Original Article

Infidelity and Kin Selection: Does Cheating Seem as Bad When it's "All in the Family"?

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Abstract: The current study explored people's perceptions of how they would feel if their partners cheated on them by having sex with their relatives, such as if a man's wife had sex with his brother. Kin selection theory suggests that in such situations, victims of infidelity might feel slightly better if their partners had sex with biological relatives (compared to sex with nonrelatives) because some of the victims' genes could still get passed on through their relatives. In two experiments, participants reported how they would feel in various scenarios involving their partners having sex with participants' relatives and nonrelatives. As expected, participants generally reported being very disapproving of a partner's hypothetical infidelity with both their relatives and nonrelatives. However, contrary to predictions generated by kin selection theory, participants tended to report that they would feel worse if their partners had sex with their relatives. We propose several explanations for the current findings and discuss their implications for kin selection theory.

Keywords: infidelity, kin selection, jealousy, inclusive fitness

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Introduction

From an evolutionary standpoint, infidelity is a clear threat to people's inclusive fitness—the representation of their genes in future generations. If a man tolerates his partner having sex with other men, he loses opportunities to pass on his own genes and at worst may end up investing resources into the offspring of competitors. Likewise, if a woman tolerates her partner having sex with other women, she may lose resources that could be invested into her own offspring and may risk losing her partner. As such, humans have evolved adaptions to dislike being the victim of infidelity, detect it, and guard against it (Shackelford and Buss, 1997).

Another consideration in human evolution that stems from inclusive fitness is kin selection (Hamilton, 1963, 1964). Humans and many other species increase the chances of

passing on their genes by investing resources in their own offspring as well as their close relatives, because relatives also share some of the same genes. Humans share 50% of their genes with each child, as well as (on average) 50% with each sibling, 25% with each half-sibling, and 12.5% with each first cousin; thus, investing resources in close relatives can increase one's inclusive fitness. In extreme cases, kin selection theory can explain social insects, such as bees and ants, being sterile and devoting their lives to helping their queens produce close relatives (Dawkins, 1976). In other more moderate cases, kin selection can lead to the evolution of alarm calls in birds or mammals, in which the individual making the alarm call brings more danger to itself, but the danger is offset by the benefits it confers to its relatives. In primates (including humans), kin selection can also be used to explain why relatives are more likely to share food with one another than with nonrelatives, and why individuals are more likely to adopt orphaned relatives than nonrelatives (Wilson, 1978).

However, the potential advantages offered by kin selection create an interesting conflict with the benefits of guarding against infidelity. Obviously, it is in person X's genetic interest to prevent his or her partner from having sex with strangers, but what if person X's partner had sex with person X's genetic relative? In this context, infidelity occurring with genetic relatives does not represent incest. The infidelity in this context occurs between a person's partner and that same person's genetic relative (e.g., a man's wife sleeping with his brother, or a woman's husband sleeping with her sister). Infidelity with a relative would still present a threat to person X's inclusive fitness, but to a lesser degree than if the infidelity occurred with a nonrelative because some of person X's genes would still get passed on through their relative. This possibility can be described in the following way: I don't want my partner to be unfaithful, but if it happened with one of my relatives it wouldn't be as bad. Admittedly, this possibility is somewhat counterintuitive, as most people likely experience a visceral reaction at the thought of their partners having affairs with close relatives. But this intuitive reaction appears to be at odds with what kin selection theory might predict, and it is the goal of these studies to examine this conflict.

There has been extensive research on infidelity from an evolutionary perspective. Some of the most influential work comes from Buss, Larsen, Westen, and Semmelroth (1992), in which they described the different costs of infidelity for men and women in terms of inclusive fitness, and showed that men and women have evolved distinct reactions to their partners being unfaithful. Both men and women report experiencing jealousy at the thought of any type of infidelity, but if forced to decide whether they would be more upset at the thought of sexual infidelity or emotional infidelity, men are more likely than women to select sexual infidelity. The theory underlying this phenomenon is that men and women experience different threats to inclusive fitness as a result of their biological differences (e.g., women are forced to invest more heavily in unborn children, and men are less certain their children are truly theirs). The greatest threat to a man's inclusive fitness is to be tricked into investing resources in another man's children at the expense of his own. Therefore, men are more sensitive to sexual infidelity because it is a sign that their children may not be their own. Women, on the other hand, are always sure that their children are genetically related to them, but they benefit from the resources that their partners invest in their children. Therefore, women are more sensitive to emotional infidelity because it is a

sign that their partner may begin diverting resources to another woman and her children. These results have been replicated many times (Sagarin et al., 2012), though there is some debate regarding the methodology and theoretical interpretations (Harris, 2003). There may be limits to the effect, as well; for example, Buss et al. (1992) report that men are more likely to indicate that sexual infidelity is more distressing if they have been in a "committed sexual relationship in the past" (p. 254), and the same is not true for women who have been in a committed sexual relationship—they reported more distress over emotional infidelity than sexual infidelity and relationship history had no effect. Also, Lishner, Nguyen, Stocks, and Zillmer (2008) report that if participants are allowed to indicate that the sexual infidelity and the emotional infidelity situations are equally distressing, most participants respond that way (though men are still more likely than women to indicate that sexual infidelity is more distressing).

There have been several studies on infidelity involving relatives (e.g., Bohner, Echterhoff, Glaß, Patrzek, and Lampridis, 2010; Fenigstein and Peltz, 2002; Michalski, Shackelford, and Salmon, 2007; Shackelford, Michalski, and Schmitt, 2004). These studies have mostly built off the findings of Buss et al. (1992) in order to evaluate whether sex differences in jealousy could be explained by socialization theories (e.g., DeSteno and Salovey, 1996). Whereas these studies did involve gauging participants' perceptions of infidelity involving relatives and nonrelatives, none of these studies specifically addressed how people would feel when pitting their own reproductive interests *against* those of their relatives. Only one study thus far has focused on how participants would feel if they themselves were victims of infidelity that involved their own relatives. Fisher et al. (2009) examined how degree of relatedness can affect distress from infidelity, and specifically mentioned the clash between the damage to social bonds vs. the potential benefits to inclusive fitness. Overall, they showed that people are more distressed when "the other person" is closely related to them, and that genetic relatedness is a more important factor than the type of sexual behavior, the risk of sexually transmitted diseases, and the damage to reputation. Fisher et al. (2009) concluded that infidelity with relatives is more distressing than infidelity with nonrelatives because of the importance of maintaining social bonds with relatives. These results are intriguing and convincing, but they do not address situations in which the degree of social closeness varies between relatives and nonrelatives. In fact, their results seem to suggest that if social closeness were held constant, infidelity with relatives might still seem less distressing than infidelity with nonrelatives because of the potential benefits to inclusive fitness. The goal of the current set of experiments was to examine these issues.

Buss et al. (1992) described the utility of evolutionary theory to generate predictions of sex differences in jealousy. The present study used this same approach to test predictions generated from kin selection theory by examining whether people would be more distressed by their partners cheating on them with relatives or nonrelatives. In this framework, evolutionary theory would lead us to predict that, overall, people would be strongly disapproving of infidelity, but people might experience less distress at the thought of their partners being unfaithful with relatives than with nonrelatives. In two experiments, participants answered questions about how they would feel if their partners had sex with a variety of their (the participants') relatives and nonrelatives. Experiment 2 of Fisher et al.

(2009) used Likert scale ratings to determine how much distress would be caused by infidelity with siblings, best friends, prostitutes, and strangers. Experiment 1 attempts to replicate and extend their findings by comparing more categories of relatives and nonrelatives while measuring social closeness.

Experiment 1

Materials and Methods

Participants

Missouri State University undergraduates (83 total: 12 men, 71 women) consented to participate in exchange for extra credit in a research methods course. This experiment was approved by Missouri State University's IRB. The average age for participants was 22.35 ($SD = 4.30$). The range of ages was between 18 and 42, although one participant did not indicate her age. Seventy-five participants reported being heterosexual. Because some prior work has suggested that sexual jealousy may manifest itself differently in same-sex relationships (Sagarin, Becker, Guadagno, Nicastle, and Millevoi, 2003; Sheets and Wolfe, 2001), all following statistics and analyses are restricted to participants who indicated they were heterosexual.

On a question involving relationship status, 32 participants responded they were single, 37 were unmarried but in a relationship, four were married, and two were divorced. Of participants who reported currently being in some type of romantic relationship, the average reported length of the relationship was 3.03 years ($SD = 4.04$). Of those who were in a relationship or married, no participants responded that they were involved with someone other than their current partners, and nobody reported that their partners were currently involved with someone else.

Procedure

Participants received a packet with instructions and questions. The instructions read as follows:

In this study, please imagine that you are in a long-term relationship with somebody, and you discover that your partner has cheated on you by having sexual intercourse with another person. On the following page there are different questions about how you might feel if you learned your partner had cheated on you with various people. For example, you may be asked to indicate on a scale of -5 to +5 how you would feel if your partner had cheated on you with your neighbor. A negative score indicates you would feel bad, and a positive score means you would feel good, and a score of 0 would mean that you would have no feelings on the matter. Even though being cheated on is probably a negative experience for most people, please give some thought about how you would actually feel in each scenario; would you feel truly devastated, only a little upset, neutral, or possibly somewhat positive about the experience?

These questions will ask about different types of relatives or friends. For example, you will have to think about how you would feel if your partner cheated on you

with a relative or a coworker. Even if you do not have every type of relationship we will ask about, try to imagine how you would feel if you did.

The subsequent pages contained the prompt "How would you feel if your partner had sex with…" and participants circled their ratings for each item. Each scale included descriptors in which participants saw that a rating of -5 corresponded to "Very bad" and +5 corresponded to "Very good" (See Appendix for all relationship types in the current experiment).

Next, participants reported sexual orientation by circling Heterosexual, Homosexual, Bisexual, Prefer not to say, or Other (with space to write something in). Participants then indicated the total numbers of male and female siblings, half-siblings, step-siblings, first cousins, and distant cousins. Participants also indicated whether they or any of their siblings were adopted, and they were asked to write down the number of male and female adoptive siblings they had. Participants were also given space to write clarifications for their answers to questions about their family information.

In questions about their relationship history, participants were asked to indicate whether they have ever been in a serious, committed romantic relationship. Participants also indicated their current relationship status (single, unmarried but in a relationship, married, divorced, and widowed). For participants currently in some type of relationship, they were asked how long they have been with their partner and whether their relationship is monogamous. Participants were again given space to write any additional information to clarify their answers about their relationship histories.

Next, participants completed a series of items based on the Inclusion of Other in the Self (IOS) scale (Aron, Aron, and Smollan, 1992). The following instructions appeared:

For the following questions, please circle the picture which best describes your relationship with various other people. If you do not have such a person in your life, indicate so, but still circle the picture that you *think* would describe your relationship with that kind of person.

Here is how the questions will appear:

Do you have a [relationship with some type of other person]?   Yes   No
Circle the kind of relationship you have (or might have) with him/her:
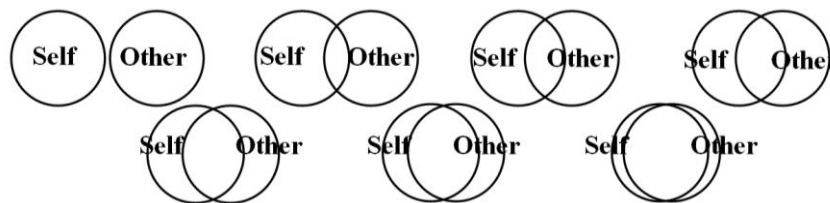
If you have any questions, please ask them now. Otherwise, turn over the page to begin.

Participants' responses were converted into ratings between 1 (not close) and 7 (very close) corresponding to the picture that was circled. Means and standard deviations for each category are reported in the Appendix. Each of the IOS questions asked about same-sex relationships, such as, "Do you have a same-sex sibling?" and "Do you have a same-sex best friend?" For the item regarding a "stranger who looks just like you," the question

asked "Have you ever seen a stranger who looks just like you?" For the item regarding a complete stranger, participants were simply asked to think of a complete stranger without responding yes or no to anything.

After the IOS scale, participants completed the Attitudes toward Infidelity Scale (ATIS; Whatley, 2006).[1] Finally, participants were asked optional questions about their actual experiences with infidelity. First, participants were asked whether they have ever been in a relationship in which their partner cheated on them. If they responded "yes," they indicated the type of relationship and who the "other person" was, they provided a rating on a scale of -5 to +5 of how the experience made them feel, they indicated whether the relationship ended because of the infidelity, and they were given space to write any additional details they wanted to provide. The last page included the same questions regarding whether the participants themselves ever cheated on their partners.

Results and Discussion

Because prior work (Buss et al., 1992) has shown that sexual jealousy may operate differently for people who have been in committed sexual relationships, the following analyses are restricted to participants who reported being in a relationship or married at the time of the study ($n = 44$), although we achieve the same findings when including data from all participants. For the following three sets of comparisons involving the distress ratings, the Bonferroni-adjusted alpha level is .017; for the two sets of comparisons involving the IOS ratings, the Bonferroni-adjusted alpha level is .025.

In a planned comparison of average ratings of feelings of distress for all relatives combined ($M = -4.54$, $SD = 0.64$) and all nonrelatives combined ($M = -4.21$, $SD = 0.70$), participants reported significantly greater feelings of distress for relatives, $t(43) = 3.12$, $SE = 0.11$, $p = .003$, Cohen's $d = 0.43$. Another way of analyzing these data would be to conduct a 2 (Related vs. Unrelated) x 7 (Type of Relationship) repeated measures ANOVA on the distress ratings. This ANOVA confirms the t-test by showing a main effect in which infidelity with relatives produces more distress than infidelity with nonrelatives, $F(1,43) = 9.74$, $MSE = 1.70$, $p = .003$, partial $\eta^2 = .19$ (See Figure 1).

A key question is how relatives and nonrelatives compare regarding feelings of closeness. A 2 (Related vs. Unrelated) x 7 (Type of Relationship) repeated measures ANOVA on the IOS ratings revealed a main effect in which IOS ratings were higher for relatives overall than for nonrelatives, $F(1,34) = 56.69$, $MSE = 2.62$, $p < .001$, partial $\eta^2 = .63$ (See Figure 2).

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[1] Data from the ATIS are not reported in the current study.

Figure 1. Average distress reported by participants when imagining that their partner has had sex with a relative, adoptive relative, step-relative, or nonrelative
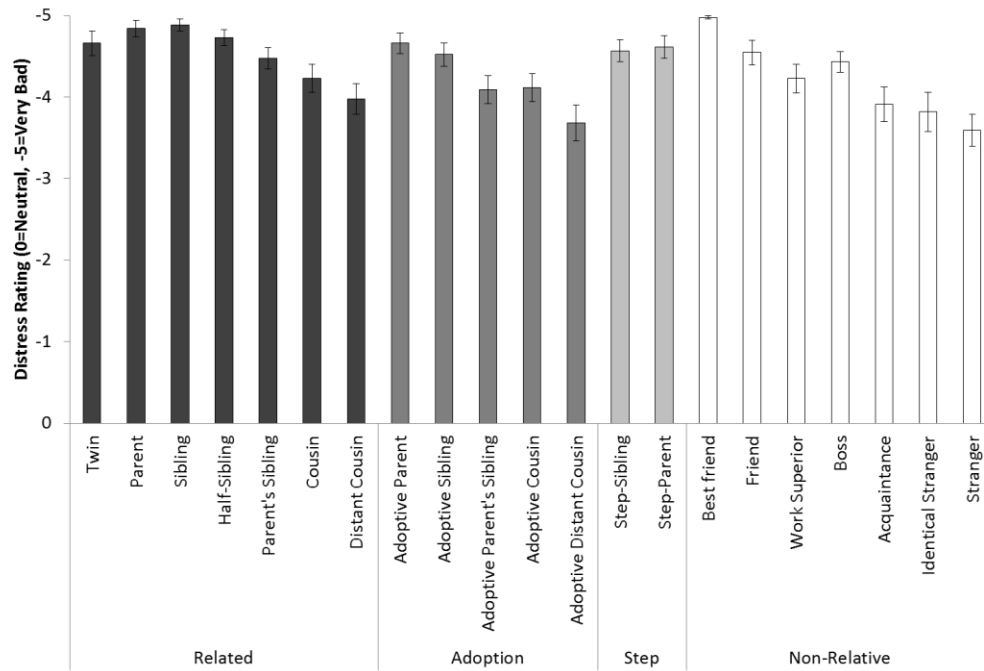
Note. Category members are ordered based on the IOS ratings (see Figure 2). Error bars represent standard error of the mean.

Figure 2. Average ratings of closeness on the IOS scale for each category of relatives, adoptive relatives, step-relatives, and nonrelatives
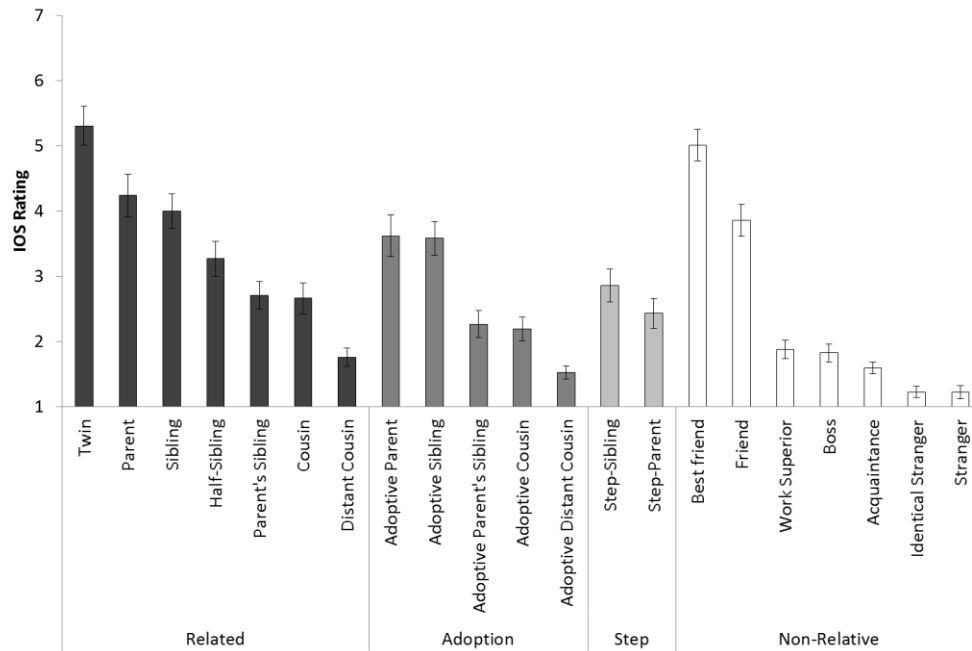
Note. For each item, participants were asked to think of same-sex relationships. Higher ratings indicate greater feelings of closeness. Error bars represent standard error of the mean.

In addition to comparing differences between relatives and nonrelatives overall, another approach is to examine differences in reactions to infidelity with family members who vary in degrees of genetic relatedness. This analysis would involve comparing reactions to different types of relatives (i.e., siblings and parents) who are biologically related, adopted, or step-relatives. A 2 (Sibling vs. Parent) x 3 (Biological vs. Adoptive vs. Step-Relative) repeated measures ANOVA on the distress ratings showed that distress is greater for infidelity involving biological relatives, $F(2,86) = 7.83$, $MSE = 0.28$, $p = .001$, partial $\eta^2 = .15$, and that there is no significant difference between all types of siblings vs. all types of parents, $F(1, 43) = 0.23$, $MSE = 0.59$, $p = .63$ (See Figure 3).

Figure 3. Average distress reported by participants imagining that their partner has had sex with a sibling or parent that is a biological relative, adoptive relative, or step-relative
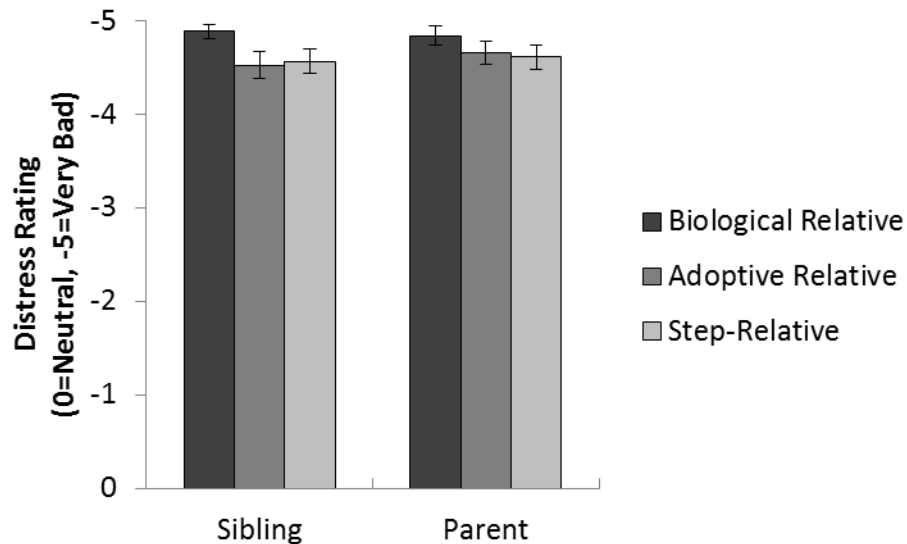
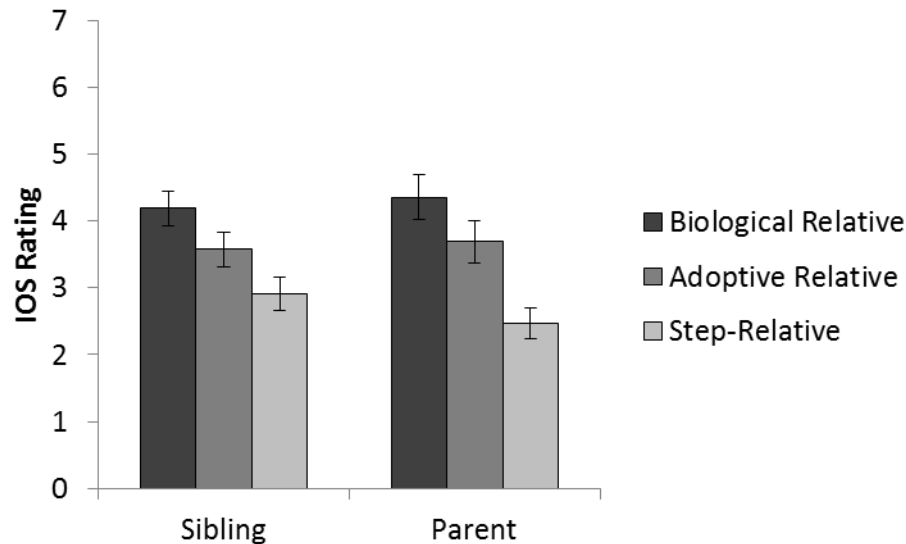*Note.* Error bars represent standard error of the mean.

Likewise, the same type of ANOVA on the IOS ratings revealed differences between biological, adoptive, and step-relatives, $F(2,70) = 19.54$, $MSE = 2.34$, $p < .001$, partial $\eta^2 = .36$, and no differences between all types of siblings and all types of parents in terms of feelings of closeness, $F(1,35) = 0.15$, $MSE = 1.09$, $p = .70$ (See Figure 4).

An additional component of Experiment 1 is that participants received an optional question about their own experiences with infidelity. For the 24 people who reported ever having been a victim of infidelity, the other person was usually a friend, acquaintance, or stranger. The average rating of the experience when participants were victims was -4.58 ($SD = 0.72$). Victims did not respond significantly differently from participants with no such experience ($n = 20$) on average ratings of distress for infidelity scenarios with relatives, $t(42) = 0.81$, $SE = 0.19$, $p = .42$, adoptive relatives, $t(42) = 0.99$, $SE = 0.29$, $p = .33$, step-relatives, $t(42) = 1.22$, $SE = 0.24$, $p = .23$, or nonrelatives, $t(42) = 0.80$, $SE = 0.26$, $p = .43$. For the 15 people who reported ever having committed infidelity themselves, the other person was usually a friend or former partner, and the average distress rating of the experience was -3.47 ($SD = 2.30$). There were also no differences between participants who

had themselves committed infidelity at some time and participants who did not report such an experience ($n = 29$) on the same measures: distress over infidelity with relatives, $t(42) = 0.22$, $SE = 0.21$, $p = .83$, adoptive relatives, $t(42) < 0.01$, $SE = 0.31$, $p > .99$, step-relatives, $t(42) = 0.24$, $SE = 0.27$, $p = .81$, and nonrelatives, $t(42) = 0.34$, $SE = 0.28$, $p = .74$.

Figure 4. Average ratings of closeness on the IOS scale for a sibling or parent that is a biological relative, adoptive relative, or step-relative.

Note. Error bars represent standard error of the mean.

The main conclusion from Experiment 1 was that participants imagined feeling worse if their partners cheated on them with relatives compared to nonrelatives (including biologically unrelated family members, such as adoptive relatives and step-relatives). The current findings support and extend those of Fisher et al. (2009) in that they provide no evidence that kin selection attenuates reactions to infidelity with relatives. The current study also examined feelings of closeness for each type of relationship with the IOS scale, and found evidence suggesting that greater feelings of distress could be related to greater feelings of closeness. In other words, participants may feel worse when imagining infidelity with biological relatives simply because participants tend to feel closer to biological relatives.

The goal of Experiment 2 was to compare various infidelity scenarios more directly by using direct comparisons between relatives and nonrelatives. Experiment 2 used a response format that may be more sensitive to detecting potential differences: a two-alternative forced choice. Although Experiment 1 showed that the average IOS ratings for all categories of relatives were higher than the average IOS ratings for all categories of nonrelatives, in Experiment 2 we only compared a subset of relatives and nonrelatives that were matched on IOS ratings. We compared IOS ratings for siblings, half-siblings, cousins, and distant cousins against best friends, friends, acquaintances, and complete strangers in a 2 (Related vs. Unrelated) x 4 (Type of Relationship) repeated measures ANOVA, and found no significant difference in feelings of closeness between relatives and nonrelatives

overall, $F(1,31) = 1.04$, $MSE = 1.43$, $p = .32$. Experiment 2 compared these categories of relatives and nonrelatives in a two-alternative forced choice task.

Experiment 2

Materials and Methods

Participants

Missouri State University undergraduates (79 total: 19 men, 57 women, 3 unspecified) consented to participate in exchange for extra credit in a research methods course. None of the participants in Experiment 2 also participated in Experiment 1. This experiment was approved by Missouri State University's IRB. The average age was 22.13 ($SD = 2.53$). The range of ages was between 19 and 31, although two participants did not indicate their ages. On a question involving relationship status, 42 participants responded they were single, 27 participants were unmarried but in a relationship, six participants were married, one participant was divorced, and one participant was widowed. Two participants did not provide any relationship status. Of participants who reported being in some type of relationship, the average reported length of the relationship was 2.52 years ($SD = 2.34$), although one participant who was in a relationship did not report the length of the relationship. Of the participants who were in a relationship or married, 30 responded that their relationships were monogamous, two responded that their relationships were not monogamous, and one did not respond. We did not ask participants to indicate their sexual orientations. Of all participants, 49.37% reported having at least one same-sex sibling, 20.25% had at least one same-sex half-sibling, 74.68% had at least one same-sex cousin, and 86.08% had at least one same-sex distant cousin.

Procedure

Participants received a packet with instructions and questions. The instructions read as follows:

> In this study, please imagine that you are in a long-term relationship with somebody, and you discover that your partner has cheated on you by having sexual intercourse with another person. On the following page there are different questions about how you might feel if you learned your partner had cheated on you with various people. For example, you may be asked which would make you feel worse—if your partner had cheated on you with your neighbor or with your roommate. Even though both possibilities would make you feel bad, try to think about which possibility would make you feel *worse*.
> You must make a decision for every question. "Equal" is not an option. If you cannot decide, simply pick one.
> These questions will ask about different types of relatives or friends. For example, you will have to think about how you would feel if your partner cheated on you with your sibling or your best friend. Even if you do not have any siblings or anyone you would consider to be a best friend, try to imagine how you would feel if you did.

The subsequent pages contained the prompt "Which would make you feel worse--if your partner had sex with…" and participants circled one of two options for each question (See Table 1 for all items in the experiment). Each item was directly compared against every other item, and every comparison appeared twice in mirror forms (e.g., sibling vs. best friend and best friend vs. sibling), which created 56 total comparisons. The comparisons were listed in a semi-random order in which mirror forms of the same question did not appear immediately adjacent to each other. The order of comparisons was the same for all participants.

Table 1. Items in Experiment 2, ordered from closer to more distant relationships

Related	Unrelated
Your sibling	Your best friend
Your half-sibling	Your friend
Your cousin	An acquaintance
Your distant cousin	A complete stranger

After participants circled their responses for the comparisons, they answered demographic questions about sex, age, numbers of same-sex relatives, current relationship status, and also filled out the ATIS.

Scoring. The responses were scored in the following way: In comparisons among different categories of nonrelatives, when participants responded they would feel worse if their partner had sex with the closer of two relationships (e.g., selecting best friend instead of friend), the response was scored as +1 for that trial. When participants selected the more distant relationship, the response was scored as -1 for that trial. There were six Nonrelative comparisons possible, and because we included mirror forms of each comparison there were 12 Nonrelative trials total. The same scoring scheme was used in comparisons among different categories of relatives; when participants responded they would feel worse if their partner had sex with the closer of the two relationships (e.g., selecting sibling instead of cousin), the response was scored as +1 for that trial. When participants selected the more distant relationship, the response was scored as -1 for that trial. Similar to the Nonrelative trials, there were six Relative comparisons possible, and mirror forms of each created 12 Relative trials total. Finally, in comparisons between nonrelatives and relatives, when participants responded they would feel worse if their partner had sex with the nonrelative (e.g., selecting best friend instead of sibling), the response was scored as +1 for that trial. When participants selected the relative, the response was scored as -1 for that trial. There were 16 types of comparisons between nonrelatives and relatives, and mirror forms of each created 32 relative/nonrelative comparisons total. We then calculated the average score for all trials for each type of comparison. We refer to this average as an infidelity score. Infidelity scores are continuous, and they can vary between -1 and +1. Positive infidelity scores represent greater distress for closer relationships or nonrelatives, and negative infidelity scores represent greater distress for distant relationships and relatives. When the infidelity score for each type of comparison is 0 or near 0, it shows that participants varied in their responses—sometimes in favor of closer relationships, sometimes in favor of more

distant relationships, or sometimes in favor of relatives and sometimes in favor of nonrelatives.

Results and discussion

Three participants failed to provide a response on every trial (each only neglecting one trial), and these participants' data were retained by giving their missing trials a score of 0 instead of +1 or -1. The following analyses are restricted to participants who were in a relationship or married at the time of the study ($n = 33$), but the same findings appeared when we included data from all participants. All *t*-tests are paired-samples, unless otherwise stated. For the following two comparisons, the Bonferroni-adjusted alpha level is .025.

Participants tended to be consistent in their responses in that they responded the same way to mirror forms of the same comparison 92.32% of the time ($SD = 6.81$). The primary research question dealt with the participants' infidelity scores, which indicated what types of infidelity participants thought would feel worse. See Figure 5 for the infidelity scores for each type of comparison.

Figure 5. Average infidelity scores for each type of comparison in Experiment 2
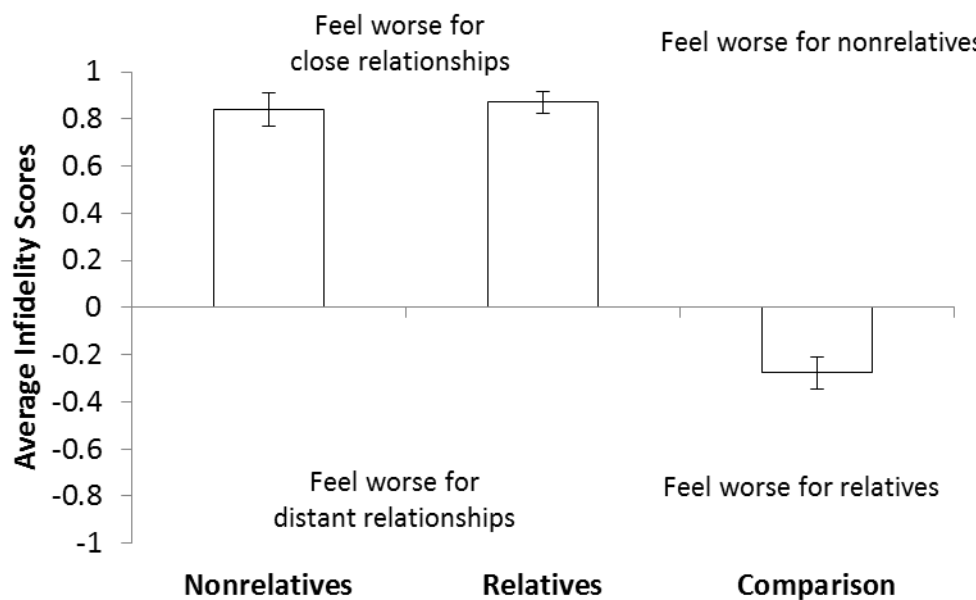
Note. "Nonrelatives" indicates comparisons between different categories of nonrelatives. "Relatives" indicates comparisons between different categories of relatives. "Comparison" indicates comparisons between different categories of relatives and nonrelatives. Error bars represent standard error of the mean.

In scenarios involving comparisons between different categories of nonrelatives, participants' average infidelity score was .84 ($SD = .41$). In other words, in situations when one's partner commits infidelity with nonrelatives, participants most often responded that they would feel worse when the "other person" is a closer social relation. In scenarios involving comparisons between different categories of relatives, participants' average

infidelity score was .87 (*SD* = .27). In other words, in situations when one's partner commits infidelity with a relative, participants most often responded that they would feel worse when the "other person" is more closely related. There was no significant difference detected in the infidelity scores for nonrelatives and the infidelity scores for relatives, *t*(32) = 0.61, *SE* = 0.05, *p* = .55. The power to detect a moderate effect size (Cohen's *d* = 0.50) at an alpha of .025 for this sample size is .70. This is evidence that participants responded similarly to situations strictly involving relatives as they did to situations strictly involving nonrelatives. In other words, participants tended to use closeness as the determining factor in both types of situations.

In scenarios involving comparisons between different categories of relatives and nonrelatives, participants' average infidelity score was -.28 (*SD* = .39). This shows that in direct comparisons between different types of relatives and nonrelatives (which produced matched IOS ratings in Experiment 1), participants more often responded that they would feel worse if their partners cheated on them with relatives than with nonrelatives. This score was somewhat closer to 0 than the score for previous comparisons, although a one-sample *t*-test showed that the proportion is still significantly different from zero, *t*(32) = 4.13, *SE* = 0.07, *p* < .001, which shows that participants show greater aversion to infidelity with relatives.

The main conclusion from Experiment 2 was that participants perceived infidelity occurring with relatives to be more distressing than infidelity occurring with nonrelatives. This supports the conclusions from Experiment 1 using a different response format. Experiment 2 also showed that participants find infidelity more distressing when the "other person" is someone who is socially close (regardless of whether they are genetically related to the participant or not). Although Experiment 2 was designed to address the possibility of ceiling effects from Experiment 1's continuous response format, one potential shortcoming of the two-alternative forced choice format is that it might create an artificial dichotomy. The current instructions stated that "'equal' is not an option," but Lishner et al. (2008) showed that when given an option, many participants will respond that two different types of jealousy-invoking situations are equally upsetting. An important consideration is that Lishner et al. provided the "equal" option for two different types of infidelity scenarios (emotional vs. sexual) for the same romantic partner, whereas the current study used only one type of infidelity scenario (sexual) with two different romantic partners. Therefore, it is not clear how an "equal" option might change the results of Experiment 2. However, Experiment 1 did provide participants with the ability to indicate that infidelity with two different partners were equally distressing, and even with different response formats both experiments reached similar conclusions: Infidelity with relatives is more distressing than infidelity with nonrelatives.

General Discussion

The current study examined whether potential adaptations for kin selection affect people's perceptions of infidelity by asking participants how they would feel if their partners cheated on them with a variety of the participants' relatives and nonrelatives. In general, evolutionary theory predicts that people would feel negatively about being cheated

on (with anyone) due to the threat to inclusive fitness. More specifically, kin selection theory might predict that people would feel better (although still negatively) about being cheated on with relatives than with nonrelatives because some proportion of the victim's genes are shared with the relative and would be passed on to potential offspring. Being cheated on with a nonrelative would theoretically result in lower inclusive fitness, and should therefore be perceived as worse than being cheated on with a relative. The results from the current experiments support the first prediction but not the second: The current evidence confirms that people dislike being cheated on, but if forced to choose between two alternatives people report they would feel worse about being cheated on with a relative than with a nonrelative. These findings generally support the results of Fisher et al. (2009), in which people also reported greater distress for infidelity involving relatives than nonrelatives. Fisher et al.'s theoretical explanation was that the importance of maintaining social bonds with relatives outweighs the potential benefits to inclusive fitness; the social bonds explanation could also work well for explaining high distress when one imagines one's partner having sex with one's best friend. Along these lines, we collected data on feelings of closeness with various types of relationships and found that people generally feel the most distress when infidelity occurs with the closest types of relationships. Both our findings and Fisher et al.'s (2009) findings are difficult to reconcile with the predictions of kin selection theory, although the results do not necessarily discount the possibility that kin selection can influence perceptions of infidelity. Below we propose several reasons why this pattern might have emerged.

The most likely reason is that the potential benefits to inclusive fitness that could be had by tolerating infidelity with relatives might be overridden by a general aversion to infidelity. In reality, there is probably no real benefit per se of tolerating infidelity with relatives except that it is not as bad as the greater loss of inclusive fitness incurred by infidelity with nonrelatives. The human ancestors who guarded against all forms of infidelity likely had higher inclusive fitness than the human ancestors who guarded against some forms while being tolerant of others. The tolerant individuals were perhaps more likely to be taken advantage of by unrelated sexual rivals. Tolerating any form of infidelity in one's partner could have also led to loss of status, which could have led to further decreases in inclusive fitness. Buss (1994, 1998) describes one function of sexual jealousy as to maintain one's status and reputation, which in this context would suggest that guarding against infidelity in any form benefits one's inclusive fitness.

Another possibility is that any tolerance for infidelity among relatives is overridden by aversion to betrayal for socially close individuals. Experiment 1 showed that feelings of distress followed the same general pattern as feelings of closeness, and participants felt worse about infidelity when it occurred with socially close relationships. Experiment 2 also showed that participants tend to report feeling worse when their partners cheat on them with more socially close relatives and nonrelatives. Given that infidelity is an act of betrayal, the perception of how bad the act seems to the victim could be a product of how many other people are betraying him/her. If a partner has sex with a stranger, only one person is betraying the victim (i.e., the partner). But if the partner has sex with a victim's friend or sibling, two people are betraying the victim (i.e., the partner and the "other person"). If relatives are seen as a general class of allies that are more socially close than

nonrelatives, infidelity involving a relative will involve a greater degree of betrayal than an act of infidelity involving a nonrelative. The betrayal perspective could explain the recurring finding in both experiments that infidelity involving nonrelatives is less distressing than infidelity involving relatives, and the betrayal explanation is not necessarily incompatible with kin selection theory. As Fisher et al. (2009) proposed, distress over infidelity with relatives could be caused by the damage it causes to social bonds. The social bonds themselves could be a product of kin selection, so it is possible that kin selection does not attenuate distress over infidelity with relatives because of the greater advantages gained from maintaining good relationships. Being on good terms with relatives may produce greater ultimate benefits to fitness than overlooking infidelity with relatives. In other words, distress may be greater for infidelity with relatives because of the greater incentive to keep social bonds strong.

With this disparity between predictions and outcomes, it is important to point out that Hamilton (1963, 1964) described only the conditions under which kin-favoring adaptations *could* evolve. This does not guarantee that these adaptations always *will* evolve under the specified conditions, or that species will evolve adaptations to maximize inclusive fitness in every way. The current results show what role (or lack thereof) kin selection plays in infidelity with relatives, and suggest that more research is needed before the picture is complete. It is possible that kin selection has shaped attitudes towards infidelity in ways not observed in this study. One possibility for future research could include dependent measures other than ratings of feelings of distress. Shackelford, Buss, and Bennett (2002) used likelihood of breaking up as a measure of reaction to infidelity. Even if the current study found no differences in feelings of distress over infidelity involving relatives and nonrelatives, future work might find that kin selection still manifests itself by making victims of infidelity more likely to forgive relatives than nonrelatives or less likely to react violently toward relatives.

It is important to consider that the current results are largely based on participants' self-reported reactions to hypothetical scenarios. People may not be able to accurately predict how they would actually react if they discovered their partners were being unfaithful. For example, Harris (2003) claimed that sex differences in jealousy only occur for hypothetical infidelity scenarios and not in real situations involving infidelity, although Sagarin et al. (2012) disputed this. Studies have replicated sex differences in jealousy in response to actual, not hypothetical, infidelity experiences (e.g., Edlund, Heider, Scherer, Farc, and Sagarin, 2006). Regarding infidelity scenarios involving imagined relatives, Bohner et al. (2010) reported that when participants rated their feelings of distress for infidelity involving partners of their siblings, there was no difference in the responses between participants who actually had siblings and those who did not. This prior work supports the use of hypothetical infidelity scenarios involving a variety of real and imagined relationships, although an ideal study would involve collecting data from people who actually have experienced infidelity with a variety of relatives and nonrelatives. But even this study would have shortcomings: People may not honestly report how they felt or reacted, and their memories of the experience may not be accurate. Even so, in Experiment 1 we attempted to collect some data on people's real-life infidelity experiences. These data did not inform the study's main hypothesis, but they did confirm that people's experiences

with infidelity were negative overall and that people who had experienced infidelity did not differ from other people in their responses to hypothetical scenarios.

Another potential shortcoming of the current study is that demand characteristics may have influenced participants' responses. By viewing contrasting targets such as a variety of relatives and nonrelatives, the experiments may have implicitly suggested that reactions *should* be different in each of these scenarios. A between-groups comparison in which participants evaluate only one type of relationship might serve to alleviate some of these concerns, although this design might also be susceptible to ceiling effects—if participants evaluate only one type of infidelity scenario they might report that any type of infidelity produces the highest possible amount of distress. Future research could address these considerations by perhaps emphasizing the potential for different infidelity scenarios to produce equal amounts of distress (Lishner et al., 2008).

There may also be concerns regarding the composition of the samples used in the current experiments. Both samples were predominantly female, and the small number of male participants likely does not allow for meaningful analyses of sex differences. Although the current study did not focus on sex differences, prior work on sex differences in jealousy (e.g., Buss et al., 1992) suggests that men and women react differently to infidelity scenarios. One should therefore be cautious in generalizing the current work to male populations, and future work could investigate sex differences directly by utilizing a larger male sample. It may be that the impact of infidelity with relatives on fitness is different for men and women depending on who the other person is, in that a man's wife is equally likely to be impregnated by his father, uncle, or brother, but a woman's husband may have a greater chance of impregnating her sister than her mother or aunt. It is also possible that likelihood of impregnation is not a factor in how people perceive infidelity with relatives, and the main consideration is betrayal.

Finally, as with all psychological phenomena, explanations can focus on the proximate ("how") level, the ultimate ("why") level, or both (Scott-Phillips, Dickins, and West, 2011). As Scott-Phillips et al. point out, behavioral scientists sometimes mistake proximate explanations for more ultimate ones, and the shorthand of talking about what organisms "want" is often misunderstood to describe those organisms' intentions instead of genetically-predisposed biological drives. Natural selection could have produced adaptations sensitive to different forms of infidelity without humans necessarily being consciously aware of those adaptations. Although the current study does attempt to explain reactions to infidelity at the ultimate level, explanations involving proximate mechanisms (such as reactions to betrayal and sensitivity to genetic relatedness) are difficult to rule out.

In conclusion, one of the major benefits of incorporating evolutionary theory into psychology is that it facilitates the generation of testable predictions. The downside to this approach is that we have to be careful of confirmation bias, which would lead us to search only for evidence that supports our existing theories. In order to strengthen the field of evolutionary psychology we should also search for and report evidence that disconfirms our predictions. The current study represents an example of a prediction generated by evolutionary theory for which the results were not supportive, and its value lies in demonstrating the limited influence of kin selection on infidelity scenarios.

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Appendix: The number of participants with each type of same-sex relationship, and the descriptive statistics for the Inclusion of Other in the Self scale (IOS) scores. Higher ratings indicate greater feelings of closeness.

	Have?	*n*	IOS Mean	IOS *SD*
Biological Relatives				
Twin	Yes	0	-	-
	No	36	5.31	1.77
Parent	Yes	40	4.35	2.12
	No	2	2.00	1.41
Sibling	Yes	23	3.78	1.73
	No	16	4.31	1.49
Half-Sibling	Yes	9	3.33	1.50
	No	28	3.25	1.67
Parent's Sibling	Yes	42	2.73	1.43
	No	1	2.00	-
Cousin	Yes	41	2.68	1.54
	No	1	2.00	-
Distant Cousin	Yes	38	1.82	0.95
	No	4	1.25	0.50
Adoptive Relatives				
Adoptive Parent	Yes	1	1.00	-
	No	36	3.69	1.91
Adoptive Sibling	Yes	1	2.00	-
	No	35	3.63	1.55
Adoptive Parent's Sibling	Yes	1	2.00	-
	No	36	2.28	1.28
Adoptive Cousin	Yes	6	2.50	1.22
	No	30	2.13	1.04
Adoptive Distant Cousin	Yes	4	1.50	0.58
	No	32	1.53	0.62
Step Relatives				
Step-Sibling	Yes	8	2.75	1.83
	No	29	2.90	1.47
Step-Parent	Yes	7	2.29	1.38
	No	30	2.47	1.38
Nonrelatives				
Best Friend	Yes	39	4.96	1.57
	No	2	6.00	-
Friend	Yes	43	3.86	1.57
	No	0	-	-
Superior from Work	Yes	31	1.97	0.95
	No	10	1.60	0.70
Boss	Yes	28	2.04	0.92
	No	13	1.38	0.50
Acquaintance	Yes	42	1.60	0.59
	No	0	-	-
Identical Stranger	Yes	15	1.47	0.74
	No	24	1.08	0.28
Complete Stranger	-	44	1.23	0.64

Note. The sums of the Yes and No responses are not always the same for each relationship because some participants declined to provide ratings for hypothetical relationships.