorstellung, dass Ihr Partner eine tiefe gefühlsmäßige Zuneigung zu dieser Person entwickeln würde.

(B) Die Vorstellung, dass Ihr Partner leidenschaftlichen Geschlechtsverkehr mit dieser anderen Person ausübt.

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

(A) Die Vorstellung, dass Ihr Partner verschiedene sexuelle Stellungen mit dieser anderen Person ausprobiert.

(B) Die Vorstellung, dass Ihr Partner sich in diese andere Person verliebt.

Results

Shown in Figure 1 are the percentages of women and men reporting more distress in response to sexual infidelity than to emotional infidelity in the first empirical probe which contrasted deep emotional attachment with passionate sexual intercourse. This probe yielded a significant sex difference ($t = 2.06$, $p < .02$). The effect size (gamma), however, was considerably smaller ($\gamma = .30$) than the comparable effect size for the U.S. sample, with the sexes differing by 12% in the responses to which infidelity scenario was more distressing. According to Cohen's (1977) criteria, this effect size is slightly larger than small.

Shown in Figure 2 are the responses to the contrast between a partner trying different sexual positions with someone else versus falling in love with that other person. The sex difference was again highly significant ($t = 4.03$, $p < .0001$). The sexes differed by 22% in their responses, with an effect size of .60, which is considered slightly above medium based on Cohen's (1977) criteria.

A comparison between Germany and the United States reveals that the percentages of women endorsing the sexual infidelity scenario were almost identical for the two cultures, differing by only 2% for the first infidelity scenario and 4% for the second scenario. In sharp contrast, the men from the two cultures differed considerably. Fully 33% more of the American men than the German men expressed greater distress to sexual than to emotional infidelity in the first dilemma, and 14% more American than German men expressed greater distress to sexual than to emotional infidelity in the second dilemma. Although the problematic nature of translation makes absolute comparisons of this sort of questionable interpretation, the results do suggest that the smaller sex difference in the German sample than in the U.S. sample may be due to differences in men's responses, rather than to differences in women's responses.

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STUDY 3: THE NETHERLANDS

Subjects and Method

A sample of 207 Dutch undergraduate students, 102 males and 105 females, participated in this study (mean age = 21.6, $SD = 2.73$). The same dilemmas were presented as in the U.S. and German studies. For both probes, the same introduction was presented as in both other countries.

The exact wording of the introduction and the first dilemma in Dutch was as follows:

De volgende vragen gaan over jaloezie. We willen je vragen te denken aan de serieuze intieme relatie die je nu hebt. Heb je nu niet een dergelijke relatie, denk dan aan een serieuze intieme relatie die je hebt gehad in het verleden, of stelt je voor hoe je je zou voelen wanneer je een dergelijke relatie zou hebben. Stel je nu voor dat je er achter komt dat je partner geïnteresseerd raakt in een ander. Wat zou je erger vinden, wat zou je meer storen (kies een mogelijkheid):

(A) je voorstellen dat je partner een diepe, emotionele band met die ander ontwikkelt.

(B) je voorstellen dat je partner hartstochtelijk seksueel contact met die ander heeft.

The second dilemma read as follows in Dutch:

(A) je voorstellen dat je partner verschillende seksuele posities met die ander uitprobeert.

(B) je voorstellen dat je partner op die ander verliefd wordt.

Results

Shown on the right of Figure 1 are the percentages of women and men reporting more distress in response to sexual infidelity than to emotional infidelity in the first dilemma. This probe, contrasting deep emotional attachment with passionate sexual intercourse, yielded a significant sex difference ($t = 3.41, p < .001$). The effect size (gamma) was medium ($\gamma = .46$), with the sexes differing by over 20% in their responses to which infidelity scenario was more distressing. This sex difference is larger than the sex difference found with the German sample, but smaller than the sex difference found with the American sample.

Shown in Figure 2 are the responses to the contrast between a partner trying different sexual positions with someone else versus falling in love with that other person. The sex difference again was significant ($t = 2.11, p < .04$). The sexes differed by just over 10% in their responses, with an effect size of .29, which is considered slightly larger than small based on Cohen's (1977) criteria.

A comparison of the responses from the three cultures is revealing. First, responding to the same probes, the sexes differed in the same ways in all three cultures, providing support for the evolutionary psychological hypothesis about sex linkage in the weighting given to the triggers of sexual jealousy. Second, the results suggest that these cultures differ in the magnitude of this sex difference. The difference between males and

females is consistently large within the American sample, but ranges from small to medium within both European samples.

DISCUSSION

This research makes two contributions to current knowledge about the nature of sex differences in jealousy. First, these studies provide the first systematic cross-cultural tests of the evolutionary psychological hypothesis that men and women differ in the weighting given to the triggers of sexual jealousy. Because the sexes have faced different adaptive problems caused by a mate's infidelity—compromised paternity confidence for men and the diversion of resources and investment for women—the sexes have been predicted to give different weighting to sexual acts of infidelity versus acts that signal emotional involvement and hence the potential diversion of resources over time.

The German and Dutch cultures provide especially rigorous tests of the hypothesis because these cultures have more relaxed attitudes about sexuality, including extramarital sex, than does the American culture; furthermore, these European cultures emphasize sexual equality, especially in the sexual domain, more than American culture does. The fact that the sex differences still emerged in these cultures provides support for the evolutionary psychological hypothesis. Even in the Netherlands, where values strongly deemphasize gender differences (Hofstede, 1994), and where a majority feels extramarital sexual relationships are acceptable under certain circumstances (Buunk & van Driel, 1989), men still tend to become more upset than women over their partner showing purely sexual interest in a third person, and women tend to become more upset than men over their partner expressing a desire for romantic and emotional involvement with someone else.

The second contribution of the present research is demonstrating that the magnitude of this sex difference differs across cultures. The Dutch and German samples showed small to moderate sex differences, whereas the American sample showed a large sex difference that was consistent across the empirical probes. Although the direction of the sex difference in jealousy is consistent across cultures, culture clearly matters in determining the magnitude of this sex difference. Further research may be directed more at identifying cultural features that account for such differences.

Several limitations qualify these results. First, although the German sample was selected in part from the adult population, the samples from the United States and the Netherlands were students. Thus, the results may not be representative of the entire cultures of these countries, and the results of the three studies are not completely comparable. Second, the vagaries of translation render exact comparisons of absolute percentages problematic; such comparisons should be interpreted with caution. Third, given that the individual probes undoubtedly contain some unreliability of measurement, the findings may actually underestimate the magnitude of the sex difference within each culture. The findings thus may be regarded as lower-bound estimates of the magnitude.

Although some investigators (e.g., Hupka & Ryan, 1990) might interpret the cultural differences found in the present research as a disconfirmation of the evolutionary psychology

framework, such an interpretation would be mistaken. Evolutionary hypotheses are sometimes misinterpreted as implying rigid, robotlike, instinctual behavior that suggests that the individual is oblivious to the social environment. In fact, evolutionary psychology postulates psychological mechanisms that were designed to respond to the social environment. Clearly, the jealousy mechanisms examined in these studies are sensitive to sociocultural conditions, even though the particulars of these cultural conditions are not yet known.

One explanation for the cross-cultural differences is that in sexually more liberal cultures where men may distribute their mating effort over a number of women, and hence devote less investment toward any one woman, men are less sexually jealous of any particular woman. Another possibility is that women in more sexually liberal cultures secure investments from a larger number of men, and hence are less jealous of any one partner's emotional involvement with other women. Still another possibility is that women in more sexually egalitarian cultures are more self-reliant for resources, and this self-reliance alters the intensity of jealousy they experience about a partner's emotional involvement with another woman.

Future research could profitably examine these and other features of the different cultures to pinpoint more precisely the causal locus of the cultural effect. Future research could also examine other cultures, including, at the other extreme, those that are more sexually conservative (e.g., perhaps China and Indonesia in the East, or Ireland within Western Europe) or that emphasize greater sexual inequality (e.g., Iran), to test the suggestion that these cultures might reveal even larger sex differences than those found within the United States. Given the importance of sexual jealousy in spousal violence and homicide, such studies might take an especially high priority.

Taken together, these studies suggest a complex portrait of human sexual psychology—one that is sex-differentiated, but also sensitive to cultural context. Whereas evolutionary psychology has been critical in guiding us to pose questions about sex differences in the triggers of jealousy and guiding a cross-cultural search for their existence, a cultural perspective has been valuable in uncovering variation in the magnitudes of those sex differences. Combining evolutionary and cultural perspectives may provide the most valuable models for exploring the mysteries of the uniquely human sexual psychology.

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