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The Relationship Between Objective Sperm Competition Risk and Men's Copulatory Interest Is Moderated by Partner's Time Spent with Other Men

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Abstract Men who spend a greater proportion of time apart from their female partner since the couple's last copulation are at greater "objective" sperm competition risk. We propose a novel cue to sperm competition risk: the time she spends with her male friends. Four hundred and twenty men in a committed, heterosexual, sexual relationship completed a questionnaire. The results indicate that men at greater objective sperm competition risk report less time desired until the couple's next copulation, greater interest in copulating with their partner, and greater anger, frustration, and upset in response to their partner's sexual rejection, but *only* among men whose partner spends more time with her male friends. These results remain after controlling statistically for the participant's age and their partner's age. We discuss limitations of the current research, and discuss how research in human sperm competition can inform social issues, including men's partner-directed sexual coercion.

Keywords Evolutionary psychology · Sperm competition · Female infidelity · Male friends

Sperm competition occurs when the sperm of two or more males simultaneously occupy the female reproductive tract and compete for fertilization of ova (Parker 1970). Sperm competition in humans most commonly occurs in the context of female infidelity (Baker and Bellis 1993; Shackelford et al. 2002, 2007; Smith 1984). Women who pursue extra-pair copulations place their regular partner at risk of cuckoldry—the unwitting investment of time and resources in offspring to whom he is genetically unrelated.

Men use various cues to estimate the risk of partner infidelity (and, therefore, sperm competition risk; Baker and Bellis 1993; Shackelford et al. 2002, 2007; Smith 1984). For example, men who report a greater likelihood of partner infidelity are at greater sperm competition risk (McKibbin et al. 2011). Additionally, men who spend

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a greater proportion of time apart from their partner since the couple's previous copulation are at greater "objective" sperm competition risk because their partner has more opportunities to surreptitiously pursue extra-pair copulations (Baker and Bellis 1993; Shackelford et al. 2002, 2007; Smith 1984).

Other cues to female infidelity may moderate the relationship between objective sperm competition risk and men's anti-cuckoldry tactics. For example, McKibbin et al. (2011) documented that men at greater objective sperm competition risk perform more anti-cuckoldry behaviors, but *only* among men who reported a higher likelihood of partner infidelity. In the current research, we assessed another potential moderating cue to female partner infidelity risk: the time women spend with their male friends—potential rivals to her regular partner. If men perceive their partner to spend less time with her male friends, then their objective sperm competition risk should *not* be related to their anti-cuckoldry behaviors.

Men's partner-directed copulatory interest may be designed, in part, as an anti-cuckoldry tactic (Shackelford et al. 2002, 2007; Starratt et al. 2013). Copulatory interest motivates men to place their sperm into competition with rival men's sperm that may be, or will be, in their partner's reproductive tract. Men at greater sperm competition risk report greater in-pair copulatory interest, as well as greater feelings of anger, frustration, and upset in response to their partner's sexual rejection (Shackelford et al. 2002, 2007; Starratt et al. 2013).

Following previous research (e.g., Shackelford et al. 2002, 2007; Starratt et al. 2013), we hypothesize that men at greater sperm competition risk will more strongly desire copulating with their partner. Specifically, we predict that men at greater objective sperm competition risk will report less time desired until the couple's next copulation (Prediction 1), greater interest in copulating with their partner (Prediction 2), and greater anger (Prediction 3), frustration (Prediction 4), and upset (Prediction 5) in response to their partner's sexual rejection, but *only* among men who report that their partner spends more time with her male friends.

Men's age and their partner's may affect their sexual desire (Hällström and Samuelsson 1990; Lewis et al. 2004). We statistically control for men's age and their partner's age in tests of our predictions.

Method

Four hundred and twenty men in a committed, sexual, heterosexual relationship participated in exchange for extra credit in a course. The mean participant age was 23.7 years (SD=7.3), the mean of their partner's age was 22.6 (SD=2.9), and the mean relationship length was 34.7 months (SD=53.8). Based on informal discussions with the participants, we estimate that 75% of the participants lived together and 50% were legally married.

Materials

Participants reported their age and their partner's age, in years, and the length of their relationship, in months. Following Shackelford et al. (2002, 2007), participants reported how many hours passed since they last had sexual intercourse with their

partner, and how many hours they spent together with their partner during that same period, including time spent sleeping together. Participants reported how soon (in hours) they would like to next have sexual intercourse with their partner. Participants reported on a Likert-type scale how much time their partner currently spends with her male friends (0 = very little time spent, 9 = very much time spent), how interested they are in having sexual intercourse with their partner (0 = much less interested, 9 = much more interested), and how angry, frustrated, and upset (0 = not at all, 9 = extremely) they would feel if their partner declined their request for sexual intercourse.

Procedures

Potential participants were asked if they were at least 18 years of age and in a heterosexual, sexual, committed relationship. Those who qualified were asked to read and sign a consent form and to complete a questionnaire. Participants were asked to place the completed questionnaire in an envelope that they then sealed, and to place the consent form in a separate envelope, to retain anonymity.

Results

Following Shackelford et al. (2002, 2007), we constructed an *objective sperm competition risk* variable by subtracting the total number of hours participants spent with their partner since the couple's last copulation from the total number of hours since the couple's last copulation and dividing this difference by the total number of hours since the couple's last copulation. We used men's reports of the time their partner spends with her male friends to construct a *time spent with male friends* variable. Participant's age and their partner's age were highly correlated (r=0.90, p<0.001), so we constructed an *average age* variable from the mean of these two variables.

Moderation Analyses

Table 1 presents zero-order correlations between the target variables. We conducted five separate moderation analyses and subsequent simple slopes analyses to test the interaction effects between objective sperm competition risk and time spent with male friends on each of the five outcomes. Prior to conducting moderation analyses, we centered scores on objective sperm competition risk and time spent with male friends (Aiken and West 1991).

We conducted five multiple regression analyses to assess the main and interaction effects of the predictor and moderator variables on each of the five outcomes while controlling for average age. We identified interaction effects for desired time until the couple's next copulation (t=−6.34, p<0.001), interest in copulation (t=2.23, p<0.05), as well as feeling angry (t=2.18, p<0.05), frustrated (t=2.33, p<0.05), and upset (t=2.20, p<0.05) by their partner's sexual rejection. We also identified main effects for objective sperm competition risk (β=−0.10, t=−2.20, p<0.05) and time spent with male friends (β=0.10, t=3.02, p<0.01) when predicting desired time until next copulation.

Table 1 Zero-order correlations between the target variables

	1	2	3	4	5	6	7
1. Objective risk of sperm competition	–						
2. Time spent with male friends	0.11*	–					
3. Time until next copulation	−0.10*	0.15**	–				
4. Interest in copulation	0.02	−0.03	−0.19**	–			
5. Anger following sexual rejection	0.06	−0.01	−0.06	0.17**	–		
6. Frustration following sexual rejection	0.05	−0.04	−0.05	0.20**	0.74**	–	
7. Upset following sexual rejection	0.07	−0.05	−0.07	0.22**	0.78**	0.79**	–
8. Average age[a]	−0.28**	−0.19**	−0.04	0.02	0.05	−0.02	0.01

[a] Average age = the mean of participant's age and their partner's age

n=420, * p<0.05, ** p<0.01

Simple Slopes Analyses

To test the predictions, we conducted simple slopes analyses to examine the relationship between objective sperm competition risk and each of the outcomes at *high*, *medium*, and *low* levels of time spent with male friends (Aiken and West 1991) while controlling for average age. We added and subtracted one standard deviation from the *time spent with male friends* variable to compute *low* and *high* levels of this variable. We then created three interaction terms between objective sperm competition risk and each of the three levels of time spent with male friends to regress onto the outcome variables. We present here results that focus on *high* and *low* levels of time spent with male friends (for full results, see Table 2 and Figs. 1, 2, 3, 4 and 5).

Prediction 1 was supported. Objective sperm competition risk was *negatively* related to how soon participants would next like to copulate with their partner when time spent with male friends was high. We did not predict a relationship between objective sperm competition risk and how soon participants would next like to copulate with their partner when the time spent with male friends was low; however, the results indicated a positive relationship. Prediction 2 was not supported. Objective sperm competition risk was positively but not statistically significantly (p=0.06) related to participant reports of their interest in copulation with their partner when time spent with male friends was high.

Predictions 3 through 5 were supported. When time spent with male friends was high, objective sperm competition risk was positively related to participants' reports of feeling angry, frustrated, and upset if their partner declined their request for sexual intercourse. Consistent with Predictions 3 through 5, objective sperm competition risk was not related to the outcome variables when time spent with male friends was low.

Discussion

With support for four of five of the predictions, the results of the current research are consistent with the hypothesis that men at greater sperm competition risk more strongly

Table 2 Simple slopes of objective risk of sperm competition regressed on five outcome variables at different levels of time spent with male friends, controlling for the mean of the participant's age and their partner's age

Level of time spent with male friends	Outcome	*b*	*SE*	*t*
High	Time until next copulation	−635.36	104.91	−6.06***
Medium		−177.87	80.77	−2.20*
Low		279.62	111.63	2.50**
High	Interest in copulation	0.86	0.46	1.88^{+}
Medium		0.16	0.35	0.45
Low		−0.54	0.49	−1.11
High	Anger	1.44	0.57	2.52*
Medium		0.58	0.44	1.32
Low		−0.28	0.61	−0.46
High	Frustration	1.40	0.60	2.30*
Medium		0.42	0.47	0.90
Low		−0.55	0.64	−0.86
High	Upset	1.49	0.58	2.56*
Medium		0.63	0.45	1.38
Low		−0.26	0.63	−0.42

n=420, $^{+}$ p=0.06, * p<0.05, ** p<0.01, *** p<0.001

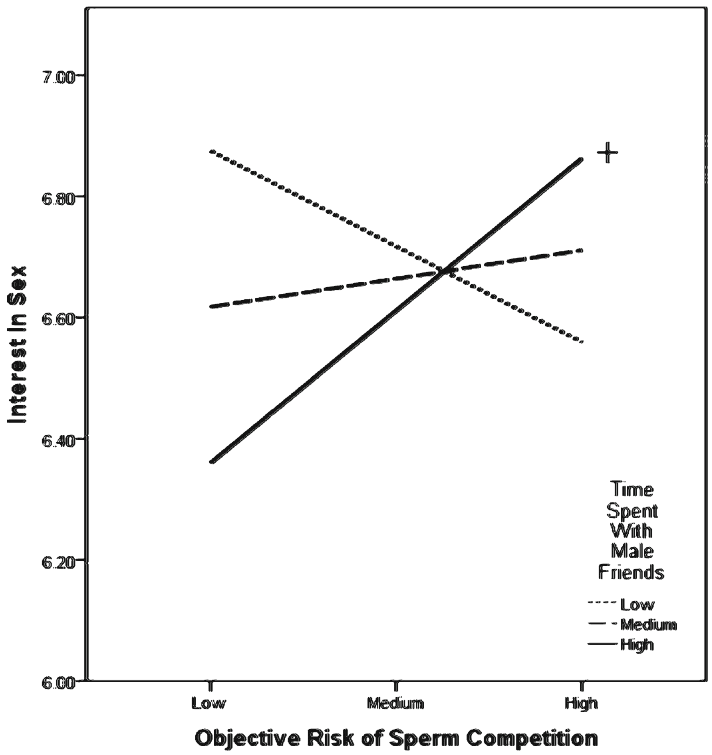

Fig. 1 Simple slopes graph for predicting men's interest in copulating with their partner from objective risk of sperm competition at high, medium, and low levels of time spent with male friends, controlling for average age. +p=0.06

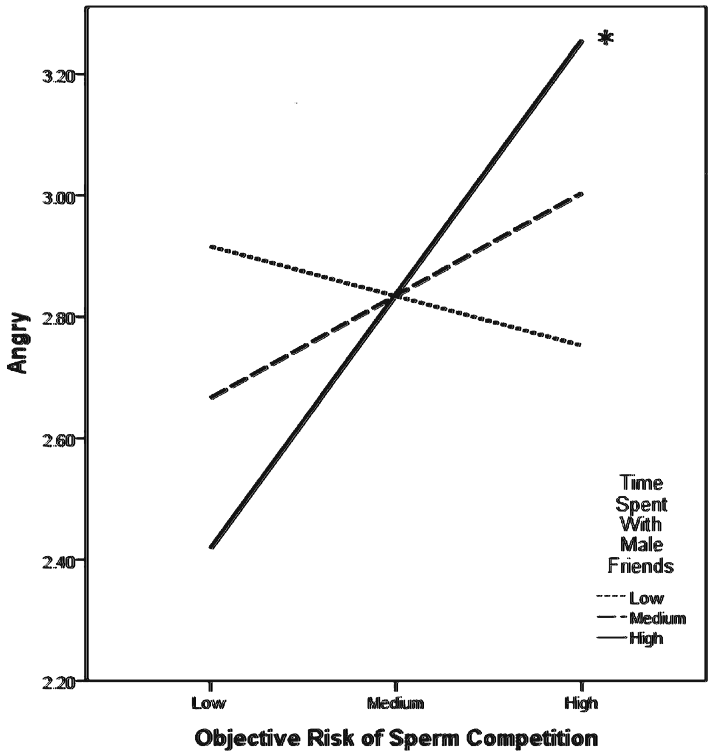

Fig. 2 Simple slopes graph for predicting men's anger in response to their partner's sexual rejection from objective risk of sperm competition at high, medium, and low levels of time spent with male friends, controlling for average age. *$p<0.05$

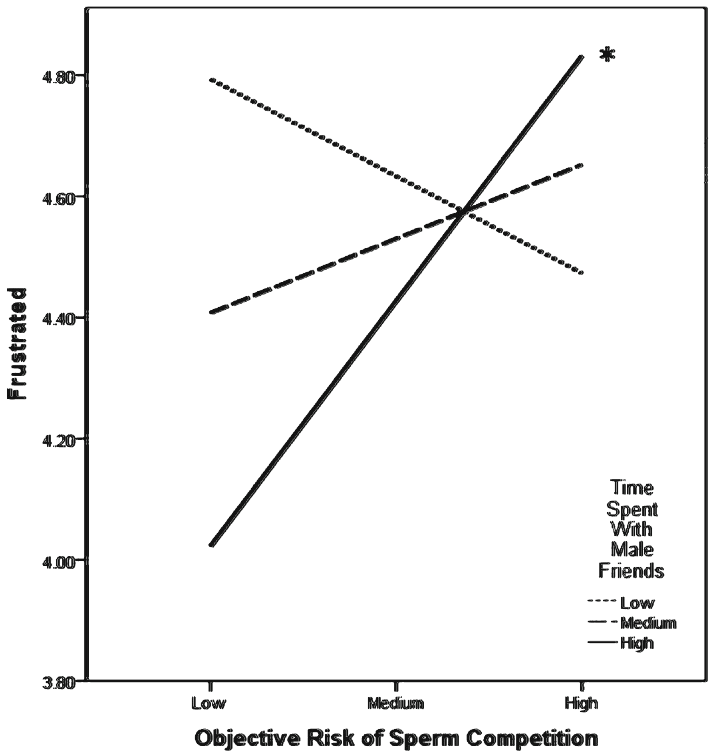

Fig. 3 Simple slopes graph for predicting men's frustration in response to their partner's sexual rejection from objective risk of sperm competition at high, medium, and low levels of time spent with male friends, controlling for average age. *$p<0.05$

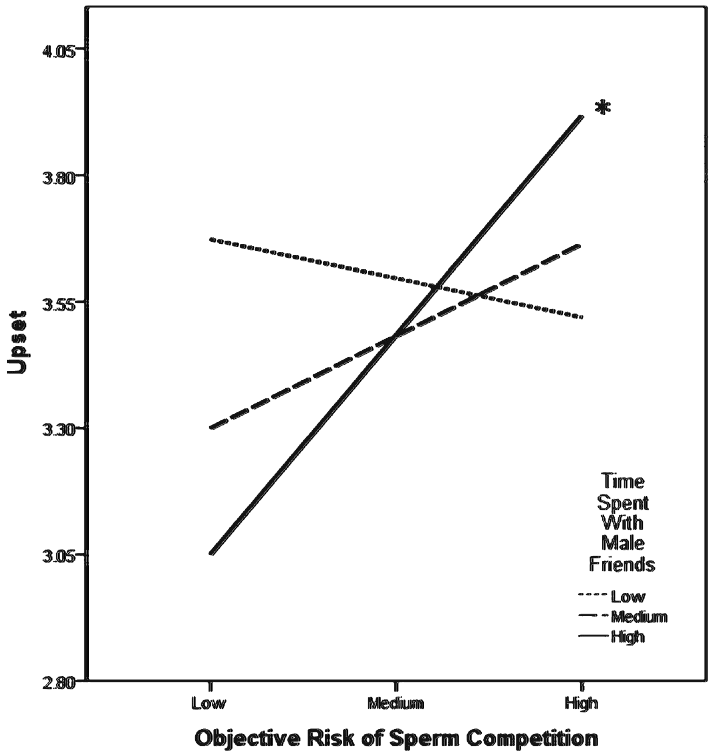

Fig. 4 Simple slopes graph for predicting men's upset in response to their partner's sexual rejection from objective risk of sperm competition at high, medium, and low levels of time spent with male friends, controlling for average age. *p<0.05

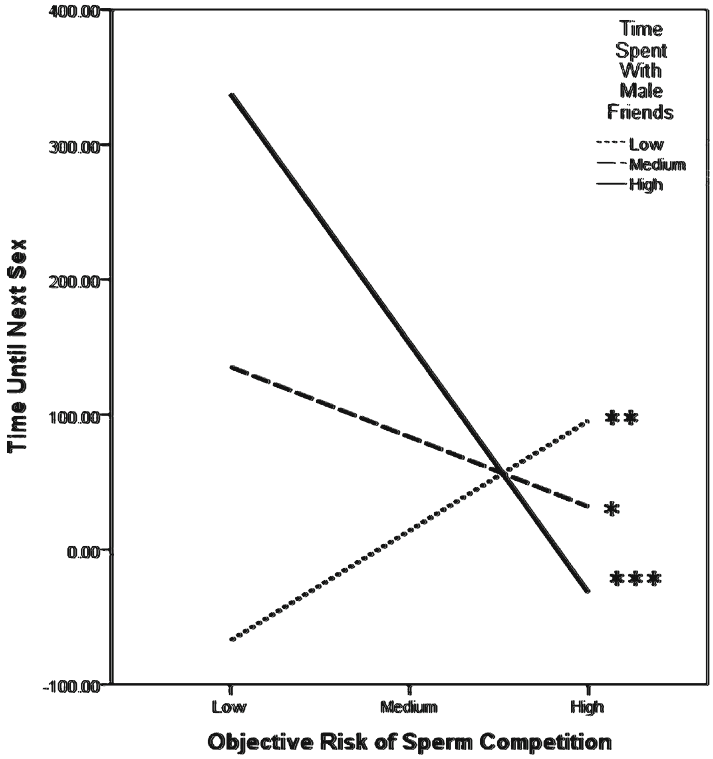

Fig. 5 Simple slopes graph for predicting men's desired time until the couple's next copulation from objective risk of sperm competition at high, medium, and low levels of time spent with male friends, controlling for average age. *p<0.05, **p<0.01, ***p<0.001

desire copulating with their partner. Men at greater objective sperm competition risk report less time desired until the couple's next copulation, greater interest in copulating with their partner, and greater anger, frustration, and upset in response to their partner's sexual rejection, but *only* among men who report that their partner spends more time with her male friends. These results remain after statistically controlling for the participant's age and their partner's age. The current study is the first to empirically investigate the time women spend with male friends as a cue to sperm competition risk.

The current research identified an unanticipated relationship: Among men whose partner spends less time with her male friends, men at greater objective sperm competition risk report more time desired until the couple's next copulation. We are unable to account for this apparently contradictory pattern of relationships, given the variables for which we collected data.

Our measure of time spent with male friends may have been ambiguously worded: "*As far as you know, how much time does your partner currently spend with her male friends?*" A participant may have interpreted "as far as you know" as the amount of time she spends with her male friends *without him*. Proper interpretation of interaction effects requires the conceptual independence of the interaction's constituent factors. To emphasize the independence between the proportion of time a couple spends apart since last copulation and the time women spend with their male friends, future research should explicitly state that the time a woman spends with her male friends should include time with and without her partner.

We secured men's reports—rather than women's own reports—to assess the time their partner spends with her male friends. Although women's own reports might more accurately index the time they *actually* spend with their male friends, the current research focuses on male psychology and, therefore, men's reports arguably provide more valid assessments of men's estimates of sperm competition risk. Future research might benefit from collecting data from both members of couples to investigate whether men overestimate or underestimate the time their partner spends with her male friends.

The non-experimental nature of this research limits causal inferences between the risk of sperm competition and men's anti-cuckoldry behaviors. For example, an alternative explanation might be that men who report greater in-pair copulatory interest consequently overestimate the proportion of time they spend apart from their partner since the couple's last copulation. This alternative explanation appears unlikely, however: Previous research supports the hypothesis that copulatory interest is, in part, an anti-cuckoldry tactic (e.g., Shackelford et al. 2002, 2007), and in one study, men who were experimentally primed with thoughts of partner infidelity reported greater interest in copulating with her (Starratt et al. 2013).

The current research is consistent with previous research documenting that men attend to multiple cues to assess overall partner infidelity risk. The relationship between sperm competition risk and men's anti-cuckoldry behaviors is moderated by men's own personalities (Kaighobadi et al. 2009), the perceived likelihood of their partner's infidelity (McKibbin et al. 2011), and relationship satisfaction (McKibbin et al. 2010). The present study identifies the time women spend with their male friends as another moderating cue.

The current research provides insight into the male psychology of sexual coercion. Sperm competition theory predicts that men at greater cuckoldry risk are more likely to

sexually coerce their partner—an outcome of their partner-directed copulatory interest (Goetz et al. 2008). Previous research has documented a positive relationship between men's partner-directed sexual coercion and the risk of their partner's infidelity (Camilleri 2004; Camilleri and Quinsey 2009; Finkelhor and Yllo 1985; Frieze 1983; Gage and Hutchinson 2006; Goetz and Shackelford 2006, 2009; Lalumière et al. 2005; McKibbin et al. 2011; Russell 1982; Starratt et al. 2008). Research guided heuristically by sperm competition theory can help identify other risk factors associated with men's sexual coercion.

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