

[in press, *Human Nature*, February 2013]

The Relationship between Objective Sperm Competition Risk and Men's Copulatory Interest is

Moderated by Partner's Time Spent with Other Men

Michael N. Pham and Todd K. Shackelford

Oakland University

Correspondence:  
Michael N. Pham  
Oakland University  
Department of Psychology  
130 Pryale Hall  
Rochester, MI 48309  
(248) 370-2300  
(248) 370-4612 (fax)  
mnpham@oakland.edu

## Abstract

Men who spend a greater proportion of time apart from their female partner since the couple's last copulation are at greater *objective* risk of sperm competition. 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, sexual relationship completed a questionnaire. The results indicate that men at greater *objective* risk of sperm competition 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 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

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

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 sperm competition (Baker and Bellis 1993; Shackelford et al. 2002, 2007; Smith 1984). For example, men who report a greater likelihood of their partner's infidelities are at greater risk of sperm competition (McKibbin, Starratt, Shackelford, and Goetz 2011). Additionally, men who spend a greater proportion of time apart from their partner since the couple's last copulation are at greater risk of sperm competition because their partner has more opportunities to surreptitiously pursue extra-pair copulations (Baker and Bellis 1993; Shackelford et al. 2002, 2007; Smith 1984).

Several cues to female partner infidelity risk moderate the relationship between the proportion of time men spend apart from their partner since the couple's last copulation and men's anti-cuckoldry tactics. For example, McKibbin et al. (2011) documented that the proportion of time the couple spent apart since their last copulation is positively related to men's anti-cuckoldry tactics, but *only* among men who reported a higher likelihood of their partner's infidelities. 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 the

proportion of time those men spend apart from their partner since the couple's last copulation should *not* be related to those men's 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, McKibbin, and Shackelford in press). 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 risk of sperm competition 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. in press).

Following previous research (e.g., Shackelford et al. 2002, 2007; Starratt et al. in press), we hypothesize that men at greater risk of sperm competition will more strongly desire copulating with their partner. Specifically, we predict that men who spend a greater proportion of time apart from their partner since the couple's last copulation 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 and women's age may affect men's 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 own 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 answered the remaining questions using a Likert-type scale ranging from 0 to 9. Participants reported 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, 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 risk of sperm competition* 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 ( $r = .90, p < .001$ ), 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 risk of sperm competition and time spent with male friends on each of the five outcomes. Prior to conducting moderation analyses, we centered scores on objective risk of sperm competition and time spent with male friends (Aiken and West 1991).

First, we conducted five multiple regression analyses to examine 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 ( $t = -6.34, p < .001$ ), interest in copulation ( $t = 2.23, p < .05$ ), as well as feeling angry ( $t = 2.18, p < .05$ ), frustrated ( $t = 2.33, p < .05$ ), and upset ( $t = 2.20, p < .05$ ) by their partner's sexual rejection. We also identified main effects for objective risk of sperm competition ( $b = -177.87, SE = 80.77, t = -2.20, p < .05$ ) and time spent with male friends ( $b = 33.08, SE = 10.96, t = 3.02, p < .01$ ) when predicting desired time until next copulation.

#### Simple slope analyses

To test the predictions, we conducted simple slopes analyses to examine the relationship between objective risk of sperm competition and each of the outcomes within *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 risk of sperm competition 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 Figures 1 through 5).

Prediction 1 was supported. Objective risk of sperm competition 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 risk of sperm competition 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 risk of sperm competition was positively but not statistically significantly ( $p = .06$ ) 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 risk of sperm competition was positively related to participants' reports of feeling angry, frustrated, and upset if their partner declined their request for sexual intercourse. Consistent with Predictions 3-5, objective risk of sperm competition 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 risk of sperm competition more strongly desire copulating with their partner. Men who spend a greater proportion of time apart from their partner since the couple's last copulation 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 greater 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.

We predicted and identified a negative relationship between the proportion of time men spend apart from their partner since the couple's last copulation and how soon these men would next like to copulate with their partner, for men who report that their partner spends more time with her male friends. We also identified an unanticipated positive relationship between the target variables for men who report that their partner spends less time with her male friends. 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 require 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 be more accurate in how much 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: 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 their partner (Starratt et al. in press).

The current research is consistent with previous research demonstrating that men attend to multiple cues to assess the overall risk of partner infidelity. 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, Bates, Shackelford, Hafen, and LaMunyon

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 and partner rape. Sperm competition theory predicts that men at greater risk of cuckoldry are more likely to sexually coerce their partner—an outcome of their partner-directed copulatory interest (Goetz, Shackelford, and Camilleri 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, Harris, Quinsey, and Rice 2005; McKibbin, Starratt, Shackelford, and Goetz 2011; Russell 1982; Starratt, Goetz, Shackelford, and Stewart-Williams 2008). Research guided heuristically by sperm competition theory can help identify other risk factors associated with men's sexual coercion.

## References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Baker, R. R., & Bellis, M. A. (1993). Human sperm competition: ejaculate adjustment by males and the function of masturbation. *Animal Behaviour*, 46, 861–885.
- 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.
- Camilleri, J. A., & Quinsey, V. L. (2009). Testing the Cuckoldry Risk Hypothesis of Partner Sexual Coercion in Community and Forensic Samples. *Evolutionary Psychology*, 7, 164-178.
- Finkelhor, D., & Yllo, K. (1985). *License to rape: Sexual abuse of wives*. New York: Holt, Rinehart, & Winston.
- Frieze, I. H. (1983). Investigating the causes and consequences of marital rape. *Signs*, 8, 532-553.
- Gage, A. J., & Hutchinson, P. L. (2006). Power, control, and intimate partner sexual violence in Haiti. *Archives of Sexual Behavior*, 35, 11-24.
- 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, 26-234.

- 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.
- Hällström, T., & Samuelsson, S. (1990). Changes in women's sexual desire in middle life: the longitudinal study of women in Gothenburg. *Archives of Sexual Behavior, 19*, 259-268.
- Kaighobadi, F., Shackelford, T. K., Popp, D., Moyer, R. M., Bates, V. M., & Liddle, J. R. (2009). Perceived risk of female infidelity moderates the relationship between men's personality and partner-directed violence. *Journal of Research in Personality, 43*, 1033-1039.
- Lewis, R. W., Fugl-Meyer, K. S., Bosch, R., Fugl-Meyer, A. R., Laumann, E. O., Lizza, E., & Martin-Morales, A. (2004). Epidemiology/risk factors of sexual dysfunction. *The Journal of Sexual Medicine, 1*, 35-39.
- McKibbin, W. F., Bates, V. M., Shackelford, T. K., LaMunyon, C. W., & Hafen, C. A. (2010). Risk of sperm competition moderates the relationship between men's satisfaction with their partner and men's interest in their partner's copulatory orgasm. *Personality and Individual Differences, 49*, 961-966.
- McKibbin, W. F., Starratt, V. G., Shackelford, T. K., & Goetz, A. T. (2011). Perceived risk of female infidelity moderates the relationship between objective risk of female infidelity and sexual coercion in Humans (*Homo sapiens*). *Journal of Comparative Psychology, 125*, 370-373.
- 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. *The Journal of Psychiatry and Law, 33*, 419-426.

- McKibbin, W. F., Starratt, V. G., Shackelford, T. K., & Goetz, A. T. (2011). Perceived risk of female infidelity moderates the relationship between objective risk of female infidelity and sexual coercion in humans. *Journal of Comparative Psychology*, *125*, 370-373.
- Parker, G. G. (1970). Sperm competition and its evolutionary consequences in the insects. *Biological Review*, *45*, 525-567.
- Russell, D. E. H. (1982). *Rape in marriage*. New York: Macmillan Press.
- Shackelford, T. K., Goetz, A. T., McKibbin, W. F., & Starratt, V. G. (2007). Absence makes the adaptations grow fonder: Proportion of time apart from partner, male sexual psychology, and sperm competition in humans (*Homo sapiens*). *Journal of Comparative Psychology*, *121*, 214-220.
- 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. (1984). Human sperm competition. In Smith, R. L. (Ed.), *Sperm competition and the evolution of animal mating systems* (pp. 601-659). New York: Academic Press.
- Starratt, V. G., McKibbin, W. F., & Shackelford, T. K. (in press). Experimental manipulation of psychological mechanisms responsive to female infidelity. *Personality and Individual Differences*.
- Starratt, V. G., Goetz, A. T., Shackelford, T. K., & Stewart-Williams, S. (2008). Men's partner-directed insults and sexual coercion in intimate relationships. *Journal of Family Violence*, *23*, 315-323.

## Figure Captions

Fig 1. Simple slopes graph for predicting men's interest in copulation with their partner from objective risk of sperm competition at high, medium, and low levels of time spent with male friends, while controlling for average age.  $+p = .06$

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, while controlling for average age.  $*p < .05$

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, while controlling for average age.  $*p < .05$

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, while controlling for average age.  $*p < .05$

Fig 5. Simple slopes graph: 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, while controlling for average age.  $*p < .05$ ,  $**p < .01$ ,  $***p < .001$

Table 1. Zero-order correlations between the target variables.

	1	2	3	4	5	6	7
1. Objective risk of sperm competition	X						
2. Time spent with male friends	.11*	X					
3. Time until next copulation	-.10*	.15**	X				
4. Interest in copulation	.02	-.03	-.19**	X			
5. Anger following sexual rejection	.06	-.01	-.06	.17**	X		
6. Frustration following sexual rejection	.05	-.04	-.05	.20**	.74**	X	
7. Upset following sexual rejection	.07	-.05	-.07	.22**	.78**	.79**	X
8. Average age	-.28**	-.19**	-.04	.02	.05	-.02	.01

*note:* average age= the mean of participant's age and their partner's age.

$n = 420$ , \* $p < .05$ , \*\* $p < .01$

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	<i>b</i>	<i>SE</i>	<i>t</i>
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	.86	.46	1.88 <sup>+</sup>
Medium		.16	.35	.45
Low		-.54	.49	-1.11
High	Anger	1.44	.57	2.52*
Medium		.58	.44	1.32
Low		-.28	.61	-.46
High	Frustration	1.40	.60	2.30*
Medium		.42	.47	.90
Low		-.55	.64	-.86
High	Upset	1.49	.58	2.56*
Medium		.63	.45	1.38
Low		-.26	.63	-.42

*n* = 420, +*p* = .06, \**p* < .05, \*\**p* < .01, \*\*\**p* < .001

Figure 1.

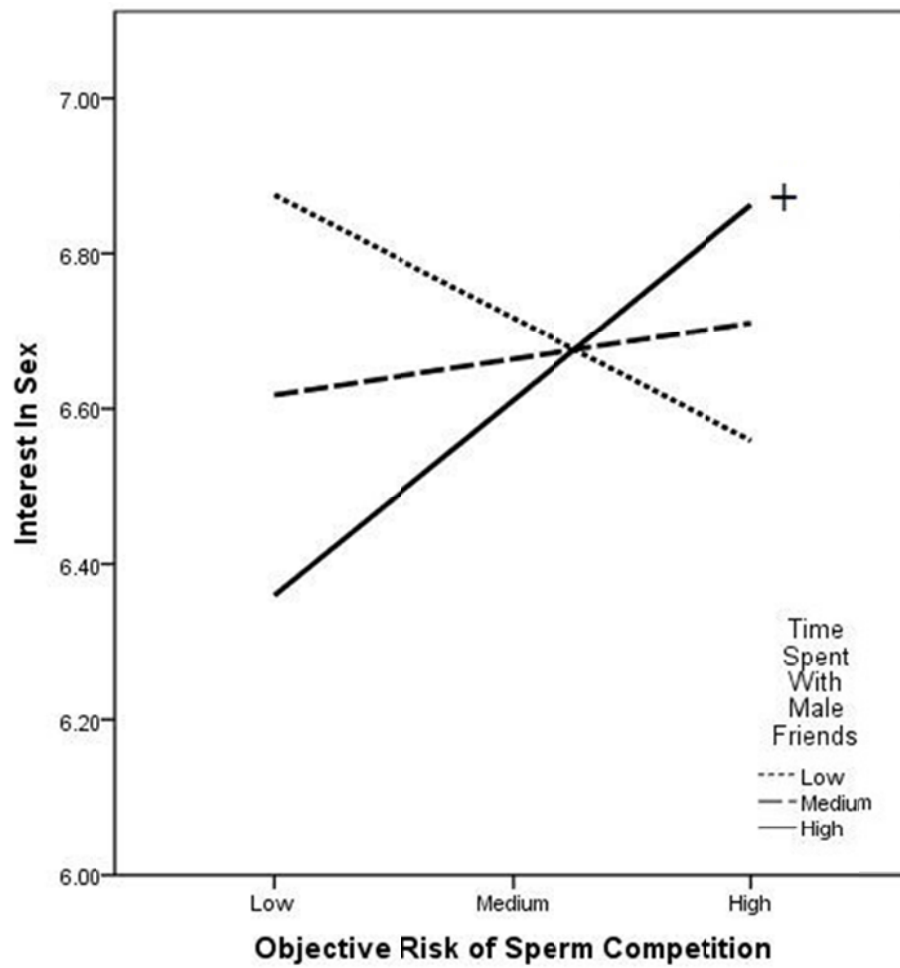


Figure 2.

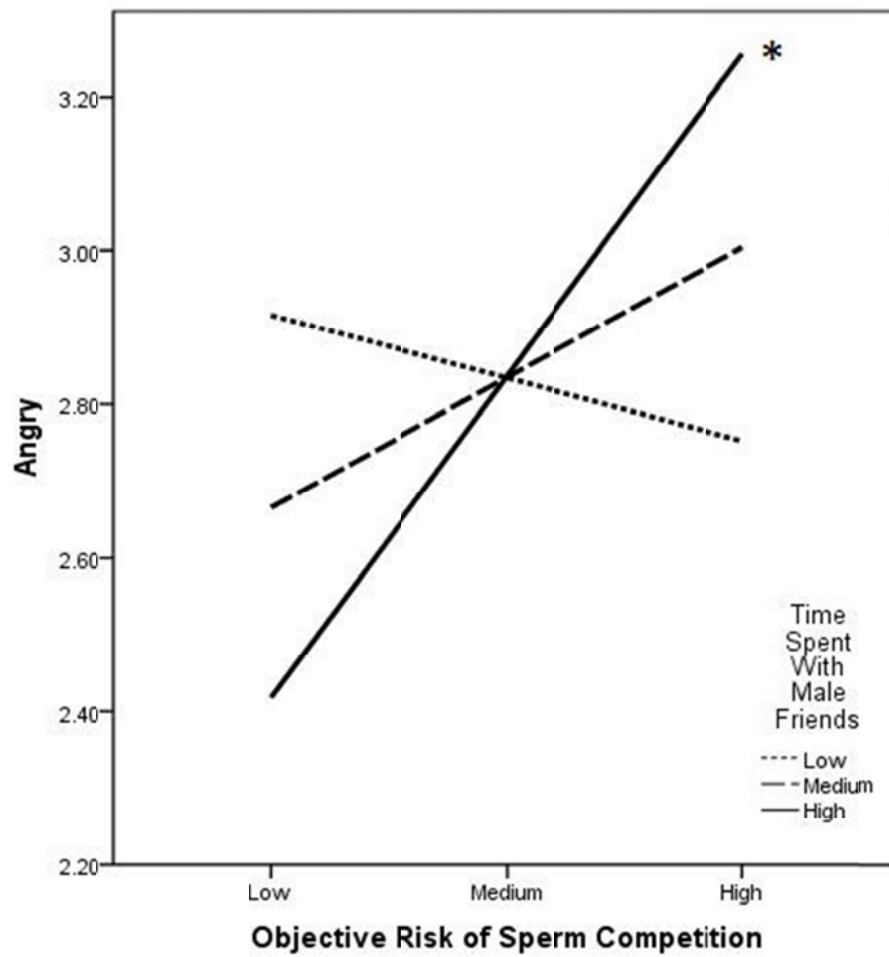


Figure 3.

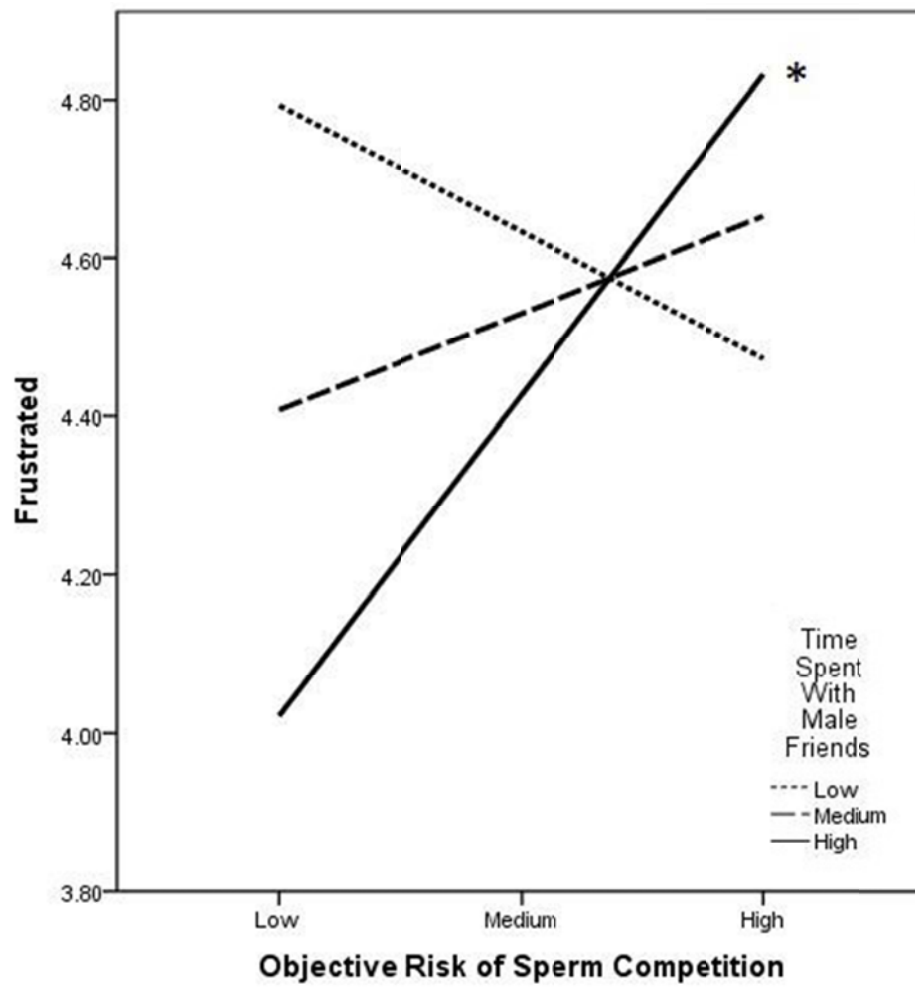


Figure 4.

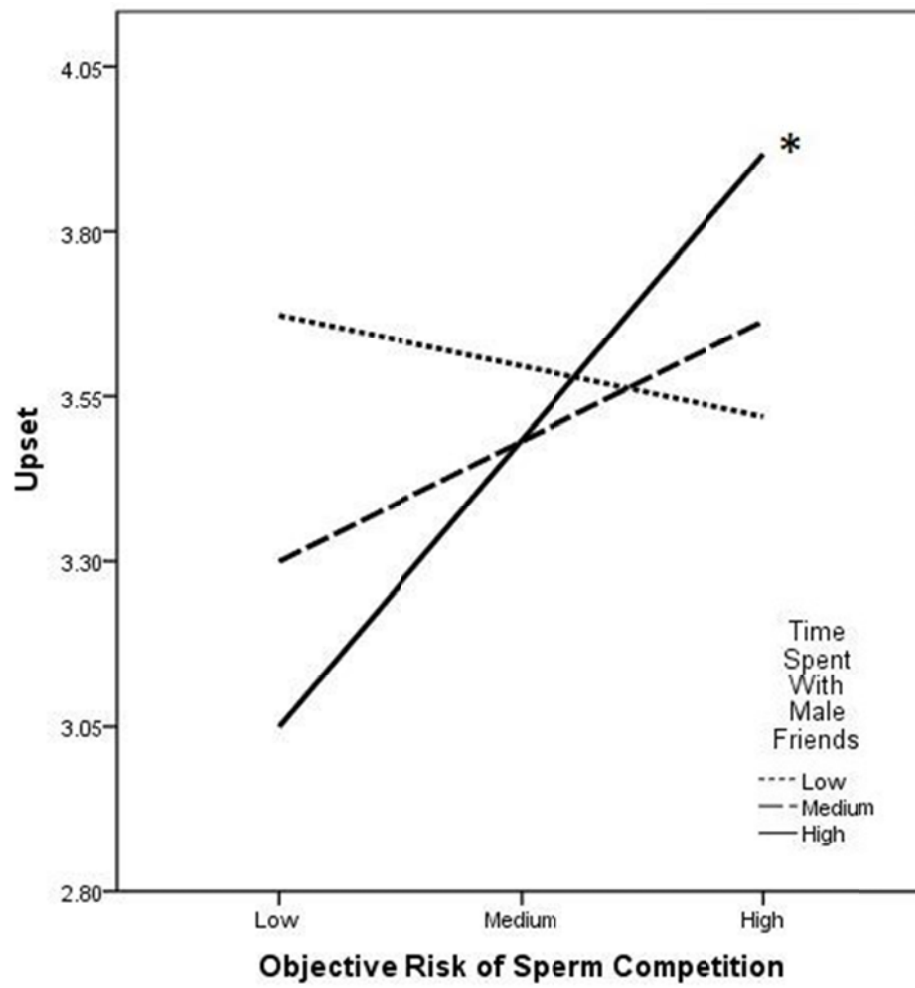


Figure 5.

