aps ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Perspectives on Psychological Science
2018, Vol. 13(2) 155–160

DOI: 10.1177/1745691617698225
www.psychologicalscience.org/PPS
SAGE

Sexual and Emotional Infidelity: Evolved Gender Differences in Jealousy Prove Robust and Replicable

David M. Buss
Department of Psychology, University of Texas at Austin

Abstract

Infidelity poses threats to high-investment mating relationships. Because of gender differences in some aspects of reproductive biology, such as internal female fertilization, the nature of these threats differs for men and women. Men, but not women, for example, have recurrently faced the problem of uncertainty in their genetic parenthood. Jealousy is an emotion hypothesized to have evolved to combat these threats. The 1992 article *Sex Differences in Jealousy: Evolution, Physiology, and Psychology* reported three empirical studies using two different methods, forced-choice and physiological experiments. Results supported the evolution-based hypotheses. The article became highly cited for several reasons. It elevated the status of jealousy as an important emotion to be explained by any comprehensive theory of human emotions. Subsequent meta-analyses robustly supported the evolutionary hypotheses. Moreover, the work supported the evolutionary meta-theory of gender differences, which posits differences only in domains in which the sexes have recurrently faced distinct adaptive problems. It also heralded the newly emerging field of evolutionary psychology as a useful perspective that possesses the scientific virtues of testability, falsifiability, and heuristic value in discovering previously unknown psychological phenomena.

Keywords

emotion, affect, evolutionary psychology, sex, gender

Jealousy is a powerful emotion. It afflicts many romantic relationships. Displays of jealousy can be positive for relationship enhancement, igniting sexual passion and signaling commitment (Buss, 2000). They can also be destructive, leading to verbal slings and arrows, physical violence, and in extreme cases homicide (Buss, 2000; Daly, Wilson, & Weghorst, 1982). Given the pervasiveness and profound consequences of jealousy, one would expect it to occupy a central place in the pantheon of theories of basic emotions that include fear, rage, and disgust (e.g., Ekman, 1992). Historically, it has been omitted.

Perhaps its noninclusion was because jealousy lacks a distinctive facial expression, unlike fear, rage, and disgust. Perhaps its omission was because jealousy does not seem relevant to problems of survival such as dangers from snakes and spiders (fear) or avoidance of food-bearing pathogens (disgust; Buss, 2014). From an evolutionary perspective, however, if jealousy is an evolved emotion, specific to solving distinct adaptive problems tributary to reproductive success, it should have a prominent place in any comprehensive theory of human emotions. Regardless of whether jealousy carries with it a distinct facial signature and regardless of whether it is linked to survival problems, there is no logical reason for excluding jealousy from taxonomies and theories of fundamental emotions.

The Evolution of Jealousy

What are the adaptive problems hypothesized to be linked to jealousy? Jealousy is an emotional state aroused when there is a threat to a valued social relationship (Daly et al., 1982; Symons, 1979). In the context of long-term mateships, dangers typically come from third parties—mate poachers—who threaten to intrude on an existing relationship. Relationship threats also arise in the absence of an immediately identifiable third party, such

Corresponding Author:
David M. Buss, Department of Psychology, University of Texas at Austin, 1 University Station, A8000, Austin, TX 78712
E-mail: dbuss@austin.utexas.edu

as when an initially well-matched couple becomes increasingly discrepant in mate value or overall desirability.

From an evolutionary perspective, the key underlying threat is the loss of reproductively relevant resources the partner provides (obviously, no conscious awareness of the underlying reproductive dynamics is required or assumed). Given the time and effort people expend to secure long-term mateships, the loss of these resources can be catastrophic. Is jealousy an evolved defense against mating relationship threats? What specifically are the threatened resources? And are these sex-differentiated such that the psychology of jealousy differs somewhat in design for men and women? These were the main psychological and scientific questions that our 1992 article, "Sex Differences in Jealousy: Evolution, Physiology, and Psychology" (Buss, Larsen, Westen, & Semmelroth, 1992), published in *Psychological Science* and one of the top 30 most cited articles in all *APS* journals over the past three decades, was designed to address.

Hypotheses About Gender Differences in the Psychological Design of Jealousy

A key sex difference in human reproductive biology is that fertilization occurs internally within women, not within men—something true of all primate and mammalian species. Consequently, men over evolutionary history confronted a critical adaptive problem—uncertainty in their paternity of children produced by a mateship (again, no conscious awareness is required or implied). Maternity is always 100% certain. No woman ever doubted that she was the biological mother. Paternity is always less than 100% certain. Some cultures use the phrase "Mama's baby, papa's maybe" to capture this asymmetry. Moreover, because humans are a species with intense biparental care, with men sometimes investing heavily in offspring, men whose paternity was jeopardized by a rival man would have risked investing unknowingly for years or decades in a rival's offspring. Hence, the costs of failing to ensure paternity are especially exacerbated when men invest. And there exists one focal act that put ancestral men at this risk—his partner having sexual intercourse with another man. This leads to the prediction that jealousy in men is an evolved defense against mate poachers and a partner's infidelity, and moreover that men's jealousy should focus heavily on the sexual aspects of a partner's infidelity.

Although no ancestral woman risked maternity uncertainty, her mate's infidelity could lead to a perilous adaptive problem—the loss of her mate's time, commitment, parental investment, and resources, all of which could be diverted to a rival woman and her children. This led us to predict that women's jealousy, also an evolved defense against a partner's infidelity, should focus heavily on cues to these sex-differentiated resource losses. Emotional infidelity—when a partner becomes attached to, psychologically enmeshed with, or falls in love with another person—is a cardinal cue to this loss.

Although the evolutionary logic of these gender-differentiated adaptive problems is straightforward, an added complexity is that sexual infidelity and emotional infidelity are correlated in nature, as we noted in our original 1992 article. People sometimes become emotionally attached to those with whom they have sex, and sometimes have sex with those with whom they become emotionally involved. But not always. Sex can occur without emotional involvement, as in a casual one-night stand or opportunistic fling. And emotional involvement can occur without sexual involvement, as occurs in some opposite-sex friendships (Bleske & Buss, 2000). Moreover, our pretesting using Likert-type scale items revealed that both men and women become extremely upset about a partner becoming either sexually or emotionally involved with a third party. Consequently, the first study in our 1992 article used a forced-choice method to avoid the anticipated methodological problem of ceiling effects that can occur with continuous measures.

Key Findings From the Jealousy Studies

We asked participants to imagine that their partner became interested in someone else: "What would upset or distress you more: (A) Imagining your partner forming a deep emotional attachment to that person. (B) Imagining your partner enjoying passionate sexual intercourse with that person" (Buss et al., 1992, p. 252). The results proved to be large in magnitude. Fully 60% of the men chose the partner's sexual infidelity as more upsetting, whereas only 17% of women made that choice. Conversely, 83% of women indicated that emotional infidelity was more distressing, compared to 40% of men. In short, we found a large 43% gender difference in response to this forced-choice infidelity dilemma. We also replicated this gender difference with a differently worded infidelity dilemma—a partner trying different sexual positions with a rival versus falling in love with a rival. Across both dilemmas, contrasting a sexual with an emotional infidelity using the forced-choice paradigm always produced a replicable gender difference.

But we also wanted to replicate using a different method, one not reliant on self-report. It happened that my colleague Randy Larsen had just set up his physiological lab, and indicated that our hypotheses could be tested with his methods. We used three physiological measures, recordings with electrodes placed on three different locations of the participants to assess heart rate, electrodermal activity (skin conductance), and corrugator supercilii contraction (brow-region frowning response).

When participants imagined their romantic partners either having sexual intercourse with a rival or falling in love and having a deep emotional involvement with a rival, gender differences again emerged. Men, compared to women, showed greater heart rate elevation, higher levels of electrodermal activity, and more intense corrugator contraction in response to the sexual infidelity scenario. One physiological expert we consulted compared the magnitude of response as roughly equivalent to drinking three strong cups of coffee at one sitting. Women showed the reverse pattern of physiological distress.

Still, we sought another replication, and moreover wanted to explain the within-sex variation in responses. Although women in Study 1 almost unanimously chose emotional infidelity as more distressing, men showed greater within-sex variation. Perhaps actual experience with a committed sexual relationship might account for some of the within-sex variation. So Study 3 replicated the forced-choice dilemmas from Study 1 using a larger sample (N = 309), and assessed the prior romantic and sexual experiences of participants. Study 3 robustly replicated the sex differences found in Study 1. Moreover, we found that although prior relationship experience did not matter for women (most women reported greater distress at a partner's emotional infidelity, regardless of prior experience), it did matter for men. Men who had experienced a committed sexual relationship, compared with men who had not, far more often chose the sexual infidelity scenario as more distressing.

Main Contributions of the Classic Jealousy Article to Psychological Science

The article made four key contributions. First, the article became pivotal in establishing jealousy as a basic emotion. It was not, as previously believed, an incidental emotion caused by neurosis, pathology, immaturity, or character defect (the dominant explanations for jealousy prior to 1992). If jealousy is an evolved emotion, emerging as a defense against a specific set of reproductive challenges, then it deserves a proper place in any comprehensive theory of basic emotions, even though it lacks a distinctive facial expression and is unrelated to problems of survival (Buss, 2014).

Second, our three studies revealed profound gender differences. Despite dozens of previous empirical studies, jealousy researchers had either failed to test for sex differences in jealousy or had not discovered any. The reason was twofold: (a) Prior researchers lacked a theory that predicted sex differences, so there was no particular reason to look for them, and (b) the methodologies they employed were almost invariably global in nature, assessing the overall frequency or intensity of experienced jealousy. Indeed, men and women do not differ in the *frequency* with which they experience jealousy. Nor do they differ in the *emotional intensity* with which they experience jealousy. It is only when a more domain-specific theory led to sex-differentiated empirical predictions that the gender differences were discovered.

Third, the article contributed to a growing body of research challenging the dominant assumption that men and women were psychologically identical or monomorphic. It supported the evolutionary meta-theory of sex differences (Buss, 1995): Men and women, although similar psychologically in most respects, differ in domains in which they have recurrently confronted different adaptive challenges over human evolutionary history (see Geary, 2010, for an empirical review). Sex-differentiated challenges of different forms of infidelity constitute one such domain.

Fourth, the article provided robust support for an important evolutionary-psychological hypothesis. Evolutionary hypotheses historically had been derogated by some as being mere speculative stories lacking empirical tests and the potential for testability and falsification (Confer et al., 2010). And in 1992, the criticism had some merit because there were very few empirical tests of evolutionary hypotheses in psychological science. Evolutionary psychology itself was just beginning to emerge. The jealousy article was one among a handful of important publications that gave a boost to the emerging field of evolutionary psychology by showing that its hypotheses had heuristic value and could be tested if precisely formulated.

Why the Sex Differences in Jealousy Article Had a Large Impact

There are several reasons the jealousy article made such a large splash—the importance of the phenomena, the robust replicability of the findings across methods, the rush of other scientists to generate competing theories of its findings, and the generativity and heuristic value of the evolutionary theoretical framework.

Infidelity and jealousy are important phenomena

The article struck a chord in part because people intuitively know that threats to relationships are real and emotional reactions to those threats are profound. Although precise estimates are difficult to come by, roughly 26% to 50% of all married couples in America experience infidelity at some point (Buss, 2016). Infidelity worldwide is one of the leading causes of divorce (Betzig, 1989). Jealousy afflicts many mating relationships (Buss, 2000). And sexual jealousy is known to be the leading cause of

mating-related violence (Buss & Duntley, 2011; Daly et al., 1982) as well as pre-breakup and post-breakup stalking (Duntley & Buss, 2012). Whereas many studies in psychological science deal with topics about which most people are relatively indifferent (e.g., reaction time experiments to trait-descriptive words presented on computer screens), the jealousy article struck a chord because most people have experienced or witnessed infidelity and jealousy in their own lives, seen their psychological and behavioral aftermath, and intuitively know that these phenomena are important. An emotion linked to love and infidelity, as well as to criminal violence by otherwise nonviolent individuals, is surely worthy of attention. Consequently, media interest in the article and interest from other psychological scientists were intense and continues to this day (e.g., coverage in *Time, Newsweek, New York Times*).

The sex differences in jealousy have proven robust and replicable with multiple methods

A second reason for its impact is the sheer replicative robustness of the gender differences across cultures and across methods. After publication, scientists sought to examine whether the gender differences in jealousy could be replicated in China, Korea, Japan, Chile, Spain, Romania, and Ireland, as well as in highly sexually egalitarian cultures such as Sweden, Norway, and the Netherlands. They were. Scientists sought to examine whether the results replicated using different methods, including experimental tests of memorial recall, speed of processing, information search, attention, and cognitive preoccupation; physiological methods such as EEG and fMRI; behavioral measures; and verbal interrogations upon the discovery of a partner's infidelity (see Edlund & Sagarin, 2017, for a recent review of different methods). The gender differences replicated across all these methods.

Several meta-analyses (involving hundreds of effect sizes) have focused on the forced-choice method, the continuous rating method, and on samples that have experienced an actual infidelity (see Edlund & Sagarin, 2017, for the most comprehensive review). The authors conclude, "These meta-analyses offer strong evidence that the sex differences in jealousy occurs . . . when using either forced-choice measures or continuous measures . . . there is significant meta-analytic evidence that the sex difference in jealousy occurs in response to actual infidelities as well" (Edlund & Sagarin, 2017, p. 288). These authors also express some puzzlement about the continued resistance to the theory and findings among some mainstream social psychologists, "despite the consistent picture that emerges across the literature in support of the theory" (Edlund & Sagarin, 2017, p. 294). A recent study found that resistance among many social psychologists to evolutionary research on gender differences is based partly on ideologically driven agendas rather than on the actual science (von Hippel & Buss, 2017).

The rush to find alternative explanations of the jealousy findings

A third reason for its impact is that other psychological scientists began to come up with competing post hoc theories to explain the gender differences. One proposed a domain-general social-cognitive theory of jealousy, but that failed to explain the known findings or to generate any novel predictions. Another tried to trace the gender differences to arbitrary gender differences in the beliefs that men and women held about the conditional probabilities of sexual and emotional infidelity (e.g., people do indeed believe that it is easier for men than women to have a sexual infidelity without emotional involvement). But this theory has been robustly falsified by studies that have controlled for differing conditional probabilities (Buss et al., 1999). It cannot explain why women and men would hold differing beliefs about the conditional probabilities, although the evolutionary account can do so well (Buss et al., 1999). And importantly, it cannot explain the large and robust panoply of other gender differences in the psychological design of jealousy, such as gender differences in the qualities of rivals who evoke the most intense jealous reactions (Buss & Haselton, 2005; Edlund & Sagarin, 2017).

A third effort to explain away the gender differences was by claiming that the forced-choice findings are due to a methodological artifact, and attempting to test this notion by putting participants under high "cognitive load" when completing the forced-choice dilemmas. This effort failed in three senses (see Barrett, Frederick, Haselton, & Kurzban, 2006, for a comprehensive theoretical and empirical refutation of the "cognitive load/methodological artifact" argument). First, although the artifact-explanation authors concluded that cognitive load caused the sex differences to disappear, their own findings revealed a significant sex difference precisely as predicted by the original theory (albeit smaller in magnitude), which they chose to ignore (it was subsequently pointed out by other authors such as Sagarin, 2005, and Barrett et al., 2006, p. 514, n. 3). Strangely, some subsequent psychologists have repeated the false claim of disappearing sex differences in print. Second, the "methodological artifact" explanation addressed only one of the dozen or so methods used, and so cannot explain why the gender differences are robust across many methods. Indeed, there have now been enough studies to conduct meta-analyses, and these show

that the gender differences in jealousy are quite robust across samples and methods (e.g., Edlund & Sagarin, 2017; Sagarin et al., 2012).

And importantly, "the method also entails the assumption that evolved jealousy mechanisms are necessarily automatic, an assumption not supported by theory or evidence. . . cognitive load manipulations cannot rule out the operation of evolved mechanisms" (Barrett et al., 2006, p. 513). In sum, the authors of the "cognitive load/methodological artifact" argument mischaracterized the evolutionary hypothesis about evolved sex difference in jealousy, used an empirical method entirely irrelevant to that theory, ignored voluminous evidence involving multiple methods against their argument, and ironically even ignored their own results, which found significant theory-predicted sex differences despite their efforts to make them "disappear" under the theory-irrelevant manipulation of cognitive load.

In short, efforts to explain the findings with alternative theories, and to explain away the findings as being due to a perceived problem with one method, have failed. Efforts to dismiss the findings as methodological artifacts have failed. The gender differences in jealousy are robust across cultures, robust across methods, and not explained by alternative hypotheses. Given the current replication crisis in social psychology, these empirical success-stories are noteworthy. Importantly, none but the evolutionary psychological hypothesis led to these novel discoveries, a testament to the heuristic value of evolutionary psychology.

Conclusions

Different forms of infidelity, such as sexual versus emotional betrayal, pose different adaptive problems in the context of romantic relationships. Although some of these problems are similar for men and women (e.g., interest from potential mate poachers in one's partner), some are sex-differentiated (e.g., paternity uncertainty, the loss of a partner's resources). Jealousy is an evolved defense against relationship threats for women and men alike, but shows some gender-differentiated design features. Our 1992 article discovered these gender differences in three empirical studies that used forced-choice and physiological methods.

The article became widely cited for several reasons. The phenomena of jealousy and infidelity are pervasive and important, since they are linked to love and long-term mating, betrayal of long-term commitments, and crimes of passion. The findings proved robust across methods and across cultures. They supported the evolutionary metatheory of sex differences. And they gave a boost to the newly emerging field of evolutionary psychology both by highlighting the testability of well-formulated evolution-based hypotheses and by illustrating the heuristic value of an evolutionary perspective in guiding researchers to discover phenomena previously unknown.

Declaration of Conflicting Interests

The author(s) declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

References

Barrett, H. C., Frederick, D. A., Haselton, M. G., & Kurzban, R. (2006). Can manipulations of cognitive load be used to test evolutionary hypotheses? *Journal of Personality and Social Psychology*, *91*, 513–518.

Betzig, L. (1989). Causes of conjugal dissolution: A cross-cultural study. *Current Anthropology*, *30*(5), 654–676.

Bleske, A. L., & Buss, D. M. (2000). Can men and women be just friends? *Personal Relationships*, *7*, 131–151.

Buss, D. M. (1995). Psychological sex differences: Origins through sexual selection. *American Psychologist*, *50*, 164–168.

Buss, D. M. (2000). *The dangerous passion: Why jealousy is as necessary as love and sex*. New York: The Free Press.

Buss, D. M. (2014). Evolutionary criteria for considering an emotion "basic": Jealousy as an illustration. *Emotion Review*, *6*, 313–315.

Buss, D. M. (2015). *Evolutionary psychology: The new science of the mind* (5th ed.). New York, NY: Taylor & Francis.

Buss, D. M. (2016). *The evolution of desire: Strategies of human mating* (Revised and updated edition). New York: Basic Books.

Buss, D. M., & Duntley, J. D. (2011). The evolution of intimate partner violence. *Aggression and Violent Behavior*, *16*, 411–419.

Buss, D. M., & Haselton, M. (2005). The evolution of jealousy. *Trends in Cognitive Sciences*, *9*, 506–507.

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., Shackelford, T. K., Kirkpatrick, L. A., Choe, J. C., Lim, H. K., Hasegawa, M., . . . Bennett, K. (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.

Confer, J. C., Easton, J. A., Fleischman, D. S., Goetz, C. D., Lewis, D. M., Perilloux, C., & Buss, D. M. (2010). Evolutionary psychology: Controversies, questions, prospects, and limitations. *American Psychologist*, *65*, 110–126.

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

Duntley, J. D., & Buss, D. M. (2012). The evolution of stalking. *Sex Roles*, *66*, 311–327.

Edlund, J. E., & Sagarin, B. J. (2017). Sex differences in jealousy: A 25-year retrospective. *Advances in Experimental Social Psychology*, *55*, 259–302.

Ekman, P. (1992). An argument for basic emotions. *Cognition & Emotion*, *6*, 169–200.

Geary, D. C. (2010). *Male, female: The evolution of human sex differences*. Washington, DC: American Psychological Association.

Sagarin, B. J. (2005). Reconsidering evolved sex differences in jealousy: Comment on Harris (2003). *Personality and Social Psychology Review*, *9*, 62–75.

Sagarin, B. J., Martin, A. L., Coutinho, S. A., Edlund, J. E., Patel, L., Skowronski, J. J., & Zengel, B. (2012). Sex differences in jealousy: A meta-analytic examination. *Evolution & Human Behavior*, *33*, 595–614.

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

von Hippel, W., & Buss, D. M. (2017). Do ideologically driven scientific agendas impede the understanding and acceptance of evolutionary principles in social psychology? In L. Jussim & J. Crawford (Eds.), *Political bias in psychology* (pp. 7–25). Cambridge, England: Cambridge University Press.