

BRIEF COMMUNICATION

Perceived Risk of Female Infidelity Moderates the Relationship Between Objective Risk of Female Infidelity and Sexual Coercion in Humans (*Homo sapiens*)

William F. McKibbin
University of Michigan-Flint

Valerie G. Starratt
Nova Southeastern University

Todd K. Shackelford
Oakland University

Aaron T. Goetz
California State University, Fullerton

Female extrapair copulation (EPC) can be costly to a woman's long-term romantic partner. If a woman has copulated recently with a man other than her long-term partner, her reproductive tract may contain the sperm of both men, initiating sperm competition (whereby sperm from multiple males compete to fertilize an egg). Should the woman become pregnant, her long-term partner is at risk of cuckoldry—investing unwittingly in offspring to whom he is not genetically related. Previous research in humans (*Homo sapiens*) and in nonhuman animals suggests that males have evolved tactics such as partner-directed sexual coercion that reduce the risk of cuckoldry. The current research provides preliminary evidence that mated men ($n = 223$) at greater risk of partner EPC, measured as having spent a greater proportion of time apart from their partner since the couple's last in-pair copulation, more frequently perform partner-directed sexually coercive behaviors. This relationship is moderated, however, by men's perceived risk of partner EPC, such that the correlation between the proportion of time spent apart since last in-pair copulation and sexually coercive behaviors remains significant *only* for those men who perceive themselves to be at some risk of partner EPC. Discussion addresses limitations of this research and highlights directions for future research investigating the relationship between female EPC and men's partner-directed sexual coercion.

Keywords: sexual coercion, female extrapair copulation, sperm competition, cuckoldry, evolutionary psychology

Female extrapair copulation (EPC) has been an adaptive problem for males of many species across evolutionary history. Female EPC can initiate sperm competition (Parker, 1970)—a phenomenon in which the sperm of two or more males concurrently occupy the reproductive tract of a female—and can result in cuckoldry: unwitting investment of a male in offspring to whom he is genetically unrelated (for review, see, e.g., Birkhead & Møller, 1998; Shackelford & Goetz, 2006). The cuckold not only contributes resources to a rival's offspring, but also is left with fewer resources to invest in current or future offspring.

Because cuckoldry was likely an adaptive problem throughout human evolutionary history as well, men today are hypothesized to have evolved psychological mechanisms that motivate anticuckoldry behaviors (see Platek & Shackelford, 2006). Previous research corroborates this hypothesis. For example, mated men at greater risk of a partner's EPC—as measured by the proportion of time spent apart from their partner since the couple's last copulation—report greater interest in copulating with their partner (Shackelford et al., 2002) and more frequent use of mate retention behaviors (Starratt, Shackelford, Goetz, & McKibbin, 2007). These behaviors range from “I bought my partner flowers” to “I hit my partner when I caught her flirting with someone else” and are hypothesized to prevent a partner's EPC (Buss, 1988). These perceptual, motivational, and behavioral changes may cause men to pursue copulation as soon as possible with their partner, thereby entering their sperm into competition with rival sperm that may be present in her reproductive tract.

Sexually coercive behaviors also have been proposed as a class of anticuckoldry tactic in humans and in nonhuman animals. Among nonhuman animals, sexual coercion by an in-pair partner reliably occurs immediately after female EPCs, intrusions by rival males, and female absence in many species of

This article was published Online First May 16, 2011.

William F. McKibbin, Department of Psychology, The University of Michigan-Flint; Valerie G. Starratt, Department of Psychology, Nova Southeastern University; Todd K. Shackelford, Department of Psychology, Oakland University; Aaron T. Goetz, Department of Psychology, California State University, Fullerton.

Correspondence concerning this article should be addressed to Todd K. Shackelford, Oakland University, Department of Psychology, 112 Pryale Hall, Rochester, MI 48309-4401. E-mail: shackelf@oakland.edu

waterfowl (e.g., Barash, 1977) and other avian species (e.g., Birkhead, Hunter, & Pellatt, 1989; Valera, Hoi, & Kristin, 2003). Forced in-pair copulation (FIPC) following observed or suspected female EPC in these avian species is often interpreted as a sperm competition tactic (Barash, 1977; Lalumière, Harris, Quinsey, & Rice, 2005).

Noting that in waterfowl instances of FIPC followed EPCs and considering reports that FIPC in humans often followed accusations of female infidelity, Thornhill and Thornhill (1992) and Wilson and Daly (1992) hypothesized that sexual coercion in response to cues of a partner's sexual infidelity might function in humans to force a man's sperm into his partner's reproductive tract at a time when there is a high risk of extrapair paternity, thereby increasing the likelihood that he will be the genetic father should his partner become pregnant.

Empirical evidence supporting the cuckoldry risk hypothesis is accumulating. Camilleri (2004), for example, found that risk of a partner's infidelity predicted interest in partner sexual coercion among men but not women. This is important because men, but not women, are at risk of being cuckolded. Goetz and Shackelford (2006) documented that a man's sexual coercion in the context of an intimate relationship was related positively to his partner's infidelities. Men who sexually coerced their partners were more likely to report that they perceived their partners to be unfaithful, and women who reported that their partners sexually coerced them were more likely to report being unfaithful. Goetz and Shackelford (2009) collected data on the proximate and ultimate causes of men's sexual coercion in intimate relationships to explore how these variables interact. In two studies, men's sexual coercion of their partners was consistently predicted by female infidelity even after controlling for men's dominance and men's nonsexual controlling behavior. Similarly, Starratt, Goetz, Shackelford, McKibbin, and Stewart-Williams (2008) found that men's accusations of their partner's sexual infidelity predicted their sexually coercive behaviors, such that men who accused their partners of being unfaithful were more likely to sexually coerce them.

Following previous research (e.g., Shackelford et al., 2002; Starratt et al., 2007), we operationalized the risk of female EPC as the proportion of time a couple has spent apart since their last in-pair copulation. As this proportion increases, the risk that an extrapair male has inseminated a woman increases (Baker & Bellis, 1995). Conversely, as this proportion decreases, sperm competition risk decreases. Infidelity is not likely to occur when a woman is with her partner. Consequently, we hypothesize positive relationships between men's partner-directed sexually coercive behaviors and the proportion of time a couple has spent apart since their last in-pair copulation. An alternative hypothesis is that men's partner-directed sexual coercion is related to the *total time* since last in-pair copulation, such that sexual coercion increases with absolute time since last copulation, implying that sexual coercion results from increasing "sexual frustration" (Shackelford et al., 2002) rather than from greater sperm competition risk. If, however, men's sexual coercion is related to the proportion of time spent apart since last in-pair copulation, independent of the total time since last in-pair copulation, this would support the hypothesis that men's partner-directed sexual coercion functions as an anticuckoldry tactic.

Method

Participants

Two hundred twenty-three men, each in a committed relationship of at least one year, and who had copulated with their partner at least once in the previous week, participated in this study. The mean age of participants was 25.6 years ($SD = 8.1$). The mean age of the participants' partners was 24.4 years ($SD = 7.6$). The mean relationship length was 50.2 months ($SD = 60.9$).

Materials

Participants first completed a demographic questionnaire that secured information including the last time the participant had copulated with his partner and the amount of time since last copulation the participant spent with his partner, following Shackelford et al. (2002). Participants also provided information on the perceived risk of their partners' past sexual infidelity ("As far as you know, has your current partner had sexual intercourse with someone other than you since you have been involved in a relationship together?"; 0 [*Definitely No*] to 9 [*Definitely Yes*]) and likely future sexual infidelity ("How likely do you think it is that your current partner will in the future have sexual intercourse with someone other than you, while still in a relationship with you?"; 0 [*Not at all likely*] to 9 [*Extremely likely*]). A total perceived risk of female EPC was calculated by averaging scores on these two items ($\alpha = .61$), with scores of 0 indicating no perceived risk of female EPC, and scores of .5 or above indicating at least some perceived risk of female EPC.

To assess men's sexual coercion in the current relationship, participants completed the Sexual Coercion in Intimate Relationships Scale (SCIRS; Shackelford & Goetz, 2004). SCIRS items vary in subtlety, ranging from hinting and subtle manipulations to outright physical force. The items cluster into three components: Resource Manipulation/Violence (e.g., "I hinted that I would withhold benefits that my partner depends on if she did not have sex with me"; "I physically forced my partner to have sex with me"), Commitment Manipulation (e.g., "I told my partner that if she loved me she would have sex with me"), and Defection Threat (e.g., "I hinted that I would have sex with another woman if my partner did not have sex with me"). Responses are recorded using a six-point ordered-category scale from 0 (*Act did not occur in the past month*) to 5 (*Act occurred 11 or more times in the past month*). Scores for each component are calculated by summing the response values for each item in that component. Full scale scores are calculated by summing response values for each item in the entire scale. Previous research has established the reliability, validity, and utility of the SCIRS as an assessment of sexual coercion in intimate relationships (Shackelford & Goetz, 2004).

Procedure

Participants were recruited from undergraduate psychology courses at a southeastern university. Four criteria must have been met to qualify for participation: the prospective participant must be (a) male; (b) at least 18 years of age; (c) currently in a committed, heterosexual relationship; and (d) must have copulated with his current partner at least once in the previous week. If the criteria

were met, the researcher provided the participant with a consent form, the survey, and a security envelope. The participant was instructed to read and sign the consent form, complete the survey, place the completed survey in the envelope, and then seal the envelope.

Results

The proportion of time spent apart since last in-pair copulation was calculated by subtracting the number of hours spent together since last copulation from the total number of hours since last copulation and dividing this difference by the total number of hours since the last copulation (following Shackelford et al., 2002). We then computed correlations to identify relationships between men's partner-directed sexual coercion and the objective risk of female EPC as measured by the proportion of time apart since last in-pair copulation.

Men's overall partner-directed sexual coercion (sum of 34 items; $\alpha = .95$) was positively and significantly correlated with the proportion of time spent apart since the couple's last in-pair copulation ($r = .18, p < .05$). Correlations between each of the three sexual coercion components and the proportion of time spent apart since last in-pair copulation also were positive and statistically significant (see Table 1; all component α s $> .88$). None of the correlations between total time since last in-pair copulation and men's sexual coercion were significant (analyses available upon request).

Additional analyses indicated that the correlation between the proportion of time spent apart since last in-pair copulation and men's partner-directed sexual coercion is moderated by men's perceived risk of their partner's EPC. We divided the participants into a higher perceived risk of EPC group and a lower perceived risk of EPC group via a median split (median = .50). As displayed in Table 1, the correlations between the proportion of time spent apart since last in-pair copulation and men's partner-directed sexual coercion remained significant only for men who perceive themselves to be at a higher risk of partner EPC.

Discussion

Risk of sperm competition and cuckoldry is a recurrent adaptive problem for males of many species, including humans (Parker, 1970; Smith, 1984). One evolved solution to this recurrent adaptive problem might be the use of FIPC associated with an increased

risk of sperm competition. Research evidence indicates this may be the case in nonhuman species. The current results suggest men also may possess such evolved solutions.

Objective risk of female EPC, as measured by the proportion of time spent apart since last in-pair copulation, positively and significantly correlates with men's partner-directed sexual coercion. Total time since last in-pair copulation is not related to men's sexually coercive behaviors. In other words, men are not sexually coercing their partners as a result of general "sexual frustration," but instead in response to the increased risk of female EPC.

Additionally, proportion of time spent apart since last in-pair copulation correlates with partner-directed sexual coercion *only* for those men who perceive some risk of partner infidelity. For men who perceive no risk of partner infidelity, there is no relationship between the proportion of time spent apart since last in-pair copulation and partner-directed sexual coercion. These results are most parsimoniously explained by sperm competition theory and the cuckoldry risk hypothesis (e.g., Goetz, Shackelford, & Camilleri, 2008).

We hypothesized that men's partner-directed sexually coercive behaviors are a response to an increased risk of female EPC and subsequent cuckoldry, as assessed by the proportion of time spent apart since the couple's last copulation. Although the results are consistent with this hypothesis, we must consider the possibility that men's sexual coercion *causes* women to spend less time together with their partners since the couple's last copulation. A methodology that includes repeated assessments of the key variables over time would allow for the identification of causal relationships. Our interpretation of the results nevertheless is consistent with interpretations of researchers studying sexual coercion in nonhuman animals. In some avian species, for example, males sexually coerce their partners immediately after her EPC, and this sexual coercion is interpreted as an anticuckoldry tactic (Barash, 1977).

The current research includes a one-time assessment of current risk of EPC which we treat as a proxy for recent risk of female EPC. It is reasonable to assume that the one-time assessment of proportion of time spent apart since last in-pair copulation accurately reflects typical recent proportions of time spent apart since last in-pair copulation. Analyses of data from an independent study corroborate this assumption: Shackelford (2006) secured daily assessments of the proportion of time spent apart from partner since the last in-pair copulation from 45 married men over a

Table 1

Correlations [and 95% CI] Between the Proportion of Time Spent Apart Since Last In-Pair Copulation and Men's Partner-Directed Sexual Coercion for All Participants, for Participants Who Perceive Themselves To Be at Lower Risk of Partner Infidelity, and for Participants Who Perceive Themselves To Be at Higher Risk of Partner Infidelity

Sexual coercion ^a	All participants <i>N</i> = 205	Perceived risk of partner infidelity	
		Lower <i>n</i> = 128	Higher <i>n</i> = 77
Total	.18* [.05, .31]	.02 [-.15, .19]	.32** [.10, .51]
Resource manipulation/violence	.17* [.03, .30]	.09 [-.08, .26]	.27* [.05, .47]
Commitment manipulation	.16* [.02, .29]	-.04 [-.21, .13]	.33** [.12, .52]
Defection threat	.14* [.004, .27]	.02 [-.15, .19]	.25* [.03, .50]

^aSee text for description of sexual coercion measure.

* $p < .05$. ** $p < .01$.

1-month period. Correlations between adjacent days for this variable are uniformly positive and significant, with an average cross-day correlation of $r = .61$.

In summary, this research tested the hypothesis that men's partner-directed sexually coercive behavior is related positively to the risk of female EPC as assessed by the proportion of time spent apart since the couple's last in-pair copulation. The results provide preliminary support for this hypothesis: men who spend a greater proportion of time apart from their partner since the couple's last in-pair copulation report more frequent performance of sexually coercive behaviors than do men who spend a greater proportion of time together with their partner since the couple's last in-pair copulation. The relationship between the proportion of time spent apart since last in-pair copulation and sexual coercion is significant only for those men who perceive some risk of their partner's infidelity. Although potential moderators of this relationship, such as female ovulatory status, can be investigated in future work, the current research adds to a growing literature indicating that men, like males of other socially monogamous species, behave in ways to address the adaptive problems of cuckoldry.

References

- Baker, R. R., & Bellis, M. A. (1995). *Human sperm competition*. London, United Kingdom: Chapman & Hall.
- Barash, D. P. (1977). Sociobiology of rape in mallards (*Anas platyrhynchos*): Response of the mated male. *Science*, *197*, 788–789.
- Birkhead, T. R., Hunter, F. M., & Pellatt, J. E. (1989). Sperm competition in the zebra finch, *Taeniopygia guttata*. *Animal Behaviour*, *38*, 935–950.
- Birkhead, T. R., & Møller, A. P. (Eds.) (1998). *Sperm competition and sexual selection*. London, United Kingdom: Academic Press.
- Buss, D. M. (1988). From vigilance to violence: Tactics of mate retention in American undergraduates. *Ethology and Sociobiology*, *9*, 291–317.
- Camilleri, J. A. (2004). *Investigating sexual coercion in romantic relationships: A test of the cuckoldry risk hypothesis* (Unpublished master's thesis). University of Saskatchewan, Saskatoon, Saskatchewan, Canada.
- Goetz, A. T., & Shackelford, T. K. (2006). Sexual coercion and forced in-pair copulation as sperm competition tactics in humans. *Human Nature*, *17*, 265–282.
- Goetz, A. T., & Shackelford, T. K. (2009). Sexual coercion in intimate relationships: A comparative analysis of the effects of women's infidelity and men's dominance and control. *Archives of Sexual Behavior*, *38*, 226–234.
- Goetz, A. T., Shackelford, T. K., & Camilleri, J. A. (2008). Proximate and ultimate explanations are required for a comprehensive understanding of partner rape. *Aggression and Violent Behavior*, *13*, 119–123.
- Lalumière, M. L., Harris, G. T., Quinsey, V. L., & Rice, M. E. (2005). *The causes of rape: Understanding individual differences in male propensity for sexual aggression*. Washington, DC: American Psychological Association.
- Parker, G. A. (1970). Sperm competition and its evolutionary consequences in the insects. *Biological Reviews*, *45*, 525–567.
- Platek, S. M., & Shackelford, T. K. (Eds.) (2006). *Female infidelity and paternal uncertainty*. New York, NY: Cambridge University Press.
- Shackelford, T. K. (2006). *Sexual behavior in partnerships*. Unpublished data. Department of Psychology, Florida Atlantic University.
- Shackelford, T. K., & Goetz, A. T. (2004). Men's sexual coercion in intimate relationships: Development and initial validation of the Sexual Coercion in Intimate Relationships Scale. *Violence and Victims*, *19*, 541–556.
- Shackelford, T. K., & Goetz, A. T. (2006). Comparative evolutionary psychology of sperm competition. *Journal of Comparative Psychology*, *120*, 139–146.
- Shackelford, T. K., LeBlanc, G. J., Weekes-Shackelford, V. A., Bleske-Rechek, A. L., Euler, H. A., & Hoier, S. (2002). Psychological adaptation to human sperm competition. *Evolution and Human Behavior*, *23*, 123–138.
- Smith, R. L. (Ed.) (1984). *Sperm competition and the evolution of animal mating systems*. London, United Kingdom: Academic Press.
- Starratt, V. G., Goetz, A. T., Shackelford, T. K., McKibbin, W. F., & Stewart-Williams, S. (2008). Men's partner-directed insults and sexual coercion in intimate relationships. *Journal of Family Violence*, *23*, 315–323.
- Starratt, V. G., Shackelford, T. K., Goetz, A. T., & McKibbin, W. F. (2007). Male mate retention behaviors vary with risk of female infidelity and sperm competition. *Acta Psychologica Sinica*, *39*, 523–527.
- Thornhill, R., & Thornhill, N. W. (1992). The evolutionary psychology of men's coercive sexuality. *Behavioral and Brain Sciences*, *15*, 363–421.
- Valera, F., Hoi, H., & Kristin, A. (2003). Male shrikes punish unfaithful females. *Behavioral Ecology*, *14*, 403–408.
- Wilson, M., & Daly, M. (1992). The man who mistook his wife for a chattel. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind* (pp. 289–322). New York, NY: Oxford University Press.

Received April 5, 2009

Revision received January 24, 2011

Accepted January 26, 2011 ■