



Intrasexual Competitiveness Mediates the Link Between Unrestricted Sociosexuality and Indirect Aggression

Adam C. Davis¹ · Graham Albert² · Steven Arnocky¹

Received: 24 January 2022 / Revised: 1 May 2022 / Accepted: 13 June 2022
© The Author(s), under exclusive licence to Springer Nature Switzerland AG 2022

Abstract

The constellation of co-adapted traits that facilitate short-term mating promote the use of riskier and interpersonally antagonistic intrasexual competition tactics. Aggressive behavior can be used to vie against rivals for mates and resources that facilitate reproductive success; however, there is limited research regarding whether individual differences in a short-term mating orientation (i.e., unrestricted sociosexuality) are reliably associated with same-sex aggression, particularly indirect aggression. There is also some research suggesting that short-term mating tendencies are linked to inter-individual variability in the desire to compete with same-sex others for access to mates and reproductive resources (i.e., intrasexual competitiveness). We therefore speculated that intrasexual competitiveness might help to explain why those pursuing a short-term mating strategy may perpetrate more indirect aggression toward same-sex peers. In a sample of 290 Canadian heterosexual young adults, unrestricted sociosexuality positively predicted same-sex indirect aggression and intrasexual competitiveness, and intrasexual competitiveness mediated the positive link between unrestricted sociosexuality and indirect aggression. Exploratory analyses revealed that the desire facet of sociosexuality was driving the effect. These findings suggest that those with a short-term mating orientation, particularly those with unrestricted sociosexual desires, engage in more indirect aggression against same-sex peers, and that this association is, in part, explained by an inclination to be combative with same-sex rivals over social and mating resources.

Keywords Mating strategies · Short-term mating · Sociosexual orientation · Indirect aggression · Intrasexual competitiveness

Introduction

Humans employ diverse mating strategies, such as forging long-term romantic relationships, engaging in short-term casual “hookups,” or secretly having emotional and/or sexual affairs (i.e., extra-pair mating; Buss & Schmitt, 1993; Simpson & Gangestad, 1991). Short-term mating strategies involving the pursuit of sex with little emotional investment have been linked to interpersonally damaging forms of mate competition, such as aggression toward peers, rivals, and intimate partners (Ainsworth & Maner, 2012; Cross, 2010; Kardum et al., 2006; Westerlund et al., 2010; Yost

& Zurbriggen, 2006). Most of this work concerns direct forms of aggression in men (e.g., physical aggression), and much less is known about the associations between short-term strategies and the perpetration of indirect aggression (e.g., social exclusion; Griskevicius et al., 2009) in both men and women. Previous work indicates that several individual difference variables (e.g., personality traits) are reliably associated with short-term strategies (Schmitt & Shackelford, 2008). However, it is uncertain whether a proclivity to compete with same-sex rivals for mating and social resources (i.e., intrasexual competitiveness; Buunk & Fisher, 2009) might serve as a proximate psychological mechanism that compels those with a short-term strategy to engage in aggression against same-sex others. In the current study, we examined whether a tendency to pursue short-term mating was associated with same-sex indirect aggression in young adults, and whether intrasexual competitiveness mediated this relation.

✉ Adam C. Davis
adamd@nipissingu.ca

¹ Department of Psychology, Nipissing University, 100 College Drive, North Bay, ON P1B8L7, Canada

² Department of Anthropology, Boston University, 232 Bay State Road, Boston, MA 02215, USA

Short-term Versus Long-term Mating Strategies

Cross-culturally, long-term mating in humans is characterized by the formation of socially monogamous pair-bonds, underpinned by heightened emotional involvement and commitment. In contrast, short-term mating is typified by short-term sexual liaisons, including one-night stands and brief sexual affairs often devoid of commitment and emotional intimacy. Variability in short-term and long-term mating strategies aligns with individual differences in sociosexual orientation (Jonason et al., 2009; Penke & Asendorpf, 2008; Schmitt & Shackelford, 2008; Simpson & Gangestad, 1991). Restricted sociosexuality embodies a desire for love and commitment prior to having sex, which signals a propensity for long-term mating. In contrast, unrestricted sociosexuality involves a preference for casual sex without commitment and having sex with a variety of partners, which reflects short-term mating.

Like other indices of short-term mating, across cultural contexts, men on average report a more unrestricted sociosexual orientation (Davis et al., *in press*; Schmitt, 2005; Schmitt & Shackelford, 2008). Short-term mating for men is adaptive because mating with multiple women would have directly increased the number of offspring that ancestral men produced over evolutionary time (Buss & Schmitt, 1993, 2019). The costs of indiscriminate short-term mating are higher for women than for men because of sex differences in obligatory parental investment (e.g., pregnancy, childbirth, and breastfeeding; Buss & Schmitt, 2019). Women also face stronger social stigma for liberal sexual activity across societies and more often experience reputational attacks for behaving promiscuously (Arnocky et al., 2019; Vaillancourt & Sharma, 2011). Nonetheless, it is evident that women across the world pursue short-term strategies, which may adaptively function to (1) acquire immediate resources (resource hypothesis), (2) “trade up” for a better long-term mate (mate switching hypothesis), (3) encourage an unwanted mate to leave the relationship (mate expulsion hypothesis), (4) punish a partner to deter their future infidelity (mate manipulation hypothesis), (5) evaluate the suitability of a potential long-term mate, and/or (6) for genetic benefits that can be passed on to prospective offspring (better genes hypothesis; Buss & Schmitt, 2019; Buss et al., 2017; Gangestad & Simpson, 2000; Symons, 1979).

The constellation of co-adapted traits that underpin short-term mating often promote the use of risky, exploitive, and violent mate competition tactics (Jonason et al., 2009, 2011, 2017; Lalumière & Quinsey, 1996). Those reporting unrestricted sociosexuality express greater risky impulsivity (i.e., acting in dangerous ways

without forethought; Cross, 2010) and sexual risk-taking (e.g., having unprotected sex; Seal & Agostinelli, 1994), as well as interest in non-traditional and risky sexual desires (e.g., paraphilia; Thomas et al., 2021). Unrestricted sociosexuality has also been associated with the Dark Triad of narcissism (egoistic and grandiose), Machiavellianism (cynical and manipulative), and psychopathy (callous and impulsive; Jonason et al., 2009, 2017; Reise & Wright, 1996). Some research suggests that these links may be more apparent in men compared to women. For example, men with an unrestricted orientation are more sexually coercive (Lalumière & Quinsey, 1996; Westerlund et al., 2010) and espouse more sexist attitudes in comparison to men with a more restricted orientation (Walker et al., 2000). Moreover, an unrestricted orientation has been related to greater rape myth acceptance and using physical force to acquire sex in men, but not in women (Yost & Zurbriggen, 2006). Unrestricted sociosexuality has also been linked to sexually harassing others in both men and women, but only to sexist beliefs and sexual coercion in men (Kennair & Bendixen, 2012). Nonetheless, both romantically partnered women and men with an unrestricted orientation were found to engage in cost-inflicting mate retention (e.g., threatening intrasexual rivals; Kardum et al., 2006).

These results indicate that short-term mating is associated with the use of more risky, exploitive, and abusive mate competition tactics, particularly among men. If so, then an unrestricted sociosexual orientation might be associated with other forms of interpersonal antagonism that facilitate mate competition, such as same-sex peer aggression (Ainsworth & Maner, 2012; Cross, 2010). Despite the links between short-term mating strategies and some deleterious outcomes across large samples of participants, it is important to stress that short-term mating is not inherently “bad.” This value judgement is problematic, and many people engaging in short-term mating do not harm or abuse their sexual partners.

Short-term Mating and Aggression

Aggression is often conceptualized as an intrasexual competition strategy that enhances competitive success against same-sex rivals for access to, and the retention of, desired mates and mating relevant resources (Archer, 2009; Buss & Shackelford, 1997). Researchers commonly distinguish between two types of aggressive behavior: direct and indirect (Archer, 2004; Björkqvist et al., 1992; Card et al., 2008). Direct aggression involves overt attempts to threaten or harm another (e.g., physical aggression), whereas indirect aggression includes more covert behavior where the identity of the aggressor is often concealed (e.g., negative gossip,

hurtful rumors, and social exclusion). Across societies, males engage in more mean-level direct aggression than females (Archer, 2004; Björkqvist, 2018; Björkqvist et al., 1992). In contrast, results are mixed concerning mean sex differences in indirect aggression. Meta-analytic work suggests that females might engage in slightly more indirect aggression than males (Archer, 2004; Card et al., 2008). Due to having greater obligatory parental investment and the importance of staying alive to rear offspring, females may have evolved to preferentially use indirect aggression in lieu of more physically risky tactics to protect themselves from injury (Campbell, 1999).

Consequently, direct aggression may be more relevant for men's intrasexual competition, whereas indirect aggression may be more relevant for women's intrasexual competition. For example, priming participants with competitive motives (i.e., a high status intrasexual rival) increased direct aggression among men but not among women (Griskivicius et al., 2009). Courtship motives (a desirable opposite-sex other) did not appear to influence women's or men's direct aggression. In contrast, competitive and courtship motives increased women's indirect aggression, whereas neither prime influenced men's indirect aggression. Based on their findings, Griskivicius et al. (2009) encouraged future researchers to focus on sociosexual orientation in relation to aggression.

Among adolescent girls, White et al. (2010) found that more indirect aggression was linked to an earlier onset of sexual activity and stated that "Future work will need to differentiate between competition for long-term and short-term mating opportunities and how these strategies relate to indirect aggression" (p. 60). Unrestricted women and men were found to engage in more direct aggression toward a member of the same sex (Cross, 2010). In a noise-blast aggression task, priming mating motives increased men's same-sex aggression, particularly among those with unrestricted sociosexuality, which was not observed among women (Ainsworth & Maner, 2012). Therefore, same-sex aggressive behavior may be more apparent among those pursuing short-term mating strategies (Ainsworth & Maner, 2012).

Intrasexual Competitiveness, Sociosexuality, and Aggression

If sociosexuality reliably predicts aggression, then this link may be mediated by intrasexual competitiveness (Buunk & Fisher, 2009). Among Dutch undergraduates, a positive association between unrestricted sociosexuality and intrasexual competitiveness was supported; however, this relation did not replicate in a follow-up study of Canadian undergraduates (Buunk & Fisher, 2009). Some studies indicate that among young adult women, there is no relation

between sociosexuality and intrasexual competitiveness (Fiacco et al., 2019; Wagstaff, 2018). However, there may be a positive correlation between intrasexual rivalry denoting competence (i.e., achievement-related competitiveness) and an unrestricted orientation. In a similar vein, among men, unrestricted sociosexuality has been positively associated with asserting superiority and negatively associated with asserting niceness (a "nice-guy" self-presentation; Simpson et al., 1999). Women with unrestricted sociosexuality have also been found to be higher in sexual competitiveness (Semenyna et al., 2019). Furthermore, women's intrasexual competitiveness has been associated with aggression toward an attractive same-sex other (Arnocky et al., 2019). Intrasexual competitiveness also correlates with men's cost-inflicting mate retention (Arnocky et al., 2019), as well as indirect (both sexes) and direct aggression (men only) against a mate poacher when primed with perceived mate scarcity (Arnocky et al., 2014). Moreover, women's and men's intrasexual competitiveness has been positively correlated with possessive jealousy and intimate partner violence (Buunk & Massar, 2021). Women higher in intrasexual competitiveness expressed more jealousy and indirect aggression (e.g., derogatory gossip) toward an imagined rival after being exposed to images of attractive and provocatively dressed models (Borau & Bonnefon, 2019). Together, these results suggest that an unrestricted sociosexual orientation might be linked with heightened intrasexual competition, which could motivate the use of aggressive mating tactics to satisfy one's mating goals.

Present Study

The objectives of the current study were to examine the associations between short-term mating, intrasexual competitiveness, and indirect aggression against same-sex peers. Despite some mixed findings in the literature (e.g., Buunk & Fisher, 2009; Fiacco et al., 2019), it is sensible to expect that unrestricted sociosexuality will positively predict intrasexual competitiveness. There is also limited work involving an examination of sociosexuality with aggressive behavior toward same-sex others, and most of this research concerns direct aggression (e.g., Cross, 2010). Therefore, we tested the hypothesis that an unrestricted sociosexual orientation would positively predict both intrasexual competitiveness and indirect aggression toward same-sex others (Hypothesis 1). Based on previous findings (e.g., Arnocky et al., 2014; Borau & Bonnefon, 2019), we further anticipated that intrasexual competitiveness would positively predict indirect aggression (Hypothesis 2), and that heightened intrasexual competitiveness might mediate the link between unrestricted sociosexuality and same-sex indirect aggression (Hypothesis 3). Focusing on indirect aggression in this dynamic

is important because it is the most common form of adult aggression, which often allows perpetrators to avoid being reprimanded or retaliated against because it is viewed as socially acceptable (Coyne & Archer, 2004; Vaillancourt & Farrell, 2021).

Method

Participants

The research was approved by the Nipissing University Research Ethics Board. Participants were 314 young adult university and college students who provided informed consent and subsequently completed paper and pencil measures as part of a larger survey on mating psychology and behavior and were entered into a draw for \$100 CAD. Because intrasexual competition dynamics vary depending on sexual orientation (e.g., Li et al., 2010), analyses were restricted to heterosexual participants (92.4%; $n = 290$). Participants' age ranged from 17–30 ($M = 20.18$, $SD = 2.04$), with 54.5% ($n = 158$) being female, 50.0% ($n = 145$) being single, and 92.8% ($n = 269$) identifying as Caucasian. With small to medium-sized standardized paths ($\beta \sim 0.26$), a sample size of 162 is required to maintain 80% power to detect a significant mediating effect (Fritz & MacKinnon, 2007).

Materials

Sociosexual Orientation

Participants completed the 9-item revised Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf, 2008), which contains three facets: behavior (e.g., “With how many different partners have you had sex with in the past 12 months?”), measured with a 5-point scale (1 = 0 to 5 = 8 or more), attitude (e.g., “Sex without love is

OK”) assessed with a 5-point scale (1 = *totally disagree* to 5 = *totally agree*), and desire (e.g., “How often do you have fantasies about having sex with someone you are not in a committed romantic relationship with?”), measured using a 5-point scale (1 = *never* to 5 = *nearly every day*). Items were summed to calculate a global sociosexual orientation score, with higher scores indicating a more unrestricted sociosexual orientation ($\alpha = 0.88$). Items were also summed for the behavior ($\alpha = 0.88$), attitude ($\alpha = 0.87$), and desire ($\alpha = 0.88$) facets of the SOI-R.

Indirect Aggression

The 35-item Indirect Aggression Scale Aggressor Version (IAS-A; Forrest et al., 2005) was administered with modified instructions to focus on same-sex aggression: “Please rate how often you have done the following things to your peers of the same sex (e.g., friends, classmates, roommates, or general acquaintances).” Participants responded to items (e.g., “Turned other people against them”) using a 5-point scale ranging from 1 (*very rarely*) to 5 (*very often*). Items were summed to create a total frequency score, with higher scores denoting a greater use of indirect aggression ($\alpha = 0.96$).

Intrasexual Competitiveness

The 12-item Intrasexual Competition Scale (ICS; Buunk & Fisher, 2009) was used to assess individual differences in attitudes toward intrasexual rivalry. Participants responded to items using a 7-point Likert-type scale ranging from 1 (*not at all applicable*) to 7 (*very much applicable*). Items were framed so that participants responded to statements involving same-sex competitors (e.g., women responded to the statement “I can’t stand it when I meet another woman who is more attractive than I am”). Items were averaged, with higher scores describing greater intrasexual competitiveness ($\alpha = 0.88$).

Table 1 Descriptive statistics and bivariate correlations among variables

	1	2	3	4	5	6
1. SOI — global	—					
2. SOI — behavior	.77**	—				
3. SOI — attitudes	.86**	.54**	—			
4. SOI — desire	.78**	.37**	.51**	—		
5. Indirect aggression	.35**	.24**	.29**	.32**	—	
6. Intrasexual competitiveness	.26**	.16*	.16*	.31**	.33**	—
Minimum	9.00	3.00	2.00	3.00	35.00	1.00
Maximum	45.00	15.00	15.00	15.00	169.00	6.17
<i>M</i>	24.66	6.91	9.59	8.16	63.79	2.74
<i>SD</i>	8.22	3.14	3.70	3.34	22.01	0.96

Pearson product-moment correlations significant at * $p < .01$ and ** $p < .001$

Results

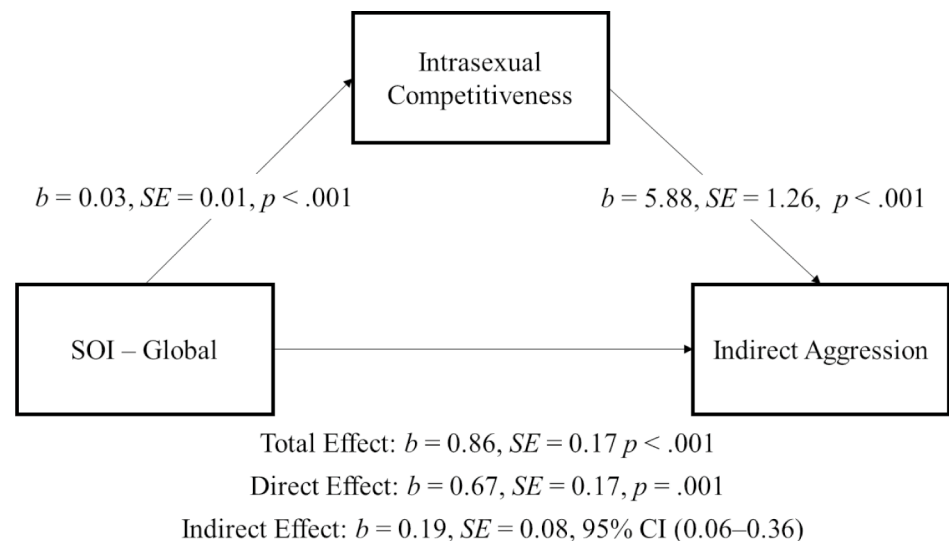
SPSS (version 27) was used for all analyses. Descriptive statistics were calculated for each variable (see Table 1). Histograms indicated that data approximated a normal distribution. Independent sample *t*-tests showed sex differences in global sociosexuality, $t(288) = 9.15$, $p < 0.001$, $d = 1.08$, such that men ($M = 28.92$, $SD = 7.50$) reported a stronger unrestricted orientation than women ($M = 21.10$, $SD = 7.04$). There were also sex differences in the behavior, $t(288) = 4.37$, $p < 0.001$, $d = 0.57$, attitude, $t(288) = 6.89$, $p < 0.001$, $d = 0.81$, and desire, $t(288) = 10.24$, $p < 0.001$, $d = 1.20$, facets of sociosexual orientation, such that men (behavior: $M = 7.77$, $SD = 3.14$; attitude: $M = 11.11$, $SD = 3.30$; desire: $M = 10.04$, $SD = 3.13$) scored higher than women in each (behavior: $M = 6.20$, $SD = 2.30$; attitude: $M = 8.32$, $SD = 3.55$; desire: $M = 6.58$, $SD = 2.61$). Similarly, sex differences manifested for same-sex indirect aggression, $t(288) = 3.47$, $p < 0.001$, $d = 0.43$, with men ($M = 68.61$, $SD = 22.84$) scoring higher than women ($M = 59.76$, $SD = 20.52$). There was no sex difference in intrasexual competitiveness. Independent sample *t*-tests further indicated differences for relationship status regarding global sociosexuality, $t(287) = 2.13$, $p = 0.034$, $d = 0.25$, with single participants ($M = 25.72$, $SD = 8.69$) reporting a more unrestricted orientation in comparison to those in romantic relationships ($M = 23.68$, $SD = 7.58$). However, only the desire facet, $t(287) = 5.23$, $p < 0.001$, $d = 0.59$ differed between single ($M = 9.14$, $SD = 3.45$) and romantically partnered participants ($M = 7.18$, $SD = 3.15$), and not the behavior and attitude facets. No

differences were found for indirect aggression or intrasexual competitiveness.

Pearson product-moment correlations showed that sociosexual orientation correlated positively with indirect aggression against same-sex others and intrasexual competitiveness, and that intrasexual competitiveness correlated positively with same-sex indirect aggression (Table 1). Each facet of the SOI-R correlated positively with intrasexual competitiveness and same-sex indirect aggression. Steiger's z (1980) for dependent correlations showed that the link between the desire facet and intrasexual competitiveness was significantly stronger than that for the behavior facet and intrasexual competition ($z = -2.34$, $p = 0.010$). Likewise, the relation between desire and intrasexual competition was stronger than that for the attitude facet and intrasexual competitiveness ($z = -2.74$, $p = 0.003$). Fisher's r -to- z -transformations for independent correlations indicated that none of the associations for women and men were significantly different from each other. Because there appeared to be no significant sex differences in the correlations between variables, we did not expect sex to moderate any of the associations in our mediation analysis.

Hayes (2013) PROCESS macro for SPSS was used to test hypotheses. Ordinary least squares (OLS) regression was used to examine if unrestricted sociosexuality would positively predict indirect aggression in addition to intrasexual competitiveness (Hypothesis 1), as well as whether intrasexual competitiveness would predict indirect aggression (Hypothesis 2). Bootstrapping ($N = 5000$ bootstrap samples) was used to examine evidence of an indirect (i.e., mediating) effect of intrasexual competitiveness on the proposed

Fig. 1 Mediation model for intrasexual competitiveness explaining the link between global sociosexuality with same-sex indirect aggression



Note. b = unstandardized regression coefficient; SE = standard error. CI = bootstrap confidence interval. Sex and relationship status were entered as covariates.

relation between unrestricted sociosexuality and same-sex indirect aggression (Hypothesis 3). Sex and relationship status were included as covariates. Unrestricted sociosexual orientation positively predicted intrasexual competitiveness (a-path), $\beta=0.27$, $p<0.001$ (see Fig. 1). Neither sex nor relationship status were significant covariates in this model. Intrasexual competitiveness positively predicted same-sex indirect aggression (b-path), $\beta=0.26$, $p<0.001$. Sex and relationship status were not significant covariates. With the mediator excluded, global unrestricted sociosexuality positively predicted indirect aggression (total effect, c-path), $\beta=0.32$, $p<0.001$. Neither sex nor relationship status were significant covariates. Including the mediator into the model reduced the strength of the link between unrestricted sociosexuality and indirect aggression, but this path remained significant (direct effect, c'-path), $\beta=0.25$, $p=0.001$, suggesting partial mediation. Including the mediator in the model reduced the strength of the link between global sociosexuality and same-sex indirect aggression by 21.9%. The indirect effect was significant, $\beta=0.07$, 95% LLCI=0.02, ULCI=0.13.

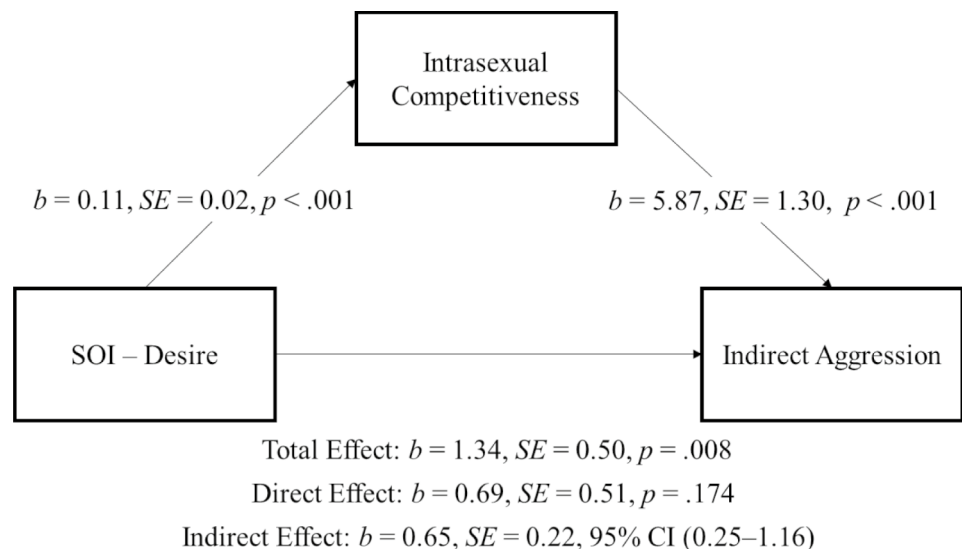
Facet-level Exploratory Mediation Analyses

We decided to explore separate mediation models for each facet of the SOI-R alongside intrasexual competitiveness and same-sex indirect aggression. Sex and relationship status was entered as a covariate in each model. We also controlled for the influence of the other two facets of sociosexuality that were not entered into the model as the focal independent variable,

which allowed us to isolate the unique contribution of each individual facet. In the first model, the behavior facet did not predict intrasexual competitiveness (a-path), $\beta=0.06$, $p=0.382$, but intrasexual competitiveness did positively predict same-sex indirect aggression (b-path), $\beta=0.26$, $p<0.001$. The behavior facet also did not predict same-sex aggression without (total effect, c-path), $\beta=0.12$, $p=0.088$, and with the mediator in the model (direct effect, c'-path), $\beta=0.10$, $p=0.126$. The indirect effect was non-significant. In the second model, the attitude facet failed to predict intrasexual competitiveness (a-path), $\beta=-0.03$, $p=0.644$; however, intrasexual competition positively predicted indirect aggression against same-sex others (b-path), $\beta=-0.26$, $p<0.001$. The attitude facet did not predict same-sex indirect aggression without (total effect, c-path), $\beta=0.10$, $p=0.173$, or with the mediator (direct effect, c'-path), $\beta=0.11$, $p=0.125$. The indirect effect was not significant. For the third model, the desire facet positively predicted intrasexual competitiveness (a-path), $\beta=0.38$, $p<0.001$, and intrasexual competitiveness positively predicted same-sex indirect aggression (b-path), $\beta=0.26$, $p<0.001$. Without the mediator, the desire positively predicted indirect aggression (total effect, c-path), $\beta=0.21$, $p=0.008$, which was reduced to non-significance when intrasexual competitiveness was included (direct effect, c'-path), $\beta=0.11$, $p=0.174$, suggesting complete mediation. Including the mediator in the model reduced the strength of the link between the desire facet of sociosexuality and same-sex indirect aggression by 47.6%.

The indirect effect was significant, $\beta=0.10$, 95% LLCI=0.04, ULCI=0.18 (see Fig. 2). Neither sex nor relationship status was a significant covariate in any of the above models.

Fig. 2 Mediation model for intrasexual competitiveness explaining the link between the desire facet of sociosexuality with same-sex indirect aggression



Note. b = unstandardized regression coefficient; SE = standard error. CI = bootstrap confidence interval. Sex and relationship status, as well as the Behavior and Attitude facets of the SOI-R were entered as covariates.

Discussion

Short-term mating is linked to riskier, more deviant, and interpersonally antagonistic mate competition (Jonason et al., 2009; Lalumière & Quinsey, 1996; Westerlund et al., 2010; Yost & Zurbriggen, 2006). Behavior intended to cause harm to others (i.e., aggression) has been shown to facilitate competition against same-sex rivals to vie for mating opportunities, retain desired mates, and grapple for resources that contribute to competitive success (Archer, 2004; Arnocky & Vaillancourt, 2012; Buss & Shackelford, 1997). However, there is limited research addressing the associations between individual differences in an unrestricted sociosexual orientation and aggression (Ainsworth & Maner, 2012; Cross, 2010), particularly indirect aggression (Griskevicius et al., 2009). Despite links between an unrestricted orientation and particular mate competition tactics (Simpson et al., 1999), the association between sociosexuality and intrasexual competitiveness remains equivocal (Buunk & Fisher, 2009; Wagstaff, 2018). Moreover, scholars have yet to test whether intrasexual competitiveness might help to explain why those with unrestricted sociosexuality might perpetrate more indirect aggression. In the current study, we tested whether expressing a short-term mating orientation predicted a desire to compete with same-sex others for mates and mating-relevant resources (i.e., intrasexual competitiveness) and the perpetration of same-sex indirect aggression (e.g., malicious gossip; Hypothesis 1). We further examined whether heightened intrasexual competitiveness predicted the use of indirect aggression against same-sex others (Hypothesis 2) and, if so, whether intrasexual competitiveness could help to explain the relation between short-term mating and indirect aggressive behavior (Hypothesis 3).

In support of Hypothesis 1, controlling for participant sex and relationship status, global unrestricted sociosexuality positively predicted intrasexual competitiveness. Mixed findings characterize research on the associations between sociosexuality and intrasexual competitiveness (Buunk & Fisher, 2009; Fiacco et al., 2019; Semenyina et al., 2019; Wagstaff, 2018). Given that people with a short-term mating orientation tend to be more disagreeable, higher in dark personality traits (Holtzman & Strube, 2011; Jonason et al., 2009; Schmitt & Shackelford, 2008), and more sexually coercive (Westerlund et al., 2010; Yost & Zurbriggen, 2006), it is sensible to expect that they express an eagerness to compete with rivals for mates. In further support of Hypothesis 1 and in line with previous research (e.g., Ainsworth & Maner, 2012; Cross, 2010), those with more unrestricted sociosexuality were more likely to perpetrate indirect aggression against same-sex others. Previous work indicates that unrestricted men

more often use tactics such as dominance, deception, and exploitation when competing for mates, whereas unrestricted women may flirt and invest more in appearance enhancement (Simpson et al., 1993, 1999). In the current study, evidence suggested that the links between sociosexuality and indirect aggression were sex-invariant, casting doubt on the idea that an unrestricted orientation may only contribute to interpersonally problematic behavior in men (Reise & Wright, 1996; Yost & Zurbriggen, 2006). It might be suggested that intrasexual competitiveness could be treated as a predictor rather than an outcome of sociosexual orientation. However, mating strategies encompass an array of competitive attitudes and tactics (Penke & Asendorpf, 2008). Therefore, the alternative proposal regarding the directionality of these variables (i.e., intrasexual competitiveness predicting unrestricted sociosexuality) is not as theoretically intuitive.

In support of Hypothesis 2, intrasexual competitiveness positively predicted same-sex indirect aggression. This is consistent with previous work where more intrasexually competitive individuals were more likely to aggress against a hypothetical mate poacher (Arnocky et al., 2014) and perpetrate intimate partner violence (Buunk & Massar, 2021). This result also accords with research showing that women higher in intrasexual competitiveness were more likely to engage in indirect aggression via derogation of a same-sex other (Borau & Bonnefon, 2019). Therefore, those eager to compete with same sex rivals for mating and social resources report a greater likelihood indirect aggression.

In line with Hypothesis 3, heightened intrasexual competitiveness partially mediated the positive relation between global unrestricted sociosexuality and same-sex indirect aggression. Therefore, intrasexual competitiveness may be one proximate mechanism that helps to explain why those who have more unrestricted sociosexuality are more likely to aggress against same-sex others. In previous work, Cross (2010) found that risky impulsivity explained why those with an unrestricted orientation were more directly aggressive against same-sex rivals for both women and men. This suggests there are likely several coordinated mechanisms that collectively determine why unrestricted individuals behave more aggressively. Arnocky et al. (2014) found that young adult men's and women's jealousy, intrasexual competitiveness, and their aggression toward a hypothetical mate poacher increased when experimentally primed with mate scarcity versus mate abundance. Although, Arnocky et al. (2016) also showed how men primed with mate abundance expressed a more unrestricted sociosexual orientation relative to men primed with mate scarcity. It is therefore possible that perceived mate availability may moderate the links between short-term mating with intrasexual competitiveness and same-sex indirect aggression in nuanced ways, which

would be a fruitful avenue for future research. Thomas and Stewart-Williams (2018) also showed how priming resource abundance (wealth) elevated interests for short-term mating in line with unrestricted sociosexuality. Income inequality (i.e., an unequal distribution of resources) is further associated with increased self-promotion in women (Blake et al., 2018), as well as same-sex aggression and violence among men (Daly, 2016). Thus, the relative availability of mates and resources, as well as the distribution of resources, may be important social-ecological parameters to consider when examining the relations between short-term mating, intrasexual competition, and same-sex aggression.

Importantly, sociosexual orientation is a multifaceted construct that embodies lower order facets (Penke & Asendorpf, 2008). Previous work indicates that the behavior, attitude, and desire facets may share differential relations with extrapair mating, sex drive, sensation-seeking (Penke & Asendorpf, 2008), and self-perceived mate value (Arnocky et al., 2021; Penke & Asendorpf, 2008), as well as various major dimensions of personality (e.g., extraversion; Fernández del Río et al., 2019). Sex differences also appear to be larger for the desire facet of sociosexuality, in comparison to the behavior and attitude facets (Fernández del Río et al., 2019; Penke & Asendorpf, 2008). Therefore, we explored whether our predictions might vary depending on the specific facet of sociosexuality under examination. Correlations between each facet with same-sex indirect aggression were similar; however, the desire facet of sociosexuality shared a significantly stronger positive link with intrasexual competitiveness in comparison to the behavior and attitude facets. This might help to explain some of the mixed findings in previous work where only global sociosexuality was considered in relation to intrasexual competitiveness (e.g., Buunk & Fisher, 2009; Fiacco et al., 2019; Wagstaff, 2018). In the exploratory mediation analyses, it was apparent that only the desire facet uniquely predicted both intrasexual competitiveness and the perpetration of same-sex aggression. These results appeared to be invariant regarding sex and relationship status. These findings accord with previous work showing that sociosexual desire shares a stronger relation with the socially aversive and malevolent “dark” personality traits embodied within the Dark Tetrad (narcissism, Machiavellianism, psychopathy, and sadism; Fernández del Río et al., 2019). Therefore, unrestricted sociosexual desires may be the key facet of sociosexuality that predicts heightened same-sex rivalry and interpersonal antagonism.

Limitations

Several limitations should be noted. Data were correlational; therefore, results from the mediation analyses cannot speak to true causal relations (Hayes, 2013). It would be prudent for future researchers to use experimental approaches

similar to Griskevicius et al. (2009) or longitudinal data to test hypotheses. For instance, using a method such as cross-lagged panel modeling with at least three waves of data, researchers could collect annual assessments for sociosexual orientation, intrasexual competitiveness, and indirect aggression, which would help to establish temporal precedence (i.e., the causal ordering of variables over time; see Davis et al., 2022 for similar approach). Using this approach, researchers could test whether unrestricted sociosexuality at time 1 predicts intrasexual competitiveness at time 2, and whether intrasexual competition at time 2 predicts same-sex indirect aggression at time 3. Furthermore, in the current study the SOI-R (Penke & Asendorpf, 2008) was used, which assesses sociosexual orientation along a single continuum. Several scholars have argued that short-term and long-term mating strategies operate along separate continua and should therefore be measured in a multidimensional way (Holtzman & Strube, 2013). However, restricting our hypotheses to short-term mating enhanced the suitability and validity of the SOI-R for measuring unrestricted sociosexuality. Therefore, in future work, it would be fruitful to use multidimensional instruments (e.g., The Multidimensional Sociosexual Orientation Inventory; Jackson & Kirkpatrick, 2007) to examine both short- and long-term mating strategies with aggressive perpetration and intrasexual competitiveness. This may be particularly important given evidence that most individuals seem to prefer a mixed mating strategy encompassing a collection of both short- and long-term tactics (Apostolou, 2021). And experimental evidence shows how mating strategies can quickly shift in response to evolutionarily relevant social-ecological stimuli (e.g., resource availability; Thomas & Stewart, 2018).

Conclusion

Like other sexually reproducing species, humans employ diverse strategies and tactics designed to attract, court, and retain sexual and romantic partners (Buss & Schmitt, 1993, 2019). Some strategies are more benign or prosocial, whereas others involve more interpersonally damaging behavior, such as aggression (Archer, 2009; Arnocky & Vaillancourt, 2012; Vaillancourt, 2013). Those employing a short-term mating orientation appear to use more erratic, interpersonally damaging, and violent forms of mate competition (Cross, 2010; Jonason et al., 2009; Kardum et al., 2006; Lalumière & Quinsey, 1996; Westerlund et al., 2010; Yost & Zurbriggen, 2006), which includes the perpetration of more indirect aggression toward same-sex others. A heightened tendency to compete with same-sex rivals for mates and mating resources (i.e., intrasexual competitiveness) may be one psychological mechanism that compels those with a short-term mating orientation to perpetrate

same-sex indirect aggression. Further studying indirect aggression in this dynamic is prudent because it is the most normative form of aggression used by adults, which often allows perpetrators to conceal their identities and avoid negative social sanctions (Coyne & Archer, 2004; Vaillancourt & Farrell, 2021).

Acknowledgements Adam C. Davis is supported by a Social Sciences and Humanities Research Council (SSHRC) Postdoctoral Fellowship.

Author Contribution ACD wrote the manuscript draft and conducted the analyses. SA designed the larger research project that the current study was a part of and collected the data. GA and SA helped to review and edit the manuscript draft.

Data Availability The data that support the findings of this study are available upon request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

Declarations

Ethics Approval This study received approval from an appointment Institutional Research Ethics Board at Nipissing University.

Consent to Participate All individuals provided informed consent to participate in the current study.

Consent to Publication All individuals were informed that the researchers planned to publish key findings in peer-reviewed journals.

Conflict of Interest The authors declare no competing interests.

References

- Ainsworth, S. E., & Maner, J. K. (2012). Sex begets violence: Mating motives, social dominance, and physical aggression in men. *Journal of Personality and Social Psychology, 103*(5), 819–829. <https://doi.org/10.1037/a0029428>
- Apostolou, M. (2021). Plurality in mating: Exploring the occurrence and contingencies of mating strategies. *Personality and Individual Differences, 175*, Article 110689. <https://doi.org/10.1016/j.paid.2021.110689>
- Archer, J. (2004). Sex differences in aggression in real-world settings: A meta-analytic review. *Review of General Psychology, 8*(4), 291–322. <https://doi.org/10.1037/10892680.8.4.291>
- Archer, J. (2009). Does sexual selection explain human sex differences in aggression? *Behavioral and Brain Sciences, 32*(3–4), 249–266. <https://doi.org/10.1017/S0140525X09990951>
- Arnocky, S., Desrochers, J., Rotella, A., Albert, G., Hodges-Simeon, C., Locke, A., & Kelly, B. (2021). Men's mate value correlates with a less restricted sociosexual orientation: A meta-analysis. *Archives of Sexual Behavior, 50*(8), 3663–3673. <https://doi.org/10.1007/s10508-021-01937-6>
- Arnocky, S., Proietti, V., Ruddick, E. L., Côté, T. R., Ortiz, T. L., Hodson, G., & Carré, J. M. (2019). Aggression toward sexualized women is mediated by decreased perceptions of humanness. *Psychological Science, 30*(5), 748–756. <https://doi.org/10.1177/0956797619836106>
- Arnocky, S., Ribout, A., Mirza, R. S., & Knack, J. M. (2014). Perceived mate availability influences intrasexual competition, jealousy and mate-guarding behavior. *Journal of Evolutionary Psychology, 12*(1), 45–64. <https://doi.org/10.1556/jep.12.2014.1.3>
- Arnocky, S., & Vaillancourt, T. (2012). A multi-informant longitudinal study on the relationship between aggression, peer victimization, and dating status in adolescence. *Evolutionary Psychology, 10*(2): 253–270. <https://doi.org/10.1177/147470491201000207>
- Arnocky, S., Woodruff, N., & Schmitt, D. P. (2016). Men's sociosexuality is sensitive to changes in mate availability. *Personal Relationships, 23*(1), 172–181. <https://doi.org/10.1111/per.12118>
- Björkqvist, K. (2018). Gender differences in aggression. *Current Opinion in Psychology, 19*, 39–42. <https://doi.org/10.1016/j.copsyc.2017.03.030>
- Björkqvist, K., Lagerspetz, K. M., & Kaukiainen, A. (1992). Do girls manipulate and boys fight? Developmental trends in regard to direct and indirect aggression. *Aggressive Behavior, 18*(2), 117–127. [https://doi.org/10.1002/1098-2337\(1992\)18:2%3C117::AIDAB2480180205%3E3.0.CO;2-3](https://doi.org/10.1002/1098-2337(1992)18:2%3C117::AIDAB2480180205%3E3.0.CO;2-3)
- Blake, K. R., Bastian, B., Denson, T. F., Grosjean, P., & Brooks, R. C. (2018). Income inequality not gender inequality positively covaries with female sexualization on social media. *Proceedings of the National Academy of Sciences, 115*(35), 8722–8727. <https://doi.org/10.1073/pnas.1717959115>
- Borau, S., & Bonnefon, J. F. (2019). The imaginary intrasexual competition: Advertisements featuring provocative female models trigger women to engage in indirect aggression. *Journal of Business Ethics, 157*(1), 45–63. <https://doi.org/10.1007/s10551-017-3643-y>
- Buss, D. M., Goetz, C., Duntley, J. D., Asao, K., & Conroy-Beam, D. (2017). The mate switching hypothesis. *Personality and Individual Differences, 104*, 143–149. <https://doi.org/10.1016/j.paid.2016.07.022>
- Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100*, 204–232. <https://doi.org/10.1037/0033-295x.100.2.204>
- Buss, D. M., & Schmitt, D. P. (2019). Mate preferences and their behavioral manifestations. *Annual Review of Psychology, 70*, 77–110. <https://doi.org/10.1146/annurev-psych-010418-103408>
- Buss, D. M., & Shackelford, T. K. (1997). Human aggression in evolutionary psychological perspective. *Clinical Psychology Review, 17*(6), 605–619. [https://doi.org/10.1016/S0272-7358\(97\)00037-8](https://doi.org/10.1016/S0272-7358(97)00037-8)
- Buunk, A. P., & Fisher, M. (2009). Individual differences in intrasexual competition. *Journal of Evolutionary Psychology, 7*(1), 37–48. <https://doi.org/10.1556/jep.7.2009.1.5>
- Buunk, A. P., & Massar, K. (2021). Intimate partner violence in Nicaragua: The role of possessive jealousy, intrasexual competitiveness, life history, mate value, and stress. *Journal of Interpersonal Violence, 36*(15–16). <https://doi.org/10.1177/0886260519842854>
- Campbell, A. (1999). Staying alive: Evolution, culture, and women's intrasexual aggression. *Behavioral and Brain Sciences, 22*(2), 203–214. <https://doi.org/10.1017/S0140525X99001818>
- Card, N. A., Stucky, B. D., Sawalani, G. M., & Little, T. D. (2008). Direct and indirect aggression during childhood and adolescence: A meta-analytic review of gender differences, intercorrelations, and relations to maladjustment. *Child Development, 79*(5), 1185–1229. <https://doi.org/10.1111/j.1467-8624.2008.01184.x>
- Coyne, S. M., & Archer, J. (2004). Indirect aggression in the media: A content analysis of British television programs. *Aggressive Behavior, 30*(3), 254–271. <https://doi.org/10.1002/ab.20022>
- Cross, C. P. (2010). Sex differences in same-sex direct aggression and sociosexuality: The role of risky impulsivity. *Evolutionary Psychology, 8*(4), 779–792. <https://doi.org/10.1177/147470491000800418>
- Daly, M. (2016). *Killing the competition: Economic inequality and homicide* (1st ed). Routledge.
- Davis, A. C., Arnocky, S., Mackinnon, M. A., & McKelvie, L. (in press). Men's extra-pair sexual interest. In T. K. Shackelford (Ed.). *The Cambridge handbook of evolutionary perspectives on sexual psychology*. Cambridge University Press

- Davis, A. C., Brittain, H., Arnocky, S., & Vaillancourt, T. (2022). Longitudinal associations between primary and secondary psychopathic traits, delinquency, and current dating status in adolescence. *Evolutionary Psychology*, 20(1). <https://doi.org/10.1177/14747049211068670>
- Fernández del R o, E., Ramos-Villagrasa, P. J., Castro,  ., & Barrada, J. R. (2019). Sociosexuality and bright and dark personality: The prediction of behavior, attitude, and desire to engage in casual sex. *International Journal of Environmental Research and Public Health*, 16(15), Article 2731. <https://doi.org/10.3390/ijerph16152731>
- Fiacco, S., Palm-Fischbacher, S., Campbell, J., & Ehlert, U. (2019). Measuring female intrasexual competition by the scale for intrasexual competition: A validation of the German version. *Archives of Women's Mental Health*, 22(2), 259–266. <https://doi.org/10.1007/s00737-018-0890-6>
- Forrest, S., Eatough, V., & Shevlin, M. (2005). Measuring adult indirect aggression: The development and psychometric assessment of the indirect aggression scales. *Aggressive Behavior*, 31(1), 84–97. <https://doi.org/10.1002/ab.20074>
- Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science*, 18(3), 233–239. <https://doi.org/10.1111/j.1467-9280.2007.01882.x>
- Gangestad, S. W., & Simpson, J. A. (2000). The evolution of human mating: Trade-offs and strategic pluralism. *Behavioral and Brain Sciences*, 23(4), 573–587. <https://doi.org/10.1017/S0140525X0000337X>
- Griskevicius, V., Tybur, J. M., Gangestad, S. W., Perea, E. F., Shapiro, J. R., & Kenrick, D. T. (2009). Aggress to impress: Hostility as an evolved context-dependent strategy. *Journal of Personality and Social Psychology*, 96(5), 980–994. <https://doi.org/10.1037/a0013907>
- Hayes, A. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford.
- Holtzman, N. S., & Strube, M. J. (2011). The intertwined evolution of narcissism and short-term mating: An emerging hypothesis. In K. W. Campbell & J. D. Miller (Eds.), *The handbook of narcissism and narcissistic personality disorder: Theoretical approaches, empirical findings, and treatments* (pp. 210–220). Wiley.
- Holtzman, N. S., & Strube, M. J. (2013). Above and beyond short-term mating, long-term mating is uniquely tied to human personality. *Evolutionary Psychology*, 11(5), 1101–1129. <https://doi.org/10.1177/147470491301100514>
- Jackson, J. J., & Kirkpatrick, L. A. (2007). The structure and measurement of human mating strategies: Toward a multidimensional model of sociosexuality. *Evolution and Human Behavior*, 28(6), 382–391. <https://doi.org/10.1016/j.evolhumbehav.2007.04.005>
- Jonason, P. K., Girgis, M., & Milne-Home, J. (2017). The exploitive mating strategy of the dark triad traits: Tests of rape-enabling attitudes. *Archives of Sexual Behavior*, 46(3), 697–706. <https://doi.org/10.1007/s10508-017-0937-1>
- Jonason, P. K., Li, N. P., Webster, G. D., & Schmitt, D. P. (2009). The dark triad: Facilitating a short-term mating strategy in men. *European Journal of Personality*, 23(1), 5–18. <https://doi.org/10.1002/per.698>
- Jonason, P. K., Valentine, K. A., Li, N. P., & Harbeson, C. L. (2011). Mate-selection and the dark triad: Facilitating a short-term mating strategy and creating a volatile environment. *Personality and Individual Differences*, 51(6), 759–763. <https://doi.org/10.1016/j.paid.2011.06.025>
- Kardum, I., Hudek-Knežević, J., & Gračanin, A. (2006). Sociosexuality and mate retention in romantic couples. *Psihologijske Teme*, 15(2), 277–296. <https://hrcak.srce.hr/9282>
- Kennair, L. E. O., & Bendixen, M. (2012). Sociosexuality as predictor of sexual harassment and coercion in female and male high school students. *Evolution and Human Behavior*, 33(5), 479–490. <https://doi.org/10.1016/j.evolhumbehav.2012.01.001>
- Lalumi re, M. L., & Quinsey, V. L. (1996). Sexual deviance, antisociality, mating effort, and the use of sexually coercive behaviors. *Personality and Individual Differences*, 21(1), 33–48. [https://doi.org/10.1016/0191-8869\(96\)00059-1](https://doi.org/10.1016/0191-8869(96)00059-1)
- Li, N. P., Smith, A. R., Griskevicius, V., Cason, M. J., & Bryan, A. (2010). Intrasexual competition and eating restriction in heterosexual and homosexual individuals. *Evolution and Human Behavior*, 31(5), 365–372. <https://doi.org/10.1016/j.evolhumbehav.2010.05.004>
- Penke, L., & Asendorpf, J. B. (2008). Beyond global sociosexual orientations: A more differentiated look at sociosexuality and its effects on courtship and romantic relationships. *Journal of Personality and Social Psychology*, 95(5), 1113–1135. <https://doi.org/10.1037/0022-3514.95.5.1113>
- Reise, S. P., & Wright, T. M. (1996). Personality traits, Cluster B personality disorders, and sociosexuality. *Journal of Research in Personality*, 30(1), 128–136. <https://doi.org/10.1006/jrpe.1996.0009>
- Semenyna, S. W., Vasey, P. L., & Honey, P. L. (2019). Replicating the relationships between dark triad traits and female mate-competition tactics in undergraduate women. *Personality and Individual Differences*, 147, 73–78. <https://doi.org/10.1016/j.paid.2019.04.028>
- Schmitt, D. P. (2005). Sociosexuality from Argentina to Zimbabwe: A 48-nation study of sex, culture, and strategies of human mating. *Behavioral and Brain Sciences*, 28(2), 247–275. <https://doi.org/10.1017/S0140525X05000051>
- Schmitt, D. P., & Shackelford, T. K. (2008). Big Five traits related to short-term mating: From personality to promiscuity across 46 nations. *Evolutionary Psychology*, 6(2), 246–282. <https://doi.org/10.1177/147470490800600204>
- Seal, D. W., & Agostinelli, G. (1994). Individual differences associated with high-risk sexual behaviour: Implications for intervention programmes. *AIDS Care*, 6(4), 393–397. <https://doi.org/10.1080/09540129408258653>
- Simpson, J. A., & Gangestad, S. W. (1991). Individual differences in sociosexuality: Evidence for convergent and discriminant validity. *Journal of Personality and Social Psychology*, 60(6), 870–883. <https://doi.org/10.1037/0022-3514.60.6.870>
- Simpson, J. A., Gangestad, S. W., & Biek, M. (1993). Personality and nonverbal social behavior: An ethological perspective of relationship initiation. *Journal of Experimental Social Psychology*, 29(5), 434–461. <https://doi.org/10.1006/jesp.1993.1020>
- Simpson, J. A., Gangestad, S. W., Christensen, P. N., & Leck, K. (1999). Fluctuating asymmetry, sociosexuality, and intrasexual competitive tactics. *Journal of Personality and Social Psychology*, 76(1), 159–172. <https://doi.org/10.1037/0022-3514.76.1.159>
- Steiger, J. H. (1980). Tests for comparing elements of a correlation matrix. *Psychological Bulletin*, 87(2), 245–251. <https://doi.org/10.1037/0033-2909.87.2.245>
- Symons, D. (1979). *The evolution of human sexuality*. Oxford University Press.
- Thomas, A. G., & Stewart-Williams, S. (2018). Mating strategy flexibility in the laboratory: Preferences for long- and short-term mating change in response to evolutionarily relevant variables. *Evolution and Human Behavior*, 39(1), 82–93. <https://doi.org/10.1016/j.evolhumbehav.2017.10.004>
- Thomas, A. G., Stone, B., Bennett, P., Stewart-Williams, S., & Kennair, L. E. O. (2021). Sex differences in voyeuristic and exhibitionistic interests: Exploring the mediating roles of sociosexuality and sexual compulsivity from an evolutionary perspective. *Archives of Sexual Behavior*, 50(5), 2151–2162. <https://doi.org/10.1007/s10508-021-01991-0>
- Vaillancourt, T. (2013). Do human females use indirect aggression as an intrasexual competition strategy? *Philosophical Transactions of the Royal Society B: Biological Sciences*, 368(1631), Article 20130080. <https://doi.org/10.1098/rstb.2013.0080>
- Vaillancourt, T., & Farrell, A. H. (2021). Mean kids become mean adults: Trajectories of indirect aggression from age 10 to 22.

- Aggressive Behavior*, 47(4), 394–404. <https://doi.org/10.1002/ab.21950>
- Vaillancourt, T., & Sharma, A. (2011). Intolerance of sexy peers: Intra-sexual competition among women. *Aggressive Behavior*, 37(6), 569–577. <https://doi.org/10.1002/ab.20413>
- Wagstaff, D. L. (2018). Comparing mating motivations, social processes, and personality as predictors of women's cosmetics use. *Evolutionary Behavioral Sciences*, 12(4), 367–380. <https://doi.org/10.1037/ebs0000119>
- Walker, D. F., Tokar, D. M., & Fischer, A. R. (2000). What are eight popular masculinity-related instruments measuring? Underlying dimensions and their relations to sociosexuality. *Psychology of Men & Masculinity*, 1(2), 98–108. <https://doi.org/10.1037/1524-9220.1.2.98>
- Westerlund, M., Santtila, P., Johansson, A., Varjonen, M., Witting, K., Jern, P., & Sandnabba, N. K. (2010). Does unrestricted sociosexual behaviour have a shared genetic basis with sexual coercion? *Psychology, Crime & Law*, 16(1–2), 5–23. <https://doi.org/10.1080/10683160802621925>
- White, D. D., Gallup, A. C., & Gallup Jr, G. G. (2010). Indirect peer aggression in adolescence and reproductive behavior. *Evolutionary Psychology*, 8(1), 49–65. <https://doi.org/10.1177/147470491000800106>
- Yost, M. R., & Zurbriggen, E. L. (2006). Gender differences in the enactment of sociosexuality: An examination of implicit social motives, sexual fantasies, coercive sexual attitudes, and aggressive sexual behavior. *Journal of Sex Research*, 43(2), 163–173. <https://doi.org/10.1080/00224490609552311>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.