



## Articles

# The Influence of a Rival's (In)fertility on Jealousy and the Allocation of Blame Following a Mate's Infidelity

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## Abstract

Selective pressures throughout evolutionary history have caused the adaptation of sex-specific responses to dilemmas that are relevant for reproductive fitness. Sex differences in imagined jealousy due to infidelity are well documented, but past work does not consider the influence of reproductive capability (i.e., being fertile versus infertile) on responses. Relying on an online survey of 369 adults, we hypothesized that infidelities involving an infertile interloper lead to less jealousy than infidelities involving a fertile interloper. Further, for sexual infidelity, regardless of the interloper's fertility, we hypothesized men would allocate the most responsibility to their partner and women would do so for the interloper, given women are assumed to behave with more intention. This hypothesis was partially supported; while men did allocate the most responsibility to their mate, so too did women, but women also blamed the interloper more than men. With regards to emotional infidelity, again independent of the interloper's fertility, we hypothesized men will primarily hold their partner responsible. However, we hypothesized that women will again consider the interloper responsible, but also their partner, due to concerns over fear of losing access to needed resources. This prediction was partially supported, as both sexes primarily hold their partner most responsible, and women held the interloper more accountable than did men. The findings shed light onto how individuals assess relationship threats and allocate responsibility, according to reproductive capability.

**Keywords:** sex differences, fertility, jealousy, infidelity, responsibility, blame

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Jealousy is generated by a real or imagined threat to a relationship, which is typically cued by a real or imagined interloper (Dijkstra & Buunk, 2002). Two distinct types of jealousy have been examined: sexual jealousy, evoked by a romantic partner engaging in an extra-dyadic sexual (but not emotional) relationship, and emotional jealousy, evoked by a romantic partner engaging in an extra-dyadic emotional (but not sexual) relationship (Buss et al., 1992; Sagarin et al., 2003).

Sharpsteen and Kirkpatrick (1997) proposed that romantic jealousy is a response to threats toward one's relationship. One key issue that has remained understudied is how threats, by way of differing sexual orientations, influence jealousy, as the vast majority of research pertains to heterosexual relationships. One exception is Sagarin et al. (2012), who found that homosexual versus heterosexual individuals have significantly different responses to jealousy. They propose a 'reproductive threat-based model' of jealousy, such that when there is

no threat of reproduction, there is less jealousy and sex differences are negligible. Similarly, [Denes et al. \(2015\)](#) asked participants about their reactions to imagined same-sex versus opposite-sex infidelity, which indicated less negative response to same-sex infidelity (see also [Leeker & Carlozzi, 2014](#)). Here, our first goal is to extend this model back to heterosexual relationships to examine how an interloper's known fertility versus infertility, a novel way to examine reproductive threat, influences jealousy. Research on infidelity has also addressed the allocation of blame, specifically whether individuals blame their partner or the interloper ([Paul, Foss, & Galloway, 1993](#)). However, there is no research that connects the allocation of responsibility (the variable we consider underlying blame) according to whether the interloper is fertile versus infertile, which is the second goal of our study.

### Jealousy in Romantic Relationships

Humans have faced sex-specific selective pressures, particularly in terms of reproductive success, throughout evolutionary history, leading to distinct psychological mechanisms and behaviors ([Buss & Schmitt, 1993](#)). In general, women are inherently choosier when selecting a potential mate because of their relatively larger parental investment compared to men ([Trivers, 1972](#)). Due to their high involvement in their children, women generally seek mates with resources (or indicators of resource potential) that can be allocated towards themselves and any children. Moreover, women often prefer long-term rather than short-term relationships, as this increases the chances of herself and her children receiving resources from a mate ([Buss & Schmitt, 1993](#)). Men, in contrast, are obligated to invest very little in children, which comes with the cost of having low paternity certainty. Thus, men's reproductive strategy is often summarized as one of quantity, rather than quality of mates, due to the emphasis on acquiring a large number of mates instead of establishing long-term care of children ([Buss & Schmitt, 1993](#)). Although individual differences exist, research supports this sex difference in general; for example, men more than women report desiring a higher number of sexual partners in their lifetime ([Fenigstein & Preston, 2007](#)).

Due to sex differences in minimal required parental investment, men and women have evolved different feelings of jealousy stemming from infidelity (see [Sagarin et al., 2012](#), for a review). Indeed, jealousy is an area where sex differences are robust, such that men and women respond in distinct, sex-specific ways to emotional versus sexual infidelity ([Buss et al., 1992](#)). Due to men's inability to be entirely certain of their paternity, and the potentially large costs of cuckoldry due to misallocated paternal resources and energy, men may be most concerned about a partner's sexual infidelity. In contrast, due to women's historical/evolutionary reliance on men's protection and resource acquisition for support of them and their children, the potential costs of mate desertion or diversion of resources are large. Consequently, women may be most concerned by a partner's emotional infidelity, as it may signal divestment of a mate's attention and resources. This pattern has been found cross-culturally (e.g., [Buss et al., 1999](#); [Buunk et al., 1996](#)), across real versus imagined responses to infidelity, and across various methods (see meta-analytic review by [Sagarin et al., 2012](#)). It has also been documented using different framing; women imagine more intense relief when an emotional infidelity is disconfirmed, while men imagine more intense relief when a sexual infidelity is disconfirmed ([Schützwohl, 2008](#)). Most recently, it has been documented via the imagined discovery of Facebook messages to one's partner that were manipulated to be indicative of either sexual or emotional infidelity ([Dunn & Billett, 2017](#)).

In broad terms, the heart of jealousy resulting from real or imagined infidelity is reproductive threat. [Sagarin et al. \(2012\)](#) suggest interlopers who might successfully reproduce with one's mate evoke jealousy, whereas indi-

viduals who pose no risk of successfully reproducing induce less jealousy. This reproductive-threat model of jealousy suggests that same-sex infidelity cannot lead to reproduction, and hence, causes less overall jealousy than heterosexual pairings, but also leads to no sex differences in jealousy. [Sagarin et al. \(2012\)](#) imply that sex differences in jealousy are not solely determined by one's sex, but instead based on an individual's reproductive capability.

We argue that reproductive capability can be attributed to a number of factors aside from homosexual relationships, including infertility. However, we disagree with the proposal that sex differences should be eliminated when reproductive threat is minimized by way of introducing fertility or infertility as the relevant variable. Given the robustness of prior research on the systematic sex differences in jealousy due to sexual versus emotional infidelity (see [Tagler & Jeffers, 2013](#), for a review) we propose that extending the reproductive threat model of [Sagarin et al., \(2012\)](#) has only partial and limited application for heterosexuals. Therefore, we propose that individuals will respond to information about fertility such that they are less distressed by infidelity involving an infertile versus fertile interloper, but men will still be generally more upset by sexual rather than emotional infidelity, and women will still be generally more upset by emotional rather than sexual infidelity.

### **Allocation of Responsibility and Blame Due to Infidelity**

The allocation of blame in infidelity overlaps with intent or 'avoidability' of the transgression, such that blame is normally allocated more heavily when the intent was clear and 'avoidability' was high ([Murray, 2002](#)). However, there are sex differences in the allocation of blame, such that women generally place more blame on the interloper compared to their partner, while men tend to place more blame on their partner compared to the interloper ([Paul, Foss, & Galloway, 1993](#); [Paul & Galloway, 1994](#)). [Paul et al. \(1993\)](#) argue that women blame the interloper because derogating or eliminating the interloper rather than a partner allows for the retention of access to the partner's resources. Contrariwise, men blame their partner due to the potential benefits of finding new mates outweighing potential costs of fighting an interloper for access to an existing mate, especially when there is proven paternity uncertainty.

These findings suggest that blame is not allocated in a stable pattern with responsibility allotted toward the party who intentionally committed a transgression, but instead implies that blame is allocated toward those who pose the most risk to one's reproductive success. Furthermore, [Paul et al.'s \(1993\)](#) finding shows both sexes are allocating the majority of blame towards women.

It is not surprising that women are often blamed for sexual infidelity more than men (although interestingly, men and women's current rate of sexual infidelity in American society appears to be roughly equal, [Fincham & May, 2017](#)). [Buunk and Dijkstra \(2014\)](#) review how, across many cultures, men's engagement in extramarital sex has been far more tolerated. Indeed, the sexual double standard is extremely enduring, to the extent that even in cultures where extramarital sexual behavior is generally more accepted, women are still judged more negatively than men (e.g., [Thompson, 1983](#)), and seen to be more responsible for their actions than men ([Mongeau, Hale, & Alles, 1994](#)). This double standard even plays into relationship dissolution; [Buunk \(1987\)](#) surveyed couples who had engaged in infidelity and ended their relationship. He found that men attributed the breakup of their relationship three times more often on their partner's infidelity than their own, while women blamed their partner's infidelity as often as they blamed themselves. Moreover, when confronted with a partner's infidelity men are more likely than women to blame others while women are more likely to blame themselves, resulting in self-doubt (see [Buunk & Dijkstra, 2014](#)).

In the current study, we frame the research in terms of responsibility rather than blame. The literature suggests blame is the result of allocating responsibility, such that people attribute greater responsibility (and hence blame) for the outcome of a negative event when it is severe, rather than when the outcome is minor (e.g., [Robbenolt, 2000](#)). There is also the underlying facet of attribution, such that an individual's conduct is attributed to being under their own control, and hence, blame is the result of committing an action for which they are directly responsible ([Réz, 2013](#)).

### **Infertility and Reproductive Threat**

Infertility is the inability to produce children after having unprotected sex regularly for at least a year ([El Kissi et al., 2013](#)). Fertility (i.e., the probability of conception from a given sexual encounter or one's current state) is closely tied to fecundity (i.e., the actual capacity for reproduction). However, they differ in a significant way: infertility (the opposite of fertility) is the inability to conceive currently within the given mating relationship, while sterility (the opposite of fecundity) is the inability to conceive at all in the future. For our purposes here, we opted to use the terms "fertility" and "infertility" when testing participants. This decision was based on the reasoning that it did not introduce more drastic disabilities that one might imagine as linked to sterility.

Female infertility has various causes, including the intentional use of hormonal and non-hormonal contraceptives. However, it is important to note that it can be caused by many other factors, such as a lack of bodily resources to sustain a pregnancy (e.g., body fat, [Suneeta et al., 2012](#)), as well as ovulation disorders and tubal damage ([Thonneau et al., 1991](#)). The rate of infertility is significant; using a French sample composed of couples who were experiencing difficulties in conceiving, [Thonneau et al. \(1991\)](#) report a rate of 14.1%. They state one out of seven women will consult a physician regarding infertility during her reproductive years. Further, female fertility is known to decrease with age ([Bulletti, Coccia, Battistoni, & Borini, 2010](#)), as it does for males ([Dunson, Baird, & Colombo, 2004](#)). Men's infertility can be attributed to inadequate sperm production, morphology, or motility ([Thonneau et al., 1991](#)), exposure to toxins, or resulting from (or in conjunction with) sexual dysfunction ([Raheem & Ralph, 2011](#)). [El Kissi et al. \(2013\)](#) found that women experience more distress over being infertile than men, which results in increased depression and lower self-esteem.

### **The Current Study**

The first goal of the current study was to extend [Sagarin et al.'s \(2012\)](#) model of reproductive threat back to heterosexual relationships to examine how an interloper's reproductive capability (i.e., fertility versus infertility) impacts on imagined feelings of jealousy caused by sexual versus emotional infidelity. The second goal was to focus on the hypothetical allocation of responsibility in the context of sexual versus emotional infidelity, again based on whether the interloper is fertile versus infertile. We note that, intuitively, while the interloper's fertility status might not matter much for strictly emotional infidelity, it may remain important to some participants. For example, it might provide them with the realization that the reason the relationship has remained emotional is *not* because the interloper is infertile.

While infertile interlopers pose no threat of reproducing with one's mate, such that males will not be cuckolded and females will not lose resources to a child resulting from the infidelity, we propose the situation is too novel to have an evolutionary basis. Unlike homosexual behavior which obviously does not lead to biological children, during human's evolutionary past, it would be unlikely that one could accurately assess the fertility status of heterosexual others (aside from cues of ovulation (e.g., [Hurst, Alquist, & Puts, 2017](#)) or based on age). Given jealousy is presumed to be an evolved module in response to relationship threats (e.g., [Buss, 2002](#)), it would be

advantageous to assume that interlopers are fertile, rather than infertile, due to the potential risks of errors in judgment and too easily dismissing the threat posed by a fertile interloper. As we reviewed, infertility may be due to many factors, but the majority are not visible and hence, humans are unlikely to have evolved a response in light of the information it provides. Thus, we cannot *fully* support the reproductive threat model proposed by Sagarin et al. (2012). We do agree that people will be affected to a limited extent by the information, such that sexual and emotional infidelity involving an infertile interloper will result in less imagined jealousy overall, as compared to that involving a fertile interloper, for both men and women (*Hypothesis 1*).

However, we cannot support the extension of the model that proposes no sex differences in response to sexual or emotional infidelity. These sex differences are robust and have deep evolutionary roots, and given the high cost of mistakenly assuming an interloper is infertile, it would be sensible for the sex difference to remain. Therefore, we also expected to replicate the past findings for the fertile condition (e.g., Buss et al., 1992), whereby men would have more imagined jealousy about a partner's sexual infidelity and women would have more imagined jealousy by a partner's emotional infidelity, for the reasons already presented earlier. However, we depart from Sagarin et al.'s (2012) reproductive threat model, and instead of predicting no sex difference in response to an infertile interloper for the two forms of infidelity, we propose men would have more imagined jealousy about a partner's sexual infidelity and women would have more imagined jealousy about a partner's emotional infidelity (*Hypothesis 2*). Thus, while Hypothesis 1 deals with the issue of infertility versus fertility specifically, Hypothesis 2 pertains with the sex difference in sexual versus emotional infidelity for just the infertile interloper.

Further, we investigate the allocation of responsibility. Past work on infidelity shows that women tend to be perceived as acting with greater intention than men, and thus as having more responsibility than men, for the same situation (Mongeau, Hale, & Alles, 1994). In general, there is a positive correlation regarding blame, such that the more preventable a situation is perceived to be, the more blame is attributed to the individual on the basis that they did not behave in a responsible manner (e.g., Alicke, Buckingham, Zell, & Davis, 2008).

Therefore, we have two hypotheses regarding responsibility. First, we predict men will hypothetically hold their partner (as compared to oneself, the interloper, or the interloper's partner) most responsible for *sexual infidelity* with an interloper (whether fertile or infertile), while women will hypothetically believe the interloper (whether fertile or infertile) is most responsible (*Hypothesis 3*). Note that while Buunk (1987) found women were equally likely to blame themselves as their partner, he did not include the possibility of blaming the interloper instead, which we expect women will do via assigning responsibility. Hence, we predict the interloper will not be blamed by men, but will be blamed by women. One study in particular is useful in this context: Dunn and Billett (2017) investigated imagined distress upon the discovery of sent and received Facebook messages and found that women were more upset when the author of the message was the interloper (i.e., the other woman) compared to their own partner, while men were more upset when the author was their partner, versus the interloper. Although their work does not examine blame specifically (and in fact, this variable is notoriously absent from work on infidelity), it does provide evidence that the sexes view the role of the interloper and their partner differently.

We also predict that men will primarily believe their partner rather than the interloper is most responsible for imagined *emotional infidelity* with an interloper, based on earlier findings (e.g., Buunk, 1987; Dunn & Billett, 2017). However, while we predict women will believe the interloper to be most responsible, we expect women will also hold their partner responsible (i.e., more than they consider themselves, or the interloper's partner, to

be responsible; *Hypothesis 4*). Given the emotional nature of the infidelity, we expect women will focus on the breach of trust caused by their partner, leading them to perceive their partner to be responsible. Research on relationship dissolution shows that women often pinpoint the deterioration of the relationship on men's failure to be emotionally present (e.g., [Riesmann, 1990](#)), and emotional infidelity might highlight this issue.

## Method

### Participants

A total of 103 men ( $M_{\text{age}} = 21.76$ ,  $SD = 3.73$ ) and 266 women ( $M_{\text{age}} = 20.61$ ,  $SD = 2.81$ ) participated. The participants were either students or community members living in Canada who were recruited via online advertisements in social media (students received partial course credit for their time). Almost 88% percent of participants reported currently living in an urban environment while 12.3% reported living somewhere rural.

For descriptive purposes only, we report that half of the men (50%) and women (53.5%) were in a long-term, committed romantic relationship. With respect to direct, personal experience with infidelity, 38.9% of men and 39.1% of women said they had been sexually cheated on (with an additional 15.7% of men and 19.2% of women saying they did not know). Likewise, 42.6% of men and 48.3% of women said they had been emotionally cheated on (with an additional 25.0% of men and 20.3% of women being unsure). In terms of one's own cheating behavior, 28.7% of men and 23.9% of women had sexually cheated on a partner, compared with 37.0% of men and 46.7% of women who emotionally cheated on a partner.

### Measures and Procedure

After being directed to the online study, participants provided informed consent and completed basic demographic questions, and then the following infidelity measure, which was comprised of questions pertaining to imagined jealousy and allocation of responsibility. All participants were presented with the same surveys, presented in the order listed above with the items presented in the order stated in the following sections. The study was granted approval by the institutional Research Ethics Board.

#### Infidelity Measure

To assess the relationship between reproductive capacity and imagined jealousy due to sexual and emotional infidelity, as well as the allocation of responsibility, we modified the scenarios used by [Buss et al. \(1992\)](#) and [Sagarin et al.'s \(2012\)](#). In order to examine sexual infidelity, participants were asked to read the following:

"Please think of a serious committed relationship you have had, are currently in, or would like to have. Imagine your partner was sexually, but not emotionally involved with someone else who was also in a relationship. Which would distress or upset you more (choose 1):

a) Imagining your partner with someone where the chance of them reproducing together was high, or b) Imagining your partner with someone where there was little to no chance of them reproducing together (the other person is infertile)."

To examine the allocation of responsibility, participants were asked: "In this situation with your partner being sexually involved with someone where the chance of them reproducing together is high, on a scale from 0-10 (0

being not at all and 10 being extremely) how responsible do you think each person is in this case?" They were provided with the options: a) yourself, b) your partner, c) the other person, and d) the other person's romantic partner. They were then asked the same question but this time, how they would distribute the responsibility across the individuals in terms of percentage, ensuring the total added up to 100%.

Participants were then asked to complete the same rating for the allocation of responsibility, and assigning of percentage, but to: "Imagine the same situation but your partner was involved with someone else where there was little to no chance of reproduction because of the other person's fertility issues."

In order to examine emotional infidelity, participants were asked, "Please think of a serious committed relationship you have had, are currently in, or would like to have. Imagine your partner was emotionally, but not sexually involved with someone else who was also in a relationship. Which would distress or upset you more (choose 1):

a) Imagining your partner with someone where the chance of them reproducing together was high, or b) Imagining your partner with someone where there was little to no chance of them reproducing together (the other person is infertile)."

To study the allocation of responsibility, participants were asked the same question as for sexual infidelity with a fertile interloper, but with the relationship described as being an "emotional, but not sexual relationship" to represent emotional infidelity. Likewise, they were also asked to allocate the percentage of responsibility to each party. Then, they were asked to complete the same items (i.e., rating of responsibility and assigning of percentage) with the interloper described as infertile ("your partner was involved with someone else where there was little to no chance of reproduction because of the other person's infertility") for emotional infidelity.

Finally, to examine which type of infidelity is more likely to invoke feelings of jealousy according to reproductive capability of the interloper, we asked participants two questions. First, they were asked: "Please think of a serious committed relationship you have had, are currently in or would like to have. Which would upset or distress you the most?" The provided options were: a) Imagining your partner having a sexual, but not emotional relationship with someone else where there was no chance of them reproducing together (the other person is infertile) or b) Imagining your partner having a strong emotional, but not sexual relationship with someone else where there was no chance of them reproducing together (the other person is infertile). Second, "Please think of a serious committed relationship you have had, are currently in or would like to have. Which would upset or distress you the most?" with the options: a) Imagining your partner having a sexual, but not emotional relationship with someone else where there was a high chance of them reproducing together, or b) Imagining your partner having a strong emotional, but not sexual relationship with someone else where there was a high chance of them reproducing together.

Note that to test Hypothesis 1 and 2, the analyses had to rely on comparisons that either examined the form of infidelity separately to allow us to examine the differences due to the interloper's fertility versus infertility, or to examine the interloper's fertility and infertility separately to investigate sexual versus emotional infidelity. This limitation was caused by relying on the original survey items, adapted to test the hypotheses, as described above. Hypotheses 1 and 2 also were not about sex differences per se, and hence, the models were created for all participants initially in Hypothesis 1, with exploratory post-hoc analyses for sex differences. Likewise, we decided to do post-hoc examination of men and women, separately, to test Hypothesis 2.

## Results

### H1: Differences in Imagined Distress from Sexual and Emotional Infidelity Separately Due to Interloper's Fertility versus Infertility

We performed a chi square analysis for sexual infidelity with an interloper who was fertile or not (as worded in the scenarios presented in the measures section), and separately, a chi square analysis for emotional infidelity with an interloper who was fertile or not. These responses were based on forced-choice items where the options pertained to only the interloper's fertility status. Both tests yielded significant differences, such that infidelity with fertile interlopers led a larger proportion of participants to imagine distress; sexual infidelity  $\chi^2(1) = 153.31, p < .001$ , emotional infidelity,  $\chi^2(1) = 127.28, p < .001$  (see Figure 1). For exploratory purposes, we examined whether there was a sex difference and found there was for sexual infidelity, such that a higher proportion of women reported imagined distress from infidelity with a fertile interloper  $\chi^2(1) = 6.67, p = .01$ , while for emotional infidelity, there was no difference  $\chi^2(1) = .72, p = ns$  (see Figure 1).

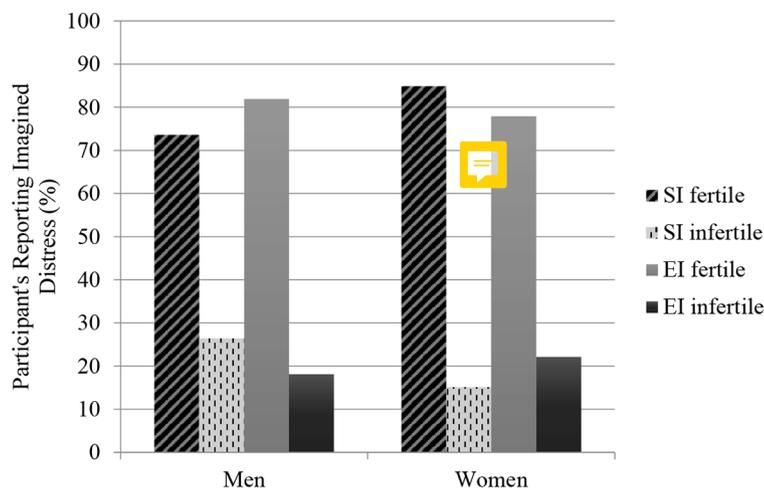


Figure 1. Examining sexual and emotional infidelity separately by participant sex when infidelity involves an infertile versus fertile interloper.

*Note.* Mean percentages of men and women's responses to forced choice question regarding imagined distress allocated towards infidelity with a fertile versus infertile interloper for sexual infidelity (SI), and separately for emotional infidelity (EI). In keeping with Hypothesis 1, participants selected a mate's infidelity with a fertile interloper as more distressing for both types of infidelity. Through exploratory analyses, we found that women selected a mate's sexual infidelity with a fertile interloper as more distressing than with an infertile interloper.

### H2: Sex Differences in Imagined Distress for Sexual versus Emotional Infidelity Separately in Relation to Interloper's Fertility and Infertility

To test the difference between imagined distress from sexual versus emotional infidelity, we calculated a chi square for when the interloper was fertile, and a second one for when the interloper was infertile. These responses were based on forced choice items, where participants had to choose between sexual versus emotional infidelity. We then did the analyses separately for men and women. Men selected sexual infidelity as more distressing than emotional infidelity,  $\chi^2(1) = 14.22, p < .01$ , while women selected emotional infidelity as more distressing than sexual infidelity,  $\chi^2(1) = 21.39, p < .01$ . The same pattern of sex differences emerged when the

interloper was infertile; men selected sexual infidelity over emotional infidelity,  $\chi^2(1) = 12.00$ ,  $p = .001$ , and women selected emotional infidelity over sexual infidelity,  $\chi^2(1) = 6.52$ ,  $p = .01$  (see Figure 2).

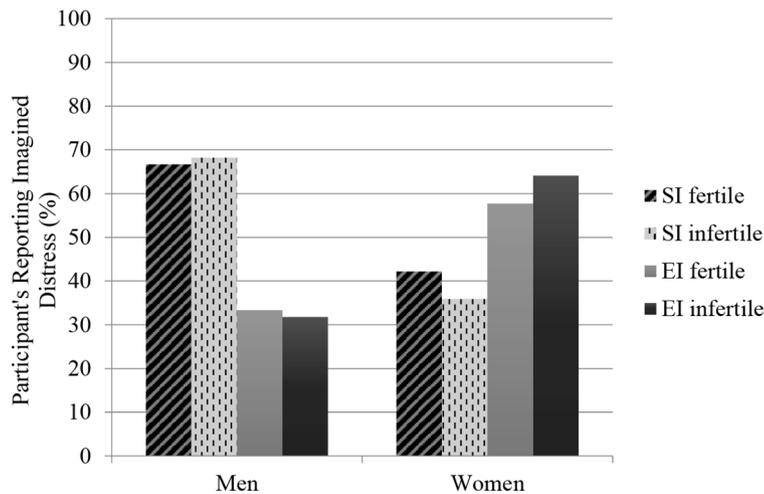


Figure 2. Examining men's and women's distress to imagined sexual versus emotional infidelity separately for fertile and infertile interlopers.

Note. Mean percentages of men and women's responses to forced choice question regarding imagined distress allocated towards sexual infidelity (SI) versus emotional infidelity (EI) with a fertile interloper, and separately for an infertile interloper. Men generally selected sexual infidelity as more distressing, and women selected emotional infidelity as more distressing, regardless of whether the interloper was described as fertile or infertile.

### H3: Allocation of Responsibility for Sexual Infidelity

To test the hypothesis that men would hold their partner, and women hold the interloper, as being most responsible for sexual infidelity, we created a repeated-measures Multivariate Analysis of Variance (MANOVA) model. Sex was the independent variable, and the four individuals' (i.e., oneself, one's partner, the interloper, the interloper's partner) level of responsibility using the assigned percentages were the repeated dependent variable. We first created a model for the fertile interloper condition, and then a second model for the infertile interloper condition.

For sexual infidelity with a fertile interloper, there was a main effect for the individual,  $F(3, 379) = 378.21$ ,  $p < .001$ ,  $\eta_p^2 = .750$  and a significant interaction for individual by sex,  $F(3, 379) = 8.74$ ,  $p < .001$ ,  $\eta_p^2 = .065$ . Pairwise comparisons for the individuals revealed all effects were significant  $p < .01$ , with partner held the most responsible, followed by the interloper, oneself, and the interloper's partner. Independent samples  $t$ -tests to explore the interaction term yielded only one significant difference; women ( $M = 45.14$ ,  $SD = 23.05$ ) allocated more responsibility to the interloper than men ( $M = 32.70$ ,  $SD = 20.53$ ),  $t(382) = 4.93$ ,  $p < .001$ .

For sexual infidelity with an infertile interloper, there was again a main effect for individual,  $F(3, 379) = 439.30$ ,  $p < .001$ ,  $\eta_p^2 = .78$ , and a significant interaction between individual and participant sex,  $F(3, 379) = 6.07$ ,  $p < .001$ ,  $\eta_p^2 = .046$ . Pairwise comparisons revealed all were significantly different,  $p < .001$ , and the same pattern for responsibility as when it was a fertile interloper. Independent samples  $t$ -tests yielded only one significant difference; women ( $M = 43.65$ ,  $SD = 20.88$ ) held the interloper more responsible than did men ( $M = 35.06$ ,  $SD = 22.83$ ),  $t(381) = 3.53$ ,  $p < .001$  (see Figure 3).

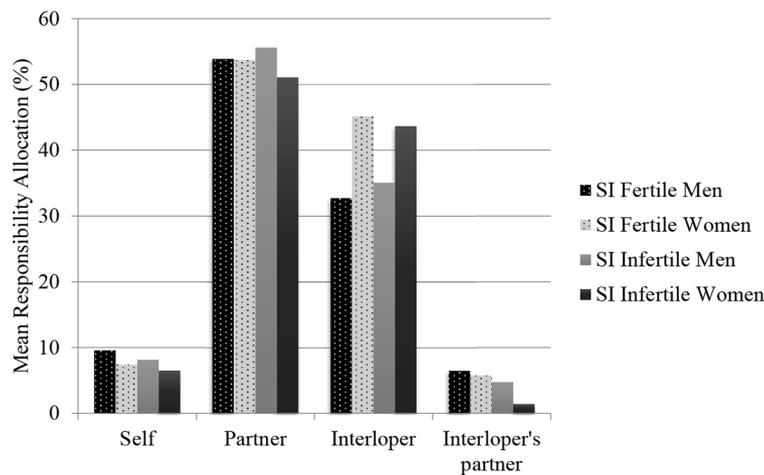


Figure 3. Men's and women's assigned percentage of responsibility to imagined sexual infidelity (SI) with fertile *versus* infertile interlopers

Note. Assigned percentage of responsibility to the four individuals (self, partner, interloper, interloper's partner) in response to imagined sexual infidelity (SI), according to whether the interloper was fertile or infertile and participant sex (men/women in the legend). Hypothesis 3 was partially supported; regardless of whether the interloper was described as fertile or infertile, participants allocated the most responsibility to their partner, then the interloper, themselves, and the interloper's partner. As predicted, women held the interloper more responsible than men.

Recall that responsibility was also measured by asking participants to rank the level of responsibility (0 to 10) each for themselves, their partner, the interloper, and the interloper's partner. Using paired samples *t*-tests showed men held their partner more responsible than themselves, the interloper more than themselves, partner more than the interloper, partner more than the interloper's partner, and interloper more than the interloper's partner ( $p < .001$  for all comparisons). Thus, the only comparison that did not yield significant difference was how responsible they considered themselves versus the interloper's partner. We then turned to sexual infidelity involving an infertile interloper, and the same pattern emerged for both men and women as for the fertile interloper condition.

#### H4: Allocation of Responsibility for Emotional Infidelity

To test the hypothesis that men would hold their partner most responsible for emotional infidelity while women would hold the interloper most responsible, a repeated measures MANOVA model was created for when the interloper was fertile, and a second one for when the interloper was infertile. Similar to the models for sexual infidelity, sex was the independent variable, and the four individuals' (i.e., oneself, one's partner, the interloper, the interloper's partner) level of responsibility using the assigned percentages were the repeated dependent variable.

For emotional infidelity with a fertile interloper, there was a main effect for the individual,  $F(3, 376) = 254.38$ ,  $p < .001$ ,  $\eta_p^2 = .760$ , as well as a significant interaction for the individual with participant sex,  $F(3, 376) = 5.94$ ,  $p < .01$ ,  $\eta_p^2 = .045$ . Pairwise comparisons showed all individuals differed from each other at  $p < .01$  level, with partner held the most responsible, then the interloper, oneself, and the interloper's partner. Independent samples *t*-tests to explore the interaction term yielded only one significant difference; women ( $M = 42.96$ ,

$SD = 22.08$ ) allocated more responsibility to the interloper than men ( $M = 33.45$ ,  $SD = 19.44$ ),  $t(380) = 4.92$ ,  $p < .001$ .

For emotional infidelity with an infertile interloper, there was a main effect for individual,  $F(3, 375) = 296.52$ ,  $p < .001$ ,  $\eta_p^2 = .90$ , and a significant interaction between individual and participant sex,  $F(3, 375) = 4.99$ ,  $p = .002$ ,  $\eta_p^2 = .03$ . All of the individuals were significantly different from each other at  $p < .001$ , in the same order as the first model. Independent samples  $t$ -tests to explore the interaction yielded two significant findings. Men ( $M = 10.85$ ,  $SD = 16.11$ ) were more likely than women ( $M = 7.39$ ,  $SD = 2.15$ ) to attribute more responsibility to themselves,  $t(377) = 2.14$ ,  $p = .03$ , and women ( $M = 42.61$ ,  $SD = 21.44$ ) placed more responsibility on the interloper than men ( $M = 34.14$ ,  $SD = 19.31$ ),  $t(378) = 3.57$ ,  $p < .001$  (see Figure 4).

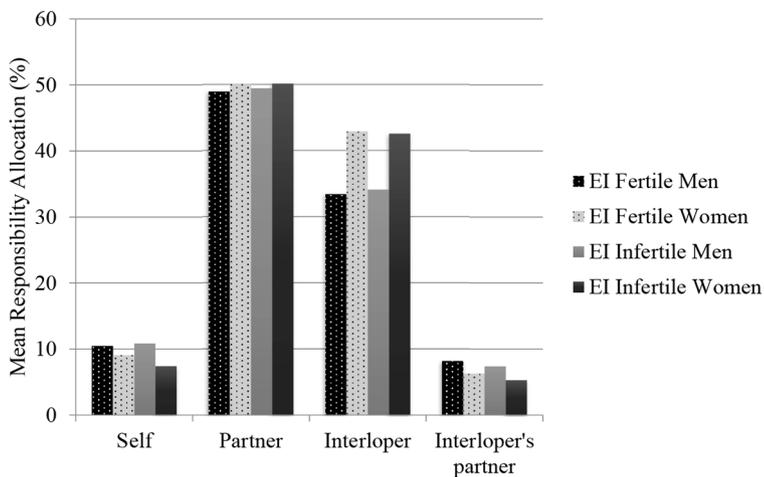


Figure 4. Sex differences in assigned percentage of responsibility to imagined emotional infidelity (SI) with fertile versus infertile interlopers.

Note. Assigned percentage of responsibility to the four individuals (self, partner, interloper, interloper's partner) in response to imagined emotional infidelity (EI), according to whether the interloper was fertile or infertile. In partial support of Hypothesis 4, regardless of whether the interloper was described as fertile or infertile, participants allocated the most responsibility to their partner, then the interloper, themselves, and the interloper's partner. Women held the interloper more responsible than men, while men placed more responsibility on themselves than women.

To investigate responsibility as evaluated through participant's ranking, paired-samples  $t$ -tests were conducted. Every comparison for men was significant at  $p < .01$  for emotional infidelity with a fertile interloper, and an infertile interloper, such that men allocated the most responsibility to their partner, the interloper, themselves, and the interloper's partner. For women, two comparisons were not significant: women ranked themselves and the interloper's partner similarly when the interloper was fertile and when the interloper was infertile, with all other comparisons significant at  $p < .001$ .

## Discussion

In the current study, we proposed that jealousy in response to sexual and emotional infidelity, as well as the allocation of responsibility, would be influenced by reproductive capability, as well as respondent sex. Using the reproductive threat model of Sagarin et al. (2012), we predicted imagined infidelities involving an infertile inter-

loper lead to a smaller proportion of participants reporting jealousy compared to infidelities involving a fertile interloper. This hypothesis was supported. We also replicated the well-established sex difference (e.g., [Buss et al., 1992](#)) in imagined distress from sexual versus emotional infidelity, whereby men are primarily distressed by sexual infidelity, and women by emotional infidelity. This result was obtained for situations involving both fertile and infertile interlopers, as we expected.

We additionally examined the allocation of responsibility. We predicted men would allocate the most responsibility for sexual and emotional infidelity to their partner, and women to the interloper, given women are thought to behave with more intention ([Mongeau, Hale, & Alles, 1994](#)). This prediction is also in keeping with [Dunn and Billett \(2017\)](#), who reported that men were more distressed by messages sent by their partner than received by an interloper, while women showed the reverse trend. Further, we hypothesized that for emotional infidelity, women would blame the interloper the most, then their partner, due to breaches of trust. We partially supported these predictions, as both sexes held their mates most responsible, although women also allocated more responsibility to the interloper than men. This allocation of responsibility was not influenced by the reproductive capability of the interloper, and was apparent across both sexual and emotional infidelity. There was one unexpected result, which was that in emotional infidelity involving an infertile interloper, men placed more responsibility on themselves than women.

Our results suggest that there is a deep sense of trust toward one's mate, which underpins the belief that the mate will behave in a responsible manner, even when faced with tempting alternative partners. Acts of infidelity breach this trust, resulting in the mate being held the most responsible for their actions. In other words, we propose the allocation of responsibility, leading to blame, may stem from feelings about the breach of trust or a sense of being betrayed by one's mate. Although there are various definitions of betrayal, the common theme consists of a serious violation of the norms and expectations for a close, personal relationship. That is, there is a sense of an intentional violation of trust by a partner (for a review, see [Couch, Jones, & Moore, 1999](#)), which is why the partner, not the interloper, may be held the most accountable.

The findings clearly indicate that the assignment of responsibility for an infidelity follows the order of one's partner, the interloper, oneself, followed by the interloper's partner. Thus, while one's partner and the interloper are being ascribed with intentionality, in that they could have avoided the infidelity and are the individuals primarily responsible for the situation, respondents are also attributing a low-level of responsibility to those external to the situation (i.e., oneself and the interloper's partner).

Given that an infidelity necessitates the involvement of a second party, the interloper, it is not surprising that participants perceive this individual must also be held somewhat responsible. Further research is needed to determine participants' actual perceptions of this interloper; perhaps they are believed to have "lured" an unsuspecting mate, or actively engaged in mate poaching behavior. It is very possible interlopers do engage in mate poaching behaviors in many situations, given that it is a very frequent activity (e.g., 63% of men and 54% of women are in their current long-term relationship because they were poached; [Schmitt & International Sexuality Description Project, 2004](#)). Therefore, one might consider the interloper as having actively tried to "steal" a mate, and in contrast, think that their mate is simply gullible or should have known better. A more detailed study of *why* people specifically hold their mates and interlopers responsible is needed.

We also found women generally allocated more responsibility to the interloper than men. There are at least two possible reasons for this finding. The first is that women might be blaming an external partner, like the interlop-

er, as a way to better maintain their relationships. That is, if a woman places more blame on her partner, he may simply leave the relationship as a result, extracting his resources from the relationship. By blaming an interloper, a woman might be carefully balancing culpability with risk of desertion, also derogating the interloper more than the partner. An alternative, albeit not mutually exclusive explanation is that this finding is reflective of the sexual double standard, in that female interlopers are behaving in culturally inappropriate ways by engaging in extra-dyadic sexual behavior (see [Bordini & Sperb, 2013](#), for a review). Thus, women are blaming other women for their sexuality, while men are less likely to blame other men. This possibility warrants future attention.

It should be stated, too, that individuals who are allocating responsibility (and blame) to their mate may be in the initial steps of activating mate guarding behaviors in an effort to maintain the relationship. Jealousy and the associated distress when presented with the potential infidelity of a romantic partner is an expression of caring about a mate ([Buss, 2002](#)). Thus, by holding their mate responsible, they are also indicating that they care about their mate, which may lead them to engage in mate guarding behaviors and endeavor to keep the relationship. While some individuals do forgive their mate after an infidelity and continue the relationship, such decisions are complex and deserve closer attention from researchers. For example, those in highly satisfying relationships are unlikely to do so, perhaps because they experience substantial disillusionment when betrayed by a mate ([Negash, Cui, Fincham, & Pasley, 2014](#)).

We found that infidelity with an interloper who is able to conceive children leads to more distress than infidelity with an interloper who is not, so we did find general support for the proposal that jealousy (and associated distress) decreases when the reproductive threat decreases ([Sagarin et al., 2012](#)). Moreover, while our findings support the classic model of men tending to be more jealous or distressed by sexual infidelity, and women of emotional infidelity ([Buss et al., 1999](#)), we found the sexes are quite similar in how they assign blame and responsibility. Recall both sexes primarily blame their partner, then the interloper (although the women blame the interloper more than men), followed by themselves, and the interloper's partner. Therefore, we must conclude that while the sexes feel differently about sexual versus emotional infidelity, there is considerable overlap in how they feel in terms of allocating responsibility and blame. Issues surrounding fertility, which has remained overlooked as a key variable by past research, needs to be considered by future researchers, as do all the various parties involved when assessing blame and responsibility.

There are several limitations with the current study. The first limitation is that the scenarios were written to explicitly highlight the fertility of the parties involved in the infidelity. While this manipulation is straight forward for sexual infidelity, it does open up the possibility of participants thinking that an emotional infidelity will lead to sexual infidelity. Our goal was simply to fully consider the effects of fertility, but in doing so, our participants may have inadvertently been primed to consider both types of infidelity. It would be interesting for future researchers to determine how participants envision the interlopers for both sexual and emotional infidelity; we predict that although it is not explicitly stated, participants think of the interlopers as fertile.

Another limitation is the actual wording to describe the fertility status of the involved parties. We initially selected using the words "fertility" and "infertility" but when we discussed the scenarios amongst a group of freshman students, they were not aware of what these terms actually meant with respect to the likelihood of conception. The same problem occurred for other possible terms, such as sterility and fecundity. Therefore, we opted to focus on the term "reproducing" in an effort to be direct, succinct, and clear. This issue is a potential limitation

because we do not know exactly what reproducing means to the participants. For example, in the case of sexual infidelity, the thought of someone engaging in sex is what presumably leads to the distress, not the thought about being cuckolded. By using the phrase “reproducing” we are perhaps highlighting the latter more than the former.

One weakness in our design is that we had to be direct in wording how likely the infidelity with the interloper would be at producing children. In everyday interactions, determining the reproductive capability of an interloper or threat to one's romantic relationship is unlikely to be that simple. While there is significant research indicating that fertility may be assessed by physical cues (Scheib, Gangestad, & Thornhill, 1999), it remains unknown how these signals would be perceived in a research context such as the current study.

Additionally, an older sample may be beneficial to include, as older individuals face infertility to a much greater degree compared to young adults (Harris, Fronczak, Roth, & Meacham, 2011; Steiner & Jukic, 2016). As such, older adults, especially women, may be more sensitive to the potential fertility of an interloper, given that they themselves are not able to have children. Older women are posited to be particularly aware of the fertility of an interloper, given that their fecundity decreases with age more rapidly and more completely than that of men (e.g., Steiner & Jukic, 2016). The special attention women pay to younger interlopers may be evidenced by the finding that women, but not men, were more upset by a mate's sexual infidelity involving a fertile versus infertile interloper. Women might feel that they are not able to compete as effectively against a younger, fertile interloper who has secured the attention of their mate and instead, must decide whether to cut their losses or fight even harder to maintain their relationship, for example. We, however, do not predict age will alter men's tendency to be more upset by sexual infidelity, and women by emotional infidelity; indeed, Green and Sabini (2006) found no age effect in a national sample of Americans.

It would be potentially worthwhile to further examine individual differences in assignment of responsibility to infidelity. Sharpsteen and Kirkpatrick (1997) found individuals with an avoidant attachment style were particularly likely to blame an interloper, while those with a secure attachment style were more likely to express anger to a partner. Therefore, perhaps those with an avoidant attachment style are more likely to hold the interloper most responsible and those with a secure attachment style hold their partner most responsible. Moreover, self-esteem may also influence one's level of personal responsibility, as might one's self perceived mate value. If one has low self esteem or believes they are a low quality mate (and low reproductive value), they may feel more threatened by a potential infidelity, given they may have a hard time finding another mate in the future. Similarly, if one has high self esteem or believes they are a high quality mate, they may feel more betrayed by infidelity than one who is a lower quality mate, presuming they have many other options available as mates in whom they could have invested.

Jealousy due to infidelity represents one of the most explored topics of interpersonal relationships within the evolutionary psychological perspective. Given the high level of research interest, it is intriguing that many characteristics (including fecundity or current fertility) of the interloper have remained relatively unexplored, as have issues that impact on feelings of blame and responsibility (although not specifically about interlopers within a paradigm involving infidelity, there has been research on the jealousy evoking effects of various characteristics within mating rivalry; e.g., Buunk, Massar, & Dijkstra, 2007). We found that infidelity involving a low probability of conception due to infertility resulted in less distress or jealousy than infidelity with a high probability of conception. This important finding suggests that people are intuitively aware that infidelity involving potential con-

ception is linked to the possibility of cuckoldry, re-direction of resources and parenting effort, and so on. Also, the results of our study show that while men have a tendency to be more jealous of sexual infidelity and women of emotional infidelity, the sexes are highly similar in how they ascribe blame and responsibility to the involved individuals. The current study adds to our understanding of factors that influence jealousy from infidelity in a novel manner, using the framework offered by evolutionary psychology.

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