



Short Communication

Oral sex as infidelity-detection

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ABSTRACT

An evolutionary history of human female infidelity and consequent sperm competition may have caused the evolution of male counter-adaptations. The infidelity-detection hypothesis for oral sex proposes that men perform oral sex to gather information about their partner's recent sexual history. We tested this hypothesis with data secured from 231 men in committed, sexual, heterosexual relationships. We found support for two derivative predictions: men at a greater recurrent risk of sperm competition expressed greater interest in, and spent more time performing, oral sex on their partner, even after controlling statistically for relationship length, relationship satisfaction, and sexual intercourse duration. The discussion addresses limitations of this research and highlights directions for future research, including distinguishing empirically the infidelity-detection hypothesis from alternative hypotheses for oral sex.

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1. Introduction

1.1. Sperm competition in humans

When a female copulates with two or more males within a sufficiently brief time period, the sperm from the different males simultaneously occupy the female's reproductive tract and compete for fertilization of ova (Parker, 1970). Sperm competition has been documented or inferred to exist in many different species, including humans (Baker & Bellis, 1993a, 1993b; Birkhead & Møller, 1998; Smith, 1984; Shackelford et al., 2002; Shackelford, Goetz, McKibbin, & Starratt, 2007).

Female infidelity is an important context for human sperm competition (Smith, 1984). Humans typically form long term pair-bonds, but women occasionally pursue extra-pair copulations, placing their regular partner at risk for cuckoldry, or unwitting investment of time and resources into genetically unrelated offspring. The reproductive costs of cuckoldry may have caused the evolution of mechanisms that reduce the likelihood of cuckoldry (Shackelford, 2003). Some anti-cuckoldry mechanisms appear to be designed to prevent female infidelity by minimizing extra-pair copulation opportunities (Buss, 2002). Other anti-cuckoldry mechanisms appear to be designed to anticipate or to "correct" female infidelity, motivating the regular partner to enter his sperm into competition with rival male sperm that may already be present or that soon may be present in his partner's reproductive tract (Shackelford, 2003).

Among men in committed relationships, those who spend a greater proportion of time apart from their partners since the couple's last copulation (and thus experience greater risk of sperm competition) ejaculate more sperm at the couple's next copulation (Baker & Bellis, 1993a). Inseminating more sperm increases a man's chances in the "sperm raffle" to fertilize his partner's ova (Parker, 1970). Men who spend a greater proportion of time apart from their partner since the couple's last copulation also report greater desire to copulate with their partner, find their partner to be more attractive, and report that other men find their partner to be more attractive (Shackelford et al., 2002, 2007).

Men mated to more attractive women are at greater recurrent risk of sperm competition, because more attractive women are more likely to be pursued and successfully lured away by rival men (Goetz et al., 2005; Schmitt & Buss, 2001). Goetz et al. (2005) documented that men at greater recurrent risk of sperm competition perform deeper and more vigorous copulatory thrusts during sex with their partner, according to both men's reports and women's reports. These copulatory behaviors may function to displace from his partner's reproductive tract another man's semen, which complements the semen-displacing morphology of the human penis (Gallup et al., 2003).

1.2. Function of oral sex

Oral sex has been documented in many species, including bonobos (Palagi, Paoli, & Tarli, 2004), orangutans (Schurmann, 1982), lemurs (Koyama, 1988), short-nosed fruit bats (Tan et al., 2009), and humans (Leichliter, Chandra, Liddon, Fenton, & Aral, 2007), but the evolutionary function of oral sex is unclear in each of these species.

Informed by sperm competition theory, Thornhill (2006) hypothesized that oral sex performed by a man on his regular partner (cunnilingus) may function to detect the presence of rival

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semen following her sexual infidelity. Cunnilingus may allow men to taste and smell rival semen near or within the vagina, providing cues to a woman's recent sexual history. This hypothesis was inspired by research on non-humans documenting the increased frequency of male genital licking and sniffing during female oestrus (Dugmore, Bailey, & Evans, 1984; Palagi, Telara, & Borgognini, 2003; Pennington, Albright, & Callahan, 1986), as well one study in humans documenting that men rate vaginal fluid as more pleasant-smelling when the woman is at peak fertility (Doty, Ford, Preti, & Huggins, 1975).

In the present study, we test the infidelity-detection hypothesis of oral sex: if cunnilingus functions to detect rival semen, then men at greater recurrent risk of sperm competition will report greater interest in performing cunnilingus on their partner (Prediction 1) and will perform cunnilingus for a longer duration, to better detect rival semen (Prediction 2).

Men engage in lengthier durations of sexual intercourse with more attractive women (Goetz et al., 2005), so the predicted greater duration of cunnilingus for men at greater recurrent risk of sperm competition may be a byproduct of sexual intercourse duration. Men's relationship satisfaction and the length of the relationship also are correlated with the performance and frequency of oral sex (Santtila et al., 2008). We assess and control statistically for these potential confounds in tests of the predictions.

2. Method

2.1. Participants

Two hundred and thirty-one men in a committed, sexual relationship lasting at least one year participated, in exchange for extra credit in a course. All participants reported having had sex with their partner at least once in the past week. The mean participant age was 25.2 years ($SD = 7.8$) and the mean relationship length was 43.4 months ($SD = 56.9$).

2.2. Materials

Participants reported their age and current relationship length on a questionnaire. Following Shackelford et al. (2002, 2007), participants answered four questions about the attractiveness of their partner on a Likert-type scale ranging from 0 (*Not at all*) to 9 (*Extremely*): How (1) physically attractive and (2) sexually attractive do you find your partner? How (3) physically attractive and (4) sexually attractive do other men find your partner?

Participants answered questions about their most recent sexual encounter with their partner on a Likert-type scale, including: duration of sexual intercourse (0 = *Less time than is typical*, 9 = *More time than is typical*), own interest in performing oral sex (0 = *Less interested or excited than is typical for me*, 9 = *More interested or ex-*

cited than is typical for me), and duration of oral sex (0 = *Less time than is typical for me*, 9 = *More time than is typical for me*).

Finally, and following Shackelford et al. (2002, 2007), participants answered four questions about their relationship satisfaction on a Likert-type scale ranging from 0 (*Not at all*) to 9 (*Extremely*): how (1) sexually satisfied, (2) emotionally satisfied, and (3) overall satisfied are you with your partner?, and (4) how committed are you to your partner?

2.3. Procedures

Potential male participants were asked if they were at least 18 years of age and in a heterosexual committed relationship. Those who qualified were asked to 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.

3. Results

Following Goetz et al. (2005), we constructed a *relationship satisfaction* measure ($\alpha = .85$) from the mean of four variables: sexual satisfaction, emotional satisfaction, overall satisfaction, and commitment to partner. Also following Goetz et al. (2005), we constructed a *recurrent risk of sperm competition* measure ($\alpha = .83$) from the mean of four variables: how sexually and physically attractive the participant views his partner, and how sexually and physically attractive the participant believes other men view his partner. Before conducting analyses, we logarithmically transformed the relationship length variable to correct for significant skew (Tabachnick & Fidell, 2006).

Table 1 displays the zero-order correlations among the target variables. Recurrent risk of sperm competition was positively correlated with men's interest in performing cunnilingus and the duration of cunnilingus. Reports on the two oral sex variables also were correlated with reports on the potentially confounding variables: relationship satisfaction, relationship length, and duration of sexual intercourse. To identify the unique effects that recurrent risk of sperm competition may have on the two oral sex variables, we conducted multiple regression analyses to control for these confounds (see Table 2).

The results of the multiple regression analyses support Predictions 1 and 2: Men at greater recurrent risk of sperm competition reported greater interest in performing cunnilingus on their partner and performed cunnilingus for a longer duration, controlling for relationship length, relationship satisfaction, and duration of sexual intercourse.

Table 1
Zero-order correlations among key variables.

	Recurrent risk	Relationship satisfaction	Relationship length (log transform)	Duration of intercourse	Interest in performing oral sex
Recurrent risk	X				
Relationship satisfaction	.56**	X			
Relationship length (log transform)	-.20**	.00	X		
Duration of intercourse	.23**	.16*	-.06	X	
Interest in performing oral sex	.26**	.23**	.01	.11	X
Duration of oral sex	.24**	.12	-.07	.31**	.40**

$N = 231$ men.

* $p < .05$, (two-tailed).

** $p < .01$ (two-tailed).

Table 2
Multiple regression analyses assessing relationships between recurrent risk of sperm competition and oral sex variables, controlling for relationship length, relationship satisfaction, and duration of intercourse.

Outcome variable	Predictor variable							
	Recurrent risk		Relationship length (log transform)		Relationship satisfaction		Duration of intercourse	
	B	t	B	t	B	t	B	t
Interest in performing oral sex	.20	2.48*	.05	.80	.11	1.37	.05	.75
Duration of oral sex	.19	2.40*	-.02	-.31	-.02	-.33	.27	4.27***

N = 231 men.

B = standardized beta coefficient, t = test statistic associated with B.

* $p < .05$, (two-tailed).

*** $p < .001$ (two-tailed).

4. Discussion

This is the first study to test an evolutionary explanation for oral sex in humans. The results support the hypothesis that cunnilingus may function to detect female infidelity (Thornhill, 2006). Men mated to more attractive women—and, therefore, exposed to a greater recurrent risk of sperm competition—report greater interest in performing cunnilingus on their partner and report performing cunnilingus for a longer duration, supporting Predictions 1 and 2. These effects remained even after controlling statistically for the potential confounds of relationship length, men's relationship satisfaction, and the duration of sexual intercourse.

An alternative explanation for the current results is that cunnilingus facilitates sperm retention via orgasm, and that men at greater recurrent risk of sperm competition may be particularly likely to perform cunnilingus. Women who receive oral sex are more likely to experience orgasm at a given copulatory event than are women who do not receive oral sex (Backstrom, Armstrong, & Puentes, 2012), and women retain more sperm when they experience an orgasm temporally near their partner's ejaculation (Baker & Bellis, 1993b). Men who induce their partner's orgasm through cunnilingus and then soon after ejaculate into their partner's reproductive tract will have more sperm retained in her tract, thereby providing them with a competitive advantage in any ensuing sperm competition. According to the sperm retention hypothesis for cunnilingus, therefore, men at greater recurrent risk of sperm competition are predicted to be especially interested in performing cunnilingus on their partner to induce her orgasm, thereby facilitating preferential retention of their own sperm. The sperm retention hypothesis, but not the infidelity detection hypothesis, depends on cunnilingus resulting in orgasm. Future research therefore may be able to disentangle these hypotheses by securing data on whether cunnilingus resulted in orgasm.

Another explanation for the current results is that men perform cunnilingus on their partner to "sexually satiate" her. Sexually dissatisfied women are more susceptible to infidelity (Buss & Shackelford, 1997), and the frequency with which men perform cunnilingus on their partner is positively related to their partner's sexual satisfaction (Young, Denny, Young, & Luquis, 2000). Therefore, cunnilingus may be a tactic men use to minimize the likelihood that their partner will be sexually unfaithful. Future research might investigate whether sperm competition risk predicts men's interest in, and time spent, performing cunnilingus, after statistically controlling for their partner's sexual satisfaction.

In conclusion, cumulating evidence demonstrates the importance of sperm competition theory for understanding sexual conflict in intimate relationships (Shackelford & Goetz, 2012). Sperm competition theory helps to explain men's partner-directed copulatory interest (Shackelford et al., 2002; Shackelford, Goetz, McKibbin, and Starratt, 2007), intimate partner violence (Goetz & Shackelford, 2006), and partner sexual coercion and rape (Goetz, Shackelford, & Camilleri, 2008). We investigated the function of oral sex guided

heuristically by sperm competition theory and provided preliminary support for the infidelity-detection hypothesis.

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