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Socio-Sexuality, Self-Reported Physical Formidability, and the Dark Triad:
Predictors of Gossip Behavior and Cognitions

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by

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Given that this dissertation is about gossip, here I'd like to do a little bit of gossiping—not the malicious variety, but the positive, praising kind. There are a number of people who aren't physically present as I sit here at my favorite coffee shop writing this, each one instrumental in my graduate school career and in the completion of this dissertation. Let's take a few minutes to talk about them.

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RESEARCH INTERESTS

Indirect aggression among males and females.
Dress style, fashion, and body adornment practices in intergroup context.

ABSTRACT

Socio-Sexuality, Self-Reported Physical Formidability, and the Dark Triad: Predictors of Gossip Behavior and Cognitions

by

Lauren Marie Keblusek

While indirect aggression (IA)—covert and anonymous forms of social manipulation meant to damage a target’s reputation—has received some empirical attention from evolutionary scholars, the moderating role of individual difference variables relevant to mate competition in shaping IA behavior and cognitions remains understudied. Specifically, individual differences including socio-sexuality (i.e., one’s attitudes and behaviors regarding casual sex) and dark triad personality traits (i.e., narcissism, Machiavellianism, and psychopathy) have not been tested as moderators of gossip behavior (i.e., sharing) and cognitions (i.e., memory for gossip and perceptions of its juiciness), despite these individual differences having been shown to moderate intrasexual competition. Further, existing research is largely focused on females, including social evaluations of rival females and the role of intrasexual competition in promoting these outcomes. Thus, while IA is more common among younger versus older women and that it confers mating advantages on the perpetrator at the expense of the victim, relatively little is known about males’ use of IA in male intrasexual competition, despite the theoretical plausibility of IA in male intrasexual competition. Finally, little research has considered the role of gossip specifically in the

perpetration of IA in mate competition, despite the fact that gossip is likely to be the key conduit for IA due to its predominance in human social life.

Given all of this, the present studies examine gossip, drawing from evolutionary theories including sexual selection and sexual strategies theories to test several predictors of gossip in an intrasexual mate competition context, including sex, socio-sexuality, dark triad personality traits, and physical formidability—all of which affect mate competition. Further, the two studies reported herein assessed the moderating role of socio-sexuality and dark triad personality traits in shaping gossip behaviors and cognitions. Ultimately, this dissertation furthers our understanding of the role of individual differences in shaping gossip behavior and cognitions from an evolutionary perspective.

Using a survey design, Study 1 examined predictors of one gossip-related behavior, specifically, frequency of self-reported gossip sharing. It was predicted that sexually restricted females and unrestricted males would engage in more gossip, particularly when they also possessed dark triad traits. Recent research suggests that dark triad traits may have evolved because they facilitate inter- and intrasexual competition. These traits should therefore be most highly operative among individuals who are involved in higher levels of intrasexual competition (namely, more sexually restricted females and unrestricted males). Counter to this hypothesis, Study 1 showed that females (but not males) with more unrestricted socio-sexualities reported more frequent gossip sharing. Narcissism and Machiavellianism were associated with more frequent gossip sharing as hypothesized, but psychopathy was not. Socio-sexuality and sex moderated the narcissism-gossip sharing relationship, such that effects of narcissism were stronger for more sexually *unrestricted* females, contrary to the hypothesis. This suggests that psychopathic individuals might make

use of direct aggression tactics more frequently than they use IA, and that unrestricted females may face intense mate competition giving rise to frequent gossip sharing. This finding regarding unrestricted females may have arisen due to a sex-ratio bias in the sample—perhaps females in the sample face intense competition due to the presence of more females than males in this particular mating pool, and accordingly adopt unrestricted strategies to compete.

Study 1 also tested a proposed Male Formidability hypothesis, which assumes that IA is more likely to be perpetrated by less physically formidable men who would suffer greater physical costs than more formidable men in direct intrasexual competition. The findings supported the hypothesis, showing that self-reported less physically formidable males reported more frequent gossip sharing than more physically formidable males. Ultimately, Study 1 highlights the importance of physical formidability, socio-sexuality, narcissism, and Machiavellianism as they relate to male and female gossip sharing in a mate competition context.

If gossip use has evolved at least in part because of its role in intrasexual competition, then there should be cognitive adaptations for evaluating and tracking gossip. Study 2 experimentally assessed two gossip-related cognitions, namely: (1) enhanced memory for threatening romantic gossip and (2) heightened perceptions of its juiciness (i.e., interestingness). Female participants were exposed to a romantic or control prime, followed by a romantic gossip message depicting potential female rivals of varying levels of threat (i.e., low, moderate, or high). It was predicted that as gossip threat level increased, so too would memory for gossip content and perceptions of its juiciness, particularly when exposed to a romantic prime. In line with this hypothesis, high threat gossip was generally perceived

to be juiciest. Counter to prediction, however, these effects emerged under the control rather than the romantic prime. Failing to support the prediction, moderate threat gossip was better remembered than high threat gossip in a recognition memory test, indicating that it may be most threatening of all due to its ambiguity. There was no effect of gossip threat level on recall, suggesting that remembering details of gossip is less important than remembering the “gist.”

It was hypothesized that memory and juiciness effects would be moderated by individual differences relevant to intrasexual mate competition (i.e., socio-sexuality, dark triad personality traits) such that sexually restricted females and those with more dark triad traits would better remember high threat gossip and perceive it to be particularly juicy. Supporting the hypothesis, more narcissistic individuals perceived gossip to be juicier on average. Counter to predictions, more narcissistic individuals had better recall for low relative to high threat gossip, highly psychopathic individuals perceived moderately threatening gossip to be particularly juicy, and those low in psychopathy better recalled low relative to moderate and high threat gossip. Findings with respect to narcissism and recall indicate that narcissists may see positive, non-malicious gossip (e.g., that portrays a potential romantic rival as “friendly” and “nice”) as particularly threatening to their social status and hence mating prospects. Findings with respect to psychopathy and juiciness again point to the possibility that moderate threat gossip is the most threatening of all due to its ambiguity. Taken together, these findings indicate that narcissism, psychopathy, and socio-sexuality differentially moderate gossip cognitions. Perhaps most importantly, the study demonstrates the importance of psychopathy and narcissism in particular in affecting memory and perceptions of gossip juiciness, ultimately suggesting that higher levels of psychopathy and

narcissism are strongly associated with intensified sexual competition, and accordingly, cognitions enabling successful aggression perpetration.

Together, both studies highlight the importance of narcissism as a predictor of gossip behavior and cognitions. Of the dark triad traits, it emerged most consistently, shaping recall, juiciness perceptions, and self-reported gossip sharing, and providing further evidence that it is sexually selected for use in mate competition. This work also highlights differences between each dark triad attribute with respect to gossip, indicating that individuals' use of gossip as an IA tactic differs—sometimes dramatically—as a function of their personalities. Finally, these studies indicate that socio-sexuality and physical formidability interact with sex to shape gossip outcomes, which reflects diverging concerns of males and females on the mating market. For instance, while formidability is highly relevant to mate competition for males, affecting their decision to use IA, it is not particularly relevant for females. Overall, these studies take an important first step toward disentangling individual difference predictors of gossip sharing and cognitions from an evolutionary perspective.

Keywords: Dark Triad, gossip, indirect aggression, physical formidability, sexual selection, socio-sexuality

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Chapter I. Introduction

Aggression is enacted through several channels, both direct and indirect. Direct aggression consists of physical fighting (e.g., punching, kicking) and direct verbal attacks (e.g., yelling, insults). Indirect aggression—covert, often anonymous social manipulation used to harm a victim’s reputation or social standing—can be conveyed nonverbally, through “once-overs” and contemptuous facial expressions, and behaviorally through ignoring and social exclusion (Archer & Coyne, 2005; Lagerspetz, Björkqvist, & Peltonen, 1988). However, indirect aggression is very often conveyed verbally, with intent to harm the victim’s reputation through rumor and malicious gossip. Unlike direct forms of aggression, indirect aggression (IA) often operates circuitously through third parties (i.e., gossip), and tends to be covert and anonymous, unlike direct forms of aggression such as punching and verbal attacks. This circuitous nature of many IA tactics means that it can be difficult to discover the identity of the perpetrator, unlike direct forms of aggression.

This dissertation focuses on gossip—malicious information about third parties who are not physically present that is meant to damage the target’s social reputation—due to its importance and predominance as an IA tactic. This dissertation proposes a series of hypotheses each hinging on a general principle rooted in sexual selection theory. If it is true that IA—and gossip specifically—is a sexually selected tool that enables success in mate competition, then individuals should have evolved behaviors and cognitions enabling successful IA perpetration generally, and successful gossip perpetration specifically. Those specific behaviors and cognitions addressed here include frequency of gossip sharing, superior memory for romantic gossip that varies in threat level, and heightened perceptions of its juiciness (i.e., the extent to which a piece of gossip is judged to be exciting and

interesting). Further, the hypotheses and predictions forwarded here all hinge on the idea that gossip-related behaviors and cognitions should be shaped by the degree of mate competition individuals face. Individual differences pertinent to intrasexual competition, including sex, dark triad personality traits, socio-sexuality, and physical formidability, are examined in this dissertation. Sexual selection theory predicts that relative to individuals who face less mate competition, those facing more intense mate competition should exhibit amplified gossip perpetration, superior memory for threatening romantic gossip, and amplified perceptions of its juiciness.

There is evidence that indirect aggression—and gossip specifically—is affected by sexual selection. Research indicates that IA perpetration is heightened by mate competition (Vaillancourt & Sharma, 2011) and mating motives (Griskivicius et al., 2009), and is most commonly perpetrated by young females, peaking during adolescence and young adulthood (e.g., Archer, 2004; Hess & Hagen, 2006; Österman et al., 1998). Further, the victims of IA are most frequently young women, who face adverse socio-psychological outcomes including anxiety and depression (Craig, 1998; Owens, Slee & Shute, 2000) as well as peer rejection (Crick & Bigbee, 1998), all of which are likely to hinder victims' mating prospects while enhancing the reproductive prospects of perpetrators (Vaillancourt, 2013). For example, perpetrators are often seen as popular among their peers (Xie, Swift, Cairns, & Cairns, 2002), and start dating earlier than victims of IA (Gallup, O'Brien, & Wilson, 2011).

Research on sex differences in IA confirms that IA is sexually selected. Results of these studies generally indicate that females engage in more IA—including gossip—than males (Crick & Grotpeter, 1995; Lagerspetz et al., 1988; Leaper & Holliday, 1995), a finding that holds cross-culturally (Österman et al., 1998). Importantly, however, this empirical focus

on sex differences means that male IA—and predictors of male IA in particular—remains understudied, despite the fact that males engage in quite frequent IA: for example, Hess and Hagen (2006) found that 55% of young adult males were more inclined to retaliate indirectly against another male who had been deceptive (by gossiping or telling on the person), while only 45% were inclined to retaliate physically (by punching the person). Further, several studies have found that sex differences in IA decrease or diminish in adulthood (e.g., Forrest, Eatough, & Shevlin, 2005; Green, Richardson, & Lago 1996), and where they exist, sex differences are often somewhat small (Foster, 2004; Nevo, Nevo, & Derech-Zehavi, 1993).

Existing work on male IA in a mate competition context generally examines differences between men and women rather than exploring how IA might function within the sexes, and among males specifically. Some research has compared the content of male gossip with female gossip, finding that male gossip tends to focus on derogation of rivals on the basis of their athleticism, masculinity, and work ethic, whereas derogatory female gossip focuses on rivals' attractiveness and promiscuity (e.g., Buss & Dedden, 1990). Additional work has compared commonly utilized male and female IA tactics, finding that males are more likely than females to use more damaging, high cost gossip (e.g., gossip that is particularly malicious; Sutton, 2014). Given this lack of attention devoted to male gossip, one aim of this dissertation was to identify individual difference predictors of male gossip, including physical formidability.

Surprisingly, researchers have not yet investigated individual differences that moderate IA perpetration, despite good evidence that socio-sexuality and personality traits affect direct aggression. An individual's socio-sexuality (or SOI score, which stands for "Socio-sexual Orientation Inventory"; Penke, 2011) is a measure of attitudes and behaviors

regarding casual sex. Individuals who have a more restricted socio-sexuality have attitudes that favor long-term over short-term mating strategies, and are less promiscuous than individuals whose socio-sexualities are unrestricted. An unrestricted socio-sexuality has been linked to heightened mate competition, and increases in directly aggressive behaviors among males (Ainsworth & Maner, 2012; Simpson, Gangestad, Christensen, & Leck, 1999). Research also suggests that females—presumably those who are sexually restricted—regulate contact with and are aggressive towards females perceived to be promiscuous (i.e., sexually unrestricted), using IA to damage the reputation these threatening rivals (see Baumeister & Twenge, 2002; Lees, 1995; Vaillancourt & Sharma, 2011). Despite this, SOI has not been associated with indirect aggression among males or females. Thus, the moderating role of socio-sexuality in shaping gossip behaviors and cognitions is a central focus in the present studies.

Individual differences in the possession of dark triad personality traits are also relevant to mate competition and hence IA. The dark triad (i.e., Machiavellianism, narcissism, and psychopathy) is characterized by a keen interest and skill in social manipulation (Paulhus & Williams, 2002). Research indicates that the possession of dark triad attributes is associated with more frequent IA perpetration (e.g., Baughman, Dearing, Giammarco, & Vernon, 2012; Peeters, Cillseen, & Scholte, 2010). However, researchers have not yet explored how dark triad traits influence gossip behavior and cognitions in a mate competition context. Previous work shows that dark triad traits are associated with mate competition and increased romantic competitiveness (Brewer, Hunt, James & Abell, 2015; Carter, Mantanaro, Linney, & Campbell, 2015), suggesting that dark triad personality traits are sexually selected to facilitate success in mate competition. Given that gossip and more

proximal psychological mechanisms enabling its perpetration (i.e., dark triad personality traits) are both sexually selected, this implies that dark triad traits should facilitate gossip perpetration. Indeed, sexual selection theory maintains that more intense mate competition gives rise to more frequent use of aggression (e.g., malicious gossip). As such, the link between dark triad personality traits and gossip perpetration should be amplified when considering dark triad traits in interaction with other individual differences relevant to the degree of mate competition one faces, such as socio-sexuality. Given this, the present studies examine interactions between the dark triad and socio-sexuality in shaping gossip sharing.

This dissertation focuses on gossip because research shows that gossip is central in human social life (Dunbar, 1998; Emler, 1994). Given the social importance of language and gossip, it is likely that gossip is the key medium through which IA is perpetrated. The two studies reported in this dissertation examine predictors of gossip behavior (i.e., sharing) and cognitions (i.e., memory for gossip and perceptions of its juiciness), both of which should enhance an individuals' success in mate competition. Some research has addressed memory for gossip as it relates to mate competition. For instance, relative to males, females better remember gossip about same-sex rivals (De Backer et al., 2007), and gossip about romantic infidelity is better recalled when it features age-matched individuals (i.e., college students rather than older adults; Reysen et al., 2011). However, we know very little about the role of individual differences relevant to mate competition in moderating memory for gossip and other cognitive outcomes, namely, juiciness perceptions. The present studies aim to fill this gap.

In terms of evolutionary literature on gossip sharing, this work has largely focused on features of gossip targets, recipients, and the social environment as predictors. For example,

research drawing on kin selection theory indicates that individuals are more likely to share negative gossip about non-kin versus kin (McAndrew & Milenkovic; 2002). Additional work has found that people are more likely to share gossip with allies (namely, friends or romantic partners) versus non-allies (McAndrew, Bell & Garcia, 2007). The social environment is also relevant to gossip perpetration. For example, Vaillancourt and Sharma (2011) found that exposure to an attractive and promiscuously dressed same-sex romantic rival elicited negative evaluative comments about her after she left the room. While instructive, this research has not addressed features of the *gossiper* her/himself as moderators of gossip sharing.

A small body of research has addressed predictors of gossip sharing that are focused on features of the gossiper, including their anxiety levels and belief that the gossip is true (Jaeger, Anthony, & Rosnow, 1980; Rosnow, Yost, & Esposito, 1986). However, this literature does not examine individual differences that would be particularly relevant to gossip as an evolved mate competition tactic. While a proximal examination of gossip helps explain how gossip is perpetrated, and by whom, it only provides a partial explanation for the phenomenon.

Tinbergen (1963) argued that a full explanation for biological traits requires answers to four complementary questions, namely: function, phylogeny, mechanism, and ontogeny. Function refers to the evolved function that a trait fulfills, answering the question, “what is it for?” The only plausible answer for the function of any trait is evolutionary. Answers to evolutionary questions require reverse-engineering functions, and testing hypotheses about those functions. Addressing functional questions with respect to gossip teaches us about how gossip can be used as a tool in, for example, mate competition, to win mates and defeat

romantic rivals. Phylogeny involves questions about the evolution of a trait across species. Species that share ecological pressures and/or are closely genetically related can provide clues about the ultimate origins of an evolved trait. Such comparisons have proven important in the study of physical aggression (which is readily observable across species), but are likely a non-starter for indirect aggression, which is likely to be unique to humans. Questions of mechanism are explanations that refer to the operation of adaptive traits, like “how does it work?” “How” questions are typically referred to as proximal explanations, and these are the focus in much standard social science research (Barkow, Tooby, & Cosmides, 1995). Answering mechanistic questions teaches us about proximal causes of gossip, including how certain attributes (e.g., upbringing, self-esteem, popularity, age, sex, personality) may render perpetration and/or victimhood more likely. Finally, ontogeny refers to the development of traits through time. Researchers have investigated the emergence of IA across the lifespan, showing that it emerges relatively early in childhood, and peaks in adolescence and early adulthood (e.g., Archer, 2004; Hess & Hagen, 2006; Österman et al., 1998). A full explanation of gossip requires answers to three of these four questions.

Taken together, proximal and ultimate explanations for indirect aggression provide a more comprehensive picture of gossip processes. Indeed, these explanations are complementary rather than mutually exclusive, and as such should be considered together. While it is convenient to distinguish proximal from functional mechanisms, the reality is that both must work together to produce attitudinal and behavioral effects in any organism. For this reason, proximal mechanisms, such as memory and attentional processes, can be best understood when viewed in light of function. Accordingly, this dissertation considers both ultimate evolutionary (i.e., mate competition) functions of gossip, as well as potential

proximal mechanisms (i.e., individual differences including socio-sexuality, physical formidability, and the dark triad) that affect how gossip is enacted, helping answer Tinbergen's questions of function and mechanism. The present studies assess the moderating role of individual differences of gossipers relevant to mate competition—namely socio-sexuality, sex, and dark triad personality traits—in shaping gossip behavior and cognitions.

If it is true that gossip is sexually selected for use in mate competition, then a few key claims can be made about necessary parts of a successful IA module. Importantly, the module should be attuned to the degree of mate competition in one's environment, such that gossip is more frequently perpetrated in environments marked by fierce mate competition. Given that socio-sexuality can be considered a proxy for the degree of mate competition one faces, the moderating role of this individual difference in shaping gossip outcomes is a focus in the present studies. Additionally, if dark triad attributes are sexually selected, then those facing more intense mate competition should possess more dark triad attributes and should make more frequent use of their social manipulation skills (i.e., gossip) to facilitate success in mate competition. Gossip perpetration should be increased further for those individuals who possess both dark triad attributes and socio-sexualities that further amplify this mate competition. Accordingly, the role of dark triad traits in interaction with socio-sexuality is also explored in this dissertation.

In addition to being moderated by the degree of mate competition, a successful (i.e., functional) IA module would also require cognitive and behavioral systems that enable successful gossip perpetration. As such, the present studies explore a host of cognitive and behavioral outcomes that are required for the successful use of gossip as an IA tactic. Study 1 examines one key behavioral outcome: frequency of gossip sharing. Those who use gossip

more frequently as an intrasexual competition tactic should inflict more reputational damage on rivals. Hypothesized cognitive outcomes tested in Study 2 include memory for gossip and perceptions of its juiciness (i.e., its interestingness, entertainment value). The ability to remember the content of threatening romantic gossip is particularly important in a mate competition context, as doing so would allow individuals to track relationships, store damaging social information, and presumably share it at a later point in time, when it most benefits the gossiper. Juiciness perceptions should facilitate attention and hence memory for gossip messages. In the present studies, the aforementioned individual differences are examined in relation to these cognitive and behavioral outcomes.

To summarize, the present studies address gaps in the gossip literature by assessing predictors of gossip in an intrasexual mate competition context, focusing on (1) the moderating role of socio-sexuality and the dark triad in shaping gossip behavior and cognitions, and (2) examining male IA processes. Study 1 assessed gossip behavior—specifically, frequency of self-reported gossip sharing. This study made use of a survey design to examine the moderating role of socio-sexuality, the dark triad, and physical formidability on gossip sharing. Using an experimental design, Study 2 explored gossip cognitions—specifically, memory for gossip and perceptions of its juiciness. In this study, female participants were exposed to a mating or control prime, followed by gossip depicting the behaviors of a low, moderate, or high threat romantic rival (e.g., who was dancing with, holding hands with, or having sex with a male, respectively). As in Study 1, the moderating role of socio-sexuality was explored, as was the link between dark triad attributes and cognitive outcomes. In sum, these studies provide a more detailed picture of how gossip

manifests itself behaviorally and cognitively as an evolved mate competition strategy among males and females alike.

In what follows, the rationale outlined above is elaborated. First, research on indirect aggression is reviewed with the aim of explaining how and why we know that IA is a sexually selected adaptation in humans. After this, sexual selection theory is explained and connected with several predictors of IA that are relevant to mate competition—namely, sex, socio-sexuality, physical formidability, and the dark triad. General hypotheses derived from sexual selection theory regarding each predictor are then forwarded. Finally, given the present study's focus on gossip as a specific IA tactic, the behavioral science literature on gossip is reviewed to highlight what we know about gossip thus far, including its use as a mate competition tactic, and common gossip content in this context. Then, specific predictions are forwarded and tested in two studies.

Chapter II. Indirect Aggression

From an evolutionary standpoint, indirect aggression (IA) is used to compete for access to fitness enhancing resources including material possessions, social status, and mates—the last of which is the focus of this dissertation. As a starting point toward understanding the role of indirect aggression in mate competition, proximal (i.e., non-evolutionary) work on indirect aggression and sex are reviewed and discussed in evolutionary context. The goal of this chapter is to consider the evidence that indirect aggression is the result of evolutionary pressures involved in mate competition. If IA aggression is an evolved strategy, it must be the case that, on average, perpetrators of IA gain fitness benefits while victims experience fitness costs. The details of the evolutionary mechanisms for IA are explicated in more detail in the coming chapter, while the specifics of gossip as a mate competition tactic are the focus of Chapter 4.

Indirect Aggression and Sex

To date, the investigation of sex differences has been a central focus in indirect aggression research. Many studies have found that among both children and adults, females prefer and more frequently use indirect aggression relative to males (Crick & Grotpeter, 1995; Dunbar, Marriott, & Duncan, 1997; Hess & Hagen, 2006; Lagerspetz et al., 1988; Leaper & Holliday, 1995; Österman et al., 1998). In contrast, males are more likely to aggress directly, using physical violence more frequently than females (Daly & Wilson, 1988; Lagerspetz et al., 1988; Crick & Grotpeter, 1995; Hess & Hagen, 2006; Österman et al., 1998). In a meta-analysis of aggression and sex, Crick, Casas, and Mosher (1997) found that peer reports ($d = -.10$), peer ratings ($d = -.19$), observational studies ($d = -.74$), and

teacher reports ($d = -.13$) all show a small to moderate female preference for indirect aggression among individuals 21 and younger.

The predominant evolutionary explanation for these observed sex differences hinge on parental investment theory (Trivers, 1972). According to parental investment theory, females engage in relatively more indirect than direct aggression compared with males due to their lower potential reproductive rate (the number of offspring they can possibly have in a lifetime; Clutton-Brock & Vincent, 1991) and subsequently higher parental investment duties compared with males. This leads to higher costs for females in engaging in direct intrasexual mate competition due to their gestation and childcare duties, which could be compromised in a physical altercation (Campbell, 1999, 2004). Potential costs of female direct aggression include survival and reproductive costs, as injuries incurred in retaliatory fighting could damage a woman's reproductive system and render her unable to raise children. Given the high cost of direct aggression, females are more likely to prefer indirect forms of aggression, which are less costly due to their covert and (often) anonymous nature, and the lower likelihood of harmful physical retaliation. On the other hand, direct aggression is more common among males because it is less costly, and because males often face more intense competition for mates, a point elaborated upon in the coming chapter.

Meta-analytic findings comport with this theoretical explanation, indicating that females are less likely to directly aggress than are males, and this sex difference is amplified as females' fear of harmful retaliation increases (Bettencourt & Miller, 1996). Females may also steer away from direct aggression because it yields psychosocial costs that could hinder their abilities to garner mates, allies, and resources that aid in survival and reproduction. In line with this, Crick (1997) found that children who engaged in aggressive behaviors that

were “non-normative” for their sex received higher social-psychological maladjustment scores in self- and teacher-reports, perhaps due to a lack of acceptance from peers.

Female Direct Aggression and Male Indirect Aggression

Despite findings that show clear sex differences in aggression strategies, it is important to note that these sex differences do not always hold. Under certain (i.e., harsh and competitive) environmental circumstances, direct aggression can be an evolutionarily advantageous strategy for women. For instance, when there is a scarcity of resource-rich males and an extreme lack of material resources, intrasexual competition escalates and direct aggression can emerge as an adaptive strategy (Campbell, 2004, 1995; Griskevicius et al., 2009). Similarly, when the operational sex ratio—the ratio of fertilizable females to males in a given environment—skews toward many females and few “suitable” or resource-rich males (as in low-income urban areas with high unemployment, homicide, and incarceration rates), intense female intrasexual competition can result, leading to direct aggression (Campbell, 2004, 1995). However, extreme forms of female direct aggression are rare—within the U.S., for example, men kill male non-kin approximately 30 times more often than females kill female non-kin, and this sex difference holds cross-culturally (Daly & Wilson, 1990).

Just as direct aggression can occur among females, indirect aggression can and often does emerge among males. Some research indicates that sex differences in IA are somewhat small (Foster, 2004; Nevo, Nevo, & Derech-Zehavi, 1993). Other empirical work has found no significant sex difference in rates of IA perpetration (Archer, 2004; Linder, Crick, & Collins, 2002; Prinstein, Boergers, & Vernberg, 2001; Rys & Bear, 1997; Österman et al., 1994), particularly among adults (Forrest, Eatough, & Shevlin, 2005; Green, Richardson, & Lago, 1996). This might be due to the higher potential retaliation costs—including longer

recovery times and more severe injuries—associated with engaging in physical altercations as an older adult. It is also true that legal conventions confer strict costs upon physical aggression, which no doubt decreases the rates of aggression compared with ancestral and despotic societies (see Betzig, 1986). Ultimately, these contradictory findings with respect to gender differences in IA perpetration suggest that situational and individual differences are likely operative—presumably under certain conditions (e.g., in professional workplace environments), males elect to use indirect rather than direct forms of aggression.

Indeed, in studying false accusations, Hess and Hagen (2006) found that 55% of young adult males were more inclined to retaliate indirectly (by gossiping or telling on the person) against another male who had been deceptive, while only 45% were inclined to retaliate physically (by punching the person). In the context of an economic game with cheaters (i.e., free riders), Feinberg et al. (2014) found that male and female participants gossiped about free riders 85% of the time when given the opportunity to do so. Ultimately, while the empirical focus on sex differences in IA often leads to the conclusion that it is a distinctly “female phenomenon,” the fact that some males use IA relatively frequently indicate that the study of male IA deserves more empirical attention in its own right.

A small body of research has addressed male IA, but much of this research focuses on sex differences. For instance, Sutton (2014) found that men are more likely to engage in *high cost* (i.e., more malicious and damaging) gossip than are women. This may be a result of the lower parental investment and higher mate competition faced by males versus females on average due to their higher potential reproductive rate relative to women (Clutton-Brock & Vincent, 1991). Further, in a study of workplace aggression, Björkqvist, Österman, and Lagerspetz (1994) found that males reported using more “rational-appearing” IA tactics such

as interrupting, unfairly judging the victim, and questioning the victim's decisions, whereas females reported using more "social manipulation," including spreading untrue rumors, giving negative glances, and cold-shoulder behavior (Björkqvist et al., 1994). While informative, this focus on sex differences means that male gossip processes remain understudied, particularly with respect to individual differences shaping male IA perpetration.

To address the aforementioned gaps in the literature, predictors of male gossip are examined in Study 1. Given the above, is likely the case that males and females have cognitive and behavioral mechanisms for *both* direct and indirect aggression. These mechanisms are presumably differentially calibrated such that among females, the fitness costs of direct aggression usually outweigh the fitness benefits (rendering IA more likely), and among males, the benefits of direct aggression may often outweigh the costs (rendering direct aggression more likely). However, environmental moderators and individual differences (e.g., social competition levels, potential retaliation and vulnerability costs) should enter into the calculation, sometimes contributing to "sex-inconsistent" aggression strategies. Following Campbell's (1999, 2004) theory for female IA, hinging on female parental investment and subsequent vulnerability costs incurred by physically fighting, in this dissertation male IA is examined with an eye to the role of physical formidability and potential retaliation costs (e.g., costs of engaging in retaliatory physical fights) in shaping male IA perpetration in a mating context.

Indirect Aggression as a Sexually Selected Adaptation

Ample empirical evidence suggests that indirect aggression tactics are adaptive products of sexual selection, meaning they are adaptations that confer reproductive benefits on perpetrators. For example, research indicates that female IA perpetration is amplified by mate competition, such as when an attractive and sexily dressed female enters the room (Vaillancourt & Sharma, 2011). Further, female IA perpetration is particularly common during adolescence and young adulthood—prime reproductive years when mate competition is most important (Archer, 2004; Hess & Hagen, 2006; Österman et al., 1998). While sexual selection theory is outlined in detail in the coming chapter, in this section, we provide additional evidence that IA is sexually selected, and is therefore important to study from a mate competition perspective. This evidence includes reproductive benefits conferred upon IA perpetrators and reproductive handicaps conferred upon victims (i.e., romantic rivals). Ultimately, for IA to have evolved as an advantageous strategy in mate competition, it must contribute to differential reproduction such that perpetrators are more successful than victims on average.

Costs of Indirect Aggression Victimization

Evolutionary scholars have argued that IA is evolutionarily advantageous in that it increases the perpetrator's status while simultaneously lowering the target's status, reputation, and mating prospects (see Buss & Dedden, 1990; Campbell, 1995). Among males and females alike, IA victimization contributes to a host of adverse psychological outcomes, all of which could detrimentally impact one's social standing, physical health, and subsequent mating prospects. For example, child and adolescent victims of indirect aggression report more anxiety (Craig, 1998), loneliness, and depression (Crick & Grotpeter,

1996; Owens, Slee & Shute, 2000) than non-victims. Further, adult victims of workplace harassment have been shown to experience depression and anxiety (Björkqvist, Österman, & Lagerspetz, 1994). Paquette and Underwood (1999) found that victimized girls perceive themselves to be less romantically appealing, athletically competent, and attractive, and they have more negative perceptions of their friendships and self-worth after victimization. Such demoralized females could remove themselves from the dating pool and retract from social life, ultimately hindering their mating prospects.

IA can have serious effects on victims' social lives, which are tied to their social standing and ultimate reproductive prospects. Victims can face peer rejection and ostracism (Crick & Bigbee, 1998), as well as social withdrawal (Olafsen & Viemerö, 2000; Owens, Slee, & Shute, 2000). In an observational study of teenagers, it was found that girls strategically regulate contact with derogated peers—specifically, those seen as promiscuous—to manage their personal reputations, using social exclusion as an IA strategy and avoiding friendship with them fifteen years later (Lees, 1993). This indicates that indirect aggression can socially isolate individuals in the long term, preventing friendships and mating opportunities for years.

IA and its detrimental reputational effects can be particularly damaging to females, who have smaller, less diffuse, and more tight-knit social groups than males (see Björkqvist, Österman, & Kaukiainen, 1992; Lagerspetz, et al., 1988). Females turn to their female social groups when under stress or in need of protection or resource sharing, particularly when males are unavailable or unreliable (Taylor et al., 2000). Thus, female friendship networks can be vital to survival and reproduction, and deterioration of those networks due to a tarnished reputation can be extremely damaging to the victim. This may explain why, in

general, female victims of IA see the aggression as particularly threatening to their wellbeing, and are thus sensitive to IA victimization—relative to males, females are more likely to retaliate against reputational threats using IA (e.g., gossip), even while statistically controlling for individuals' perceived social norms for aggression perpetration by sex (e.g., how socially acceptable it is to gossip; Hess & Hagen, 2006). Additional evidence suggests that while physical attack drives men to aggress more readily than women, women are driven to aggress more readily after being insulted or receiving a negative evaluation—after being verbally or indirectly victimized (Bettencourt & Miller, 1996).

The aforementioned psychological outcomes of IA can lead to physical costs as well. Female intrasexual competition—often giving rise to IA—can contribute to the development of body dissatisfaction and eating disorders (see Vaillancourt, 2013), which could adversely impact females' survival and reproductive prospects. Eating disorders have been cited as an indicator of social competition (Rodin, Silberstien, & Striegel-Moore, 1984), and among female undergraduates, links have been found between body dissatisfaction, bulimia, and anorexia on the one hand, and rivalry for mates on the other (Faer, Hendriks, Abed, & Figueredo, 2005). Girls who are indirectly victimized are prone to risky and unhealthful behaviors such as smoking (Olafsen & Viemerö, 2000), and may even contemplate suicide (Owens, Slee, & Shute, 2000). Further, some work has found that anxiety—such as that brought on by IA—is associated with suppressed ovulation and infertility (Seibel & Taymore, 1982). Thus, there are direct links between IA victimization and hindered reproductive prospects.

Research confirms that IA can also alter males' perceptions of other females. Fisher and Cox (2009) found that when attractive females gossip to males about rival females, men

lower their estimates of the target female's attractiveness. Further, males may not consider females who are socially derogated on the basis of their sexual behavior (e.g., labeled "sluts") to be potential marriage partners (Lees, 1993).

In sum, the costs of IA to victims can include physical illness and psychological damage, loss of social connections, and lowered desirability in the eyes of potential mates. Given all of this, it appears as though IA is an effective intrasexual mate competition tactic, helping perpetrators fend off romantic rivals. Ultimately, there are very likely fitness costs for victims of IA.

Benefits of Indirect Aggression Perpetration

While IA disadvantages victims, it simultaneously benefits perpetrators. Female IA perpetrators tend to begin dating earlier in life than do victims and less aggressive peers (Gallup, O'Brien, & Wilson, 2011), and tend to begin having intercourse at an earlier age than victims (White, Gallup, & Gallup, 2010). Further, IA perpetration is associated with maintenance of long-term romantic relationships: perpetration has been shown to predict being in a relationship one year later (Arnocky & Vaillancourt, 2012). Generally speaking, it appears as though IA victims are less willing to compete for mates than are perpetrators, and perpetrators receive mating and reproductive benefits (see Vaillancourt, 2013).

Successful IA perpetrators also benefit socially by being seen as popular, high-status, and central in their social networks among their peers (Vaillancourt & Hymel, 2006; Xie, Swift, Cairns, & Cairns, 2002), which can assist them on the mating market. For example, Kurland and Pelled (2000) suggest that gossiping—one form of IA—can enhance individuals' status and power in the workplace, particularly when it is seen as credible. Further, those who gossip more receive higher ratings of informal influence in an

organization (Grosser, Lopez-Kidwell, & Labianca, 2010). Influential, high status IA perpetrators may not be as vulnerable to fitness costs resulting from IA victimization—due to their social power, high status individuals may be less susceptible to reputational damage as the target of gossip (Fine, 1977).

Given all of this, the conclusion that emerges is that IA confers reproductive benefits upon perpetrators and reproductive costs upon victims. Thus, we have evidence that IA is likely sexually selected—an effective strategy in intrasexual competition for mates. Accordingly, the present studies examine predictors of IA from an evolutionary perspective, in a mate competition context. In what follows, sexual selection theory is outlined in detail, and individual differences relevant to mate competition and IA perpetration are examined.

Chapter III. Sexual Selection, Sex Differences, and Individual Differences

Sexual Selection Theory

Theory and research confirm that sexual selection is a critical force in the evolution of human aggression. In what follows, sexual selection theory is described and contrasted with natural selection theory. After this, key sex differences produced via sexual selection are highlighted, and their links with aggression are elucidated. Proximal and ultimate literature on each predictor of gossip explored in the present studies is then reviewed. Finally, general predictions of sexual selection theory regarding each predictor are forwarded. This section lays the groundwork for hypotheses tested in the present studies, each involving the moderating role of individual differences relevant to mate competition in shaping gossip behaviors and cognitions.

Darwin's (1859) theory of natural selection explains traits that confer direct survival benefits to those who possess them. Naturally selected traits—for example, human eyes, hearts, and opposable thumbs—are efficient and economical in solving specific survival-related problems (e.g., seeing, pumping blood throughout the body, and helping us grip objects), and are shared across individuals with normal development. Under natural selection, environmental challenges that organisms face give rise to adaptations that solve those specific survival challenges. Those who possess the best quality adaptations are most likely to survive, reproduce, and pass those traits to their offspring, whereas those without the adaptations—or those with a less functional variant—are less likely to survive and pass along their genes.

Sexual selection is a form of natural selection in which the selective force is mating success. Sexual selection theory was introduced to explain those extravagant traits that are not directly related to survival (traits that may even be injurious to survival), but are more directly related to reproduction (Darwin, 1871). These elaborate features include birds' colorful, extravagant plumage (e.g., peacock tails), and the weaponry (e.g., elk horns) and conspicuous mating displays of many species, which are typically more well-developed in males than females. Sexual selection explains these inefficient, costly, sexually dimorphic (i.e., exclusive to one sex, or more well-developed in one sex than other), and individually variable features of organisms that aid in reproduction efforts but not necessarily survival. Ultimately, those possessing more elaborate or exaggerated sexually selected traits are more likely to successfully attain mates and reproduce.

Sexual selection operates through two routes: *intrasexual* competition, or competition between same-sex rivals for access to mates, and *intersexual* competition, or opposite-sex mate choice. Intrasexual competition leads to the development of sexually selected armaments—psychological mechanisms (e.g., highly dominant, competitive, or manipulative personalities to enable successful IA perpetration), behavioral traits (e.g., direct or indirect aggression), and phenotypic features (e.g., fangs, antlers, large muscles) that enhance individuals' ability to compete against same-sex rivals for mates. Examples of armaments across species include—but are certainly not limited to—strength, large size, weapons, proneness to anger, and direct/indirect aggression (Puts, 2010). Among human males specifically, large, powerful muscles—especially arm muscles—are hypothesized to be armaments used in intrasexual competition, because upper body strength in particular is important for fighting, human upper body strength is highly sexually dimorphic, and larger

males are generally more successful in mating than smaller males (Lassek & Gaulin, 2009; Sell et al., 2009). On average, those with larger, more exaggerated armaments (i.e., human males vs. females, as will be discussed in the coming text) face more intense intrasexual competition, and possession of these armaments helps them to effectively defeat romantic rivals via aggression or intimidation.

While competition gives rise to armaments aiding in successful competition, mate choice leads to the development of sexually selected ornaments and mating displays that confer reproductive benefits on those who have and display them (Puts, 2010). Ornaments are attractive and often extravagant phenotypic features that enhance one's ability to attract mates because they are seen as desirable to potential mates (i.e., high quality individuals with good genes produce better quality traits), such as the bright, colorful feathers of many bird species. Such traits are highly individually variable, and the sex that chooses has adaptations for selecting the best quality individual. Among human females, large breasts and buttocks are considered sexually selected ornaments, as they vary in quality, and those higher in quality are more desirable to males (Singh, 1994), but are non-essential for survival. Similarly, some suggest that human penises, which are longer, thicker, and more flexible than those of other primates, are ornaments among human males (Miller, 1998; Puts, 2010). Ultimately, to have evolved, the possession of more elaborate armaments and ornaments must increase the reproductive success of those who possess them.

Sex Differences Produced by Sexual Selection

Sexual selection produces sex differences in males' and females' cognitions, physical appearances (i.e., phenotypes), and behavior. Some of these sex differences include differences in aggressive tactics utilized (e.g., direct versus indirect aggression), male-specific armaments for intrasexual competition (e.g., large muscles for use in physical fights against rivals), female ornaments to attract mates (e.g., breasts and buttocks), and diverging sexual preferences (e.g., preferences for casual sexual encounters versus committed long-term relationships). These differences reflect the distinct evolutionary pressures facing males and females, including the degree of intrasexual mate competition they face.

Parental Investment

Parental investment is a key evolutionary force influencing the degree of competition faced by males and females, and accordingly helps shape the armaments and ornaments of both sexes. Parental investment theory (Trivers, 1972) explains how sexual selection operates within different species—it helps explicate which sex will be most likely to engage in intrasexual competition and which will tend to be the “choosy” sex with regard to mate selection. It also helps explain which sex has more pronounced and exaggerated characteristics: the sex engaged in the fiercest intrasexual competition should have large armaments to defeat same-sex rivals and elaborate ornaments to impress potential mates. Trivers (1972) defines parental investment as “any investment by the parent in an individual offspring that increases the offspring’s chance of surviving (and hence reproductive success) at the cost of the parent’s ability to invest in other offspring” (p. 139). Thus, parental investment includes metabolic investments associated with the production of sex cells, as well as teaching and providing food and protection to one’s young.

Parental investment theory maintains that the sex with greater parental investment duties will be a limiting resource among the opposite sex, as parental investment duties limit the number of offspring that sex can produce and care for in a lifetime (Trivers, 1972). Overall, members of the lesser-investing sex (i.e., those with the higher potential reproductive rate) will compete for access to members of the highly investing sex (i.e., those with the lower potential reproductive rate) because copulation with several different high-investing individuals will substantially increase the lower investing sex's total reproductive success in their lifetime (Clutton-Brock & Vincent, 1991; Trivers, 1972). As we will see below, due to their lower parental investment, human males generally face more intense competition for access to females than vice versa.

Human females invest a substantial amount of time and energy to reproduce and raise their young, including gestation, lactation (which lasts roughly 4 years in hunter-gatherer societies; see Campbell, 1999), and protection and provisioning for young. Because human infants have large craniums and females have small pelvic outlets, human babies are born relatively immature, which in turn begets longer periods of parental care and energetic investment (see Foley, 1996)—care that overwhelmingly comes from females in human societies (Campbell, 1999). This substantial parental investment cost lowers the potential reproductive rate of human females, leading to a male-biased operational sex ratio (OSR; ratio of sexually available males to fertilizable females in a given location at a given point in time; Emlen & Oring, 1977) and rendering females a scarce and valuable resource among males, who compete for access to them (Puts, 2010). Females also have lower potential reproductive rates than males due to their limited number of eggs relative to males' large number of sperm, the former being much more costly to produce than the latter (Clutton-

Brock & Vincent, 1991; Orians, 1969). Indeed, among human females, the maximum number of children produced and reared in a lifetime is approximately 12, and reaching that maximum is rare (Buss & Schmitt, 1993). Given this lower potential reproductive rate, females are the more “choosy” (and less intrasexually competitive) sex, seeking out desirable (i.e., parental investing) males (Clutton-Brock & Vincent, 1991). This choosiness is evolutionarily advantageous, as fitness costs associated with making a poor choice are much higher for females than for males (Buss, 1988; Symons, 1979). Indeed, the health, safety, and genetic quality of a females’ limited number of offspring are directly related to her choice of mates.

In contrast with females, males have much less costly parental investment duties—they do not gestate or lactate as females do, and they engage in substantially less childcare. Males within monogamous mating systems engage in some parental investment, and human males in modern western societies invest more than males of most species (Buss, 1988; Puts, 2010; Symons, 1979). Still, it remains less than that of females, with the minimum investment being sperm (Buss & Schmitt, 1993). Across a variety of species including *homo sapiens*, this lower parental investment among males means that they have higher potential reproductive rates (Clutton-Brock & Vincent, 1991), more variation in reproductive success than do females, and strong intrasexual competition for mating opportunities with a variety of females, who are a scarce and desirable resource (Symons, 1979).

Beyond male intrasexual competitiveness and female choosiness, another key sex difference emerging from this differential parental investment by sex involves males’ and females’ sexual preferences. In general, the maximum number of offspring a male can sire is determined by the number of fertile copulation partners he can obtain. Given their high

potential reproductive rates, lower parental investment, and the subsequently intense intrasexual competition they face, human males are generally more likely than women to adopt a high-mating effort reproductive strategy. This type of strategy enhances males' reproduction by enabling them to seek out a high number of sexual partners (Figueredo, Gladden, & Beck, 2011). Relative to females, males are generally more likely to have more unrestricted, short-term sexual strategies, meaning they are more likely to pursue casual sexual encounters (see Gangestad & Simpson, 1990). Relatedly, males tend to expend more effort obtaining and retaining mates compared to females (Rowe, Vazsonyi, & Figueredo, 1997). In contrast, due to their higher parental investment, females are choosier, and more likely to have restricted, long-term sexual strategies, meaning they are more likely to pursue enduring romantic relationships (see Gangestad & Simpson, 1990). Females engage in intrasexual competition to attract high quality long-term, parental investing (i.e., caring, ambitious, and resource-rich) mates who are in relatively short supply due to these diverging sexual preferences by sex (Buss, 1988; Buss & Schmitt, 1993). Although a trend rather than a universal, this sexual dimorphism in sexual preferences and behaviors can be considered one key sex difference produced by sexual selection. Additional key sex differences created via sexual selection include physical and behavioral armaments for use in mate competition.

These are examined below.

Male Armaments

Human males have engaged in more direct (i.e., physical) aggression than females over the course of our ancestral history due to differences in parental investment and reproductive rates, which give rise to heightened male relative to female intrasexual competition and violence (Archer, 2004). Supporting the notion that male violence is

sexually selected, research indicates that the sex difference in direct aggression peaks in young adulthood, when reproduction is of primary concern (Archer, 2009; Daly & Wilson, 1988). In addition to psychological and behavioral proclivities for direct aggression, males possess a number of sexually selected physical features aiding in combat, and these armaments are likely a product of intrasexual competition (Puts, 2010).

Across many mammalian species including humans, males are larger, with more exaggerated armaments than females (Archer, 2009; Clutton-Brock & Vincent, 1991). Presumably due to intense male intrasexual competition and aggression, human males are taller (Archer, 2009; Gaulin & Boster, 1985; Gray & Wolfe, 1980) and more muscular than females (Lassek & Gaulin, 2009). Human males have approximately 90% greater upper body strength and 65% greater lower body strength than human females, and an average man is stronger than 99.9% of women (e.g., Lassek & Gaulin, 2009). Females have 40% the upper body muscle mass and 33% the lower body muscle mass of males, even after controlling for height and body mass (Janssen et al., 2000), and they have 60% of the total muscle mass of males (Abe, Kearns, & Fukunaga, 2003). Ultimately, size (i.e., height and weight) and physical strength are positively associated with physically aggressive behaviors among males (see Archer & Thanzami, 2007; Gallup, White, & Gallup, 2007; Sell, 2005; Tremblay et al., 1998) but not females (Archer & Thanzami, 2009; Gallup et al., 2007; Sell, 2005). Further, physical strength (as measured by bicep circumference) has been positively associated with proneness to anger, a history of fighting, and a belief that fighting is a useful way to solve problems (Sell, 2005).

Another male armament that appears to arise from intense male intrasexual competition is low voice pitch, which is associated with masculinity and high testosterone,

signaling social and especially physical dominance (Dabbs & Mallinger, 1999; Evans, Neave, Wakelin, & Hamilton, 2008; Puts, Gaulin, & Verdolini, 2006). Voice pitch is used strategically in male intrasexual competition: those who believe they are physically dominant lower their pitch in interaction with a perceived rival, but raise their pitch when they believe they are less physically dominant (Puts, Gaulin, & Verdolini, 2006). Additional male armaments include dominant facial features that are associated with high testosterone, such as prominent brow ridges and big jaws, which can help protect men from injury resulting from physical blows to the face (Puts, 2010). Further, beards may be sexually selected ornaments aiding in intrasexual competition insofar as they increase males' perceived size and formidability, deterring rivals (Puts, 2010). Ultimately, these masculine features appear to be sexually selected armaments designed to amplify men's perceived size and formidability and to aid in successful male-male fights for mates.

Testosterone is linked with the development of the behavioral and phenotypic armaments described above. For example, male muscle mass is associated with higher testosterone levels (Bhasin, 2003). Further, meta-analyses indicate that there is a small positive relationship (mean weighted correlation of $r = .14$) between testosterone levels and aggressive tendencies (Book, Starzyk, & Quinsey, 2001), but this is not found in all studies (see Campbell et al., 1997), perhaps because testosterone is a state as much as a trait—studies have shown that it increases when experiencing a victory (Carré Campbell, Lozoya, Goetz, and Welker, 2013). Testosterone levels have also been positively associated with anger and tension in both males and females (von der Pahlen et al., 2002; van Honk et al., 1999). Given this, it is clear that testosterone influences the development and maintenance of male armaments.

Female Ornaments

While males possess a number of behavioral and phenotypic traits associated with male intrasexual competition and aggression, females do not appear to possess similar armaments—as noted previously, they are less tall, muscular, and strong than males on average. This is because females engage in less fierce intrasexual competition (and hence physical aggression) than males due to higher parental investment and lower reproductive potential relative to males. Physical features specific to females are likely ornaments driven by male choice rather than armaments developed for intrasexual competition (Puts, 2010).

Indeed, a number of female traits are physically attractive but are not likely to aid in intrasexual competition or direct aggression. These attractive features include cues to age and health status, such as full lips, symmetrical faces, clear, smooth skin, clear eyes, and shiny hair (Buss & Schmitt, 1993; Thornhill & Gangestad, 1999). Neotenous facial features (i.e., large eyes, small nose and chin, high forehead), high cheekbones, and high-pitched voices are also seen as attractive to males (Berry & Waro, 1993; Collins & Missing, 2003; Grammer et al., 2003), presumably because they signal youth and fecundity (i.e., an ability to have a large number of offspring across the lifespan). Males also prefer women with shallow abdominal depth and small waists, presumably because this indicates that a female is not currently pregnant (Rilling et al., 2009). Feminine voices also appear to be a product of sexual selection via mate choice: males (particularly those preferring short-term romantic encounters) see feminine voices as attractive, and females also perceive feminine voices to be flirtatious and attractive to men (Puts, Barndt, Wellry, Dawood, & Burriss, 2011).

Additionally, males typically desire large breasts and buttocks in female mates. This preference appears to be attributable to fat reserves in the breast and buttocks which signal

greater fertility and reproductive success due to known associations between buttock and breast size, on the one hand, and earlier menarche (and maintenance of ovulation) on the other (Cant, 1981). Fatty deposits in the breast and buttocks also could serve as nutritional reserves that provide energy to offspring during lactation and pregnancy (Cant, 1981). Indeed, research indicates that males may prefer optimal waist-to-hip ratios (.7) because gluteofemoral fat stores contain omega 3 fatty acids that support brain development and enhance offspring intelligence (Lassek & Gaulin, 2008). Thus, evidence suggests that optimal waist-to-hip ratios signal health, fertility, and high reproductive potential (Lassek & Gaulin, 2008; Singh, 1993), and appear to be sexually selected via mate choice.

In general, those female ornaments outlined above are likely shaped by estrogen levels, and could signal genetic quality in that estrogen hinders immune function, similar to testosterone among males (Thornhill & Gangestad, 1999). Ultimately, these indicators of genetic fitness are likely a signal for potential mates rather than for same-sex competitors deciding whether or not to aggress. While females do not engage in as much direct aggression as males (Daly & Wilson, 1988) and do not have the associated physical armaments for physical attack, they do appear to have their own unique psychological and behavioral armaments for use in mate competition. These are armaments enabling successful indirect aggression perpetration in competition for suitable long-term mates, and likely include behavioral proclivities (e.g., tendency to gossip frequently) as well as cognitive abilities (e.g., memory for gossip content). As noted previously, IA is particularly common among females due to their high parental investment and the resulting costliness of engaging in direct aggression (Campbell, 1995, 1999, 2004). Indeed, incurring physical injury could be particularly detrimental to her fertility and the survival of her offspring. We can conceive of

females' greater use of indirect versus direct aggression relative to males as another key sex difference produced via sexual selection. In the coming section, we draw on sexual selection theory to address several additional key individual and sex differences relevant to mate competition, all of which are hypothesized predictors of IA behavior and cognitions in the present studies.

Sexual Selection & Gossip Predictors

We have seen that sexually selected traits are often sexually dimorphic due to the differing levels of mate competition faced by males and females, respectively. Those who face more mate competition—males—generally have physical armaments enabling success in intrasexual competition, including tendencies to behave aggressively and physical features enabling successful direct aggression perpetration. Beyond sex however, additional individual differences relevant to sexual selection and hence IA perpetration include socio-sexuality, physical formidability, and the possession of dark triad personality traits. While some of these predictors of aggression (i.e., the dark triad) have been explored from a proximal or non-evolutionary perspective, and some of them (i.e., physical formidability and socio-sexuality) have been examined in relation to direct aggression perpetration, research has yet to consider how each of them relate to IA (specifically, gossip) perpetration in a mate competition context. Given this, these attributes, in addition to sex, were all hypothesized predictors of gossip behavior and cognitions in the present studies. Ultimately, if IA is a sexually selected, then the operation of this adaptive IA module should be affected by sex differences, individual differences relevant to mate competition (namely, physical formidability, socio-sexuality, and dark triad traits), and interactions between these attributes,

giving rise to heightened IA (i.e., gossip) perpetration and cognitions associated with successful IA perpetration (e.g., memory for gossip).

In the coming sections, each predictor of gossip is introduced, proximal and ultimate literature relevant to each predictor is reviewed, and their relevance to intrasexual competition is outlined. General predictions derived from sexual selection theory are forwarded for each predictor in turn—these predictions will be tested in this dissertation.

Socio-sexuality

Socio-sexuality reflects an individual's attitudes and behaviors regarding casual sexual encounters (Penke, 2011), and together with sex is related to the degree of mate competition one faces. Those with unrestricted socio-sexualities are quicker to enter into sexual relationships with others, whereas those with restricted socio-sexualities prefer attachment and closeness with their partner prior to entering into a sexual relationship (Gangestad & Simpson, 1990; Penke, 2011). Evolutionary scholars have argued that socio-sexuality is a sexually selected individual difference, directly affecting individuals' reproductive efforts: those with unrestricted socio-sexualities likely have more offspring due to their sexual behaviors, whereas those with restricted socio-sexualities likely have parental investing mates that promote the survival of their offspring (Gangestad & Simpson, 1990). SOI is an individual difference: those predominately concerned with their total reproductive output (male or female) are likely to be sexually unrestricted, whereas those concerned with obtaining and retaining high quality long-term mates are likely to be sexually restricted. However, socio-sexuality can also be considered a sex difference shaped by parental investment.

Given the differential parental investment of males and females, differences in SOI can also be considered sexually dimorphic: females tend to pursue restricted strategies due to their high parental investment and hence their desire to seek out good parental investing males, whereas males—who have lower parental investment requirements—tend to pursue unrestricted strategies to maximize their total reproductive output (Buss & Schmitt, 1993). Applying sexual strategies theory helps us better understand socio-sexuality as a sex difference. Socio-sexuality is closely related to one's sexual strategy—whether they are seeking a short- or long-term romantic relationship (Buss & Schmitt, 1993). Sexual strategies theory maintains that females tend to be more sexually restricted, preferring long-term strategies, whereas males are less restricted, preferring a short-term sexual strategy, and empirical work supports the theory (Buss & Schmitt, 1993). Indeed, in a classic psychological experiment in which a same- or opposite-sex confederate approached students on a college campus asking “would you go to my apartment with me,” “come over to my apartment tonight,” or “go to bed with me tonight,” around 75% of male college students said that they would go to bed with the female confederate (Clark & Hatfield, 1989). In contrast, when approached and propositioned for sex by a male confederate, 0% of females accepted, and several became upset, saying things like “What is wrong with you? Leave me alone” (Clark & Hatfield, 1989, p.52). Cross-culturally, males prefer more sexual partners than females, as an unrestricted, short-term sexual strategy—a preference for variety—helps maximize their reproductive output (Schmitt, 2003; Symons, 1979).

The fact that many males pursue an unrestricted strategy—seeking access to a variety of females—keeps male intrasexual competition relatively high. In turn, the comparatively high number of sexually unrestricted males pursuing casual sexual encounters rather than

enduring relationships with a single female increases female intrasexual competition for long-term, parental investing males. These choosy, sexually restricted females compete for the somewhat limited supply of long-term strategizing, and “well-resourced” men who will provide long-term support to the female and her offspring (Campbell, 2004). Indeed, scholars contend that female intrasexual aggression is most common when young women want to manage their sexual reputation, guard male mates from female rivals, and obtain access to high quality (i.e., parental investing) long-term male mates with resources (Campbell, 1995, 2004). Given all of this, we see that one’s socio-sexuality influences the degree of mate competition one faces, which should in turn influence aggression perpetration.

Sexual selection theory predicts that due to the competition that unrestricted males and restricted females face, both should possess particularly elaborate armaments for use in mate competition. This likely includes behavioral armaments for direct and indirect aggression perpetration, ranging from behavioral tendencies to punch and kick, to the use of malicious gossip and social exclusion. Research supports this contention for males, finding that sexually unrestricted males engage in more direct aggression (i.e., rival derogation) than restricted males (Simpson, Gangestad, Christensen, & Leck, 1999). With respect to females, Bleske and Shackelford (2001) found that women aggressed indirectly, expressing a desire to avoid friendships with females described as promiscuous because befriending sexually unrestricted females could thwart their long-term mating prospects “by triggering men’s desire for sexual variety and casual sex” (p. 411). This suggests that sexually restricted females use aggression to compete with sexually unrestricted females, who are seen as rivals by virtue of their perceived promiscuity. Ultimately, this work indicates that socio-sexuality is highly relevant to mate competition.

Applying sexual selection theory, a general prediction regarding socio-sexuality can be forwarded: given that socio-sexuality is a proxy for mate competition, those facing more intense intrasexual competition due to their socio-sexualities (i.e., restricted females and unrestricted males) should have particularly elaborate behavioral and cognitive armaments for IA and gossip specifically (e.g., more frequent gossip sharing, heightened memory for threatening romantic gossip).

Socio-sexuality Prediction: Sexually unrestricted males and sexually restricted females should possess more elaborate cognitive and behavioral armaments enabling the successful use of IA in mate competition.

In addition to testing the prediction above, the studies in this dissertation examined the moderating role of socio-sexuality in interaction with the individual differences elucidated below, including dark triad personality traits and physical formidability. If humans have a sexually selected module for IA perpetration, then its operation should be moderated by the degree of mate competition individuals face. Given that socio-sexuality is a proxy for mate competition, it should shape the functioning of the module, giving rise to IA behavior and cognitions—an idea that has not yet been tested in the context of IA, and is therefore a focus in this dissertation.

Dark Triad Personality Traits

The dark triad is composed of three related personality traits, all associated with keen interest and skill in social manipulation: narcissism, Machiavellianism, and psychopathy (Paulhus & Williams, 2002). All three attributes are similar insofar as they involve some degree of social manipulation, but scholarly debate continues regarding specific points of difference between them (Jones & Figueredo, 2013). Given the semi-independent nature of these traits, each will be considered separately in the text that follows. Proximal research

regarding each predictor is reviewed, and then evolutionary explanations for each trait are discussed in turn.

Psychopathy. Psychopathic individuals are characterized by their impulsivity, callousness, and interpersonal coldness (Baughman, Dearing, Giammarco, & Vernon, 2012). Psychopathy has been linked to direct and indirect bullying behavior in adults (Baughman, Dearing, Giammarco, & Vernon, 2012) and cyber-bullying in adolescents (Pabian, De Backer, & Vandebosch, 2015). Additional research indicates that psychopathic individuals' motivations for gossip include social enjoyment and to hurt others (Lyons & Hughes, 2015), which aligns with the hypothesis that gossip is sexually selected to harm romantic rivals' reputations. If the sexual selection explanation is correct, then psychopathic individuals should use IA frequently and successfully in intrasexual competition, to undermine rivals and subsequently boost their social dominance, and therefore their mating prospects. Psychopathy likely facilitates successful IA perpetration, and gossip perpetration specifically. Due to their lack of empathy, psychopathic individuals likely will not hesitate to say harsh or hurtful things about others, regardless of the accuracy of this information. This highly malicious and damaging gossip should be particularly effective in undermining rivals.

Narcissism. Narcissism is defined by an inflated sense of self, vanity, and feelings of entitlement (Kerig & Stellwagen, 2010; Washburn et al., 2004). Narcissists have fragile egos and seek out positive feedback to help protect their self-esteem (Morf and Rhodewalt, 2001). Those high in narcissism are particularly sensitive to ego threats (i.e., insults), and tend to respond to these threats with aggression (Baumeister, Smart, & Boden, 1996; Bushman & Baumeister, 1998). Accordingly, narcissism has been positively associated with indirect

aggression (Kerig & Stellwagen, 2010). Additional research has found that relational aggression is more common among young adults who are self-conscious and afraid of negative evaluation by others, both of which characterize narcissistic individuals (Loudin, Loukas, & Robinson, 2003). In a similar vein, Crick (1995) found that IA is particularly common among those who, assuming others' behaviors are malicious personal attacks (as ego-involved narcissists may be prone to do), make hostile rather than benign attributions for others' ambiguous behavior. Further, those who are sensitive to and tend to become distressed in relational provocation scenarios are also more likely to engage in direct and indirect aggression (Crick, Grotpeter, & Bigbee, 2002)—this presumably includes narcissistic individuals. If the sexual selection explanation for IA is correct, then highly narcissistic individuals should use IA (and specifically, gossip) frequently and successfully in intrasexual mate competition. Narcissism presumably facilitates IA perpetration, because narcissists' strong desire to protect their fragile self-esteem likely renders them highly vigilant to threats, including threats posed by perceived romantic rivals. Given this, narcissists should be highly skilled in gleaning information about potential romantic rivals through rumor and gossip, and should also be highly motivated to punish perceived romantic rivals using IA tactics including gossip.

Machiavellianism. Machiavellian individuals are socially manipulative, and tend to strategically deceive others for personal gain (Christie & Geis, 2013). Research indicates that IA is commonly perpetrated among those with high levels of Machiavellianism (Kerig & Stellwagen, 2010; Peeters, Cillseen, & Scholte, 2010). Machiavellian individuals' awareness of social conditions (i.e., accurately interpreting nonverbal signals, making correct attributions about others) and ability to harness social networks to manipulate others is

central to successful IA in mate competition. Indeed, the Machiavellian intelligence hypothesis maintains that human's advanced cognitive abilities evolved through intense social competition giving rise to individuals with increasingly Machiavellian attributes, who gained survival and reproductive benefits as a result of their social manipulation skills (Byrne & Whiten, 1988). This suggests that Machiavellianism is (at least in part) sexually selected.

A number of scholars suggest that successful IA perpetration requires Machiavellian attributes, including keen social intelligence and sophistication (Björkqvist et al., 1992; Kaukiainen et al., 1999), and more specifically, social information processing and social awareness leading to the ability to cooperate, form alliances, exploit, manipulate, and deceive others (Andreou, 2006; Byrne & Whiten, 1997; Sutton, Smith, & Swettenham, 1999). Accordingly, empirical evidence indicates that social intelligence—the ability to navigate complex social environments—is positively and significantly correlated with indirect but *not* direct aggression among children and teens (Kaukiainen et al., 1999). Additional research has found that peer estimated social intelligence predicts peer estimated relational (i.e., indirect) aggression in children, whereas a *lack* of social skills predicts direct aggression (Andreou, 2006).

Elaborating on the proximal processes involved in Machiavellianism, Hawley (2011) suggests that highly successful Machiavellians are flexible, pursuing dual strategies—they are manipulative and aggressive, but still socially sophisticated and morally aware, engaging in some pro-social acts to protect their social success and help minimize the social costs of aggression. Bistrategic children—those utilizing both aggressive and pro-social strategies—appear to be particularly successful in social competition and reputation management, as they tend to hold high status positions as individuals and as members of groups (Wurster & Xie,

2014). If the sexual selection explanation for IA is correct, then highly Machiavellian individuals should be particularly effective in using IA (and specifically, gossip) in intrasexual mate competition. Machiavellianism presumably facilitates IA perpetration—due to Machiavellian individuals’ social manipulation skills, they should be particularly effective in manipulating rivals’ reputations using gossip and other IA tactics. Further, Machiavellian individuals’ deception skills should make them particularly skilled in sharing inaccurate gossip in a convincing manner, and their ability to form alliances should help this gossip to spread to a vast network of individuals, thereby amplifying its effectiveness. Thus, each dark triad attribute appears to be closely linked with successful IA perpetration. In the coming section, empirical evidence supporting the hypothesis that dark triad attributes are sexually selected is reviewed.

Sexual Selection & the Dark Triad. Discussing the dark triad, evolutionary scholars have argued that these seemingly “selfish” and “antisocial” personality attributes are evolutionarily advantageous for those who possess them, aiding in the conferral, maintenance, and control of fitness-relevant resources (including mates) despite potential social costs—Hawley (2011) notes that, “unrestrained altruism is a strategy that generally does not pay” (p. 61). Indeed, dark triad personalities have been linked with romantic competitiveness and more success in mating, suggesting they are sexually selected psychological armaments arising from and aiding in intense intrasexual competition.

Females’ possession of dark triad traits predicts enhanced willingness to obtain direct and indirect romantic revenge (in the form of yelling or rumor spreading) against a rival or romantic partner, and it also predicts prior and future intended infidelity perpetration (Brewer, Hunt, James, & Abell, 2015). Women with dark triad attributes are more

competitive in general and in mate competition, and narcissism in particular predicts romantic competitiveness (Carter, Mantanaro, Linney, & Campbell, 2015). Possession of dark triad traits is also positively correlated with an individuals' number of sex partners (Jonason et al., 2010), suggesting it confers mating benefits, particularly for sexually unrestricted individuals. Further, narcissism and psychopathy have been associated with an unrestricted sexual strategy among men but not women (Reise & Wright, 1996), suggesting that these personality traits assist males in intrasexual competition.

The evidence above suggests that the expression of dark triad traits is sexually selected, aiding in the successful use of IA in intrasexual competition. Similar to socio-sexuality, dark triad attributes appear to serve as a proxy for the level of mate competition in one's environment. If this is true, then those with more dark triad attributes should have more elaborate behavioral and cognitive armaments for IA—and gossip specifically—as a mate competition tactic (e.g., more frequent gossip sharing, strong memory for threatening gossip content, and heightened perceptions of its juiciness). Further, if IA is sexually selected, then the operation of the evolved IA module should be moderated by additional individual differences relevant to the degree of mate competition one faces—namely, socio-sexuality. Accordingly, dark triad traits and socio-sexuality should interact to shape gossip outcomes. While previous research has linked the dark triad and IA perpetration, it has not done so with respect to cognitive and behavioral gossip outcomes specifically (i.e., frequency of gossip sharing, memory for romantic gossip, perceptions of its juiciness). Further, extant research has not explored the moderating role of socio-sexuality in this process, which is very important to consider in the study of IA in a mate competition context. Given this, the following dark triad prediction is tested in the present studies:

Dark Triad Prediction: Those with more dark triad personality traits should possess more elaborate cognitive and behavioral armaments enabling the successful use of IA in mate competition. This effect should be amplified for sexually unrestricted males and sexually restricted females.

Physical Formidability

Given the previous discussion involving male armaments arising from intrasexual competition, it is clear that physical formidability—one's size and strength—plays an important role in sexual selection. We have seen that existing research focuses on positive associations between physical size and strength on the one hand, and the successful use of direct aggression aiding in intrasexual mate competition on the other. For example, testosterone is associated with larger physical size (i.e., broader shoulders, larger muscles; Bhasin et al., 1996), and males higher in testosterone tend to be more physically aggressive (see Windle & Windle, 1995). Further, larger flexed bicep circumference accurately predicts both physical lifting strength and self-perceived success in physical altercations (Sell, 2005).

Despite this, we know very little about links between physical formidability and males' use of indirect aggression as a mate competition strategy. Extending Campbell's (1999) vulnerability cost explanation for female IA, posing that females engage in more IA relative to direct aggression due to the high costs associated with physical fighting, hypotheses can be developed regarding the role of physical formidability in shaping male IA. While some males possess exaggerated physical armaments such as large muscles that enable success in physical fights arising from mate competition, here it is argued that those who possess less exaggerated physical armaments and are less physically formidable (i.e., smaller and weaker) will have more exaggerated—or at least more operative—psychological and

behavioral armaments assisting them in successful mate competition. These armaments likely include behavioral tendencies to engage in more frequent IA, and cognitive abilities enabling more successful IA perpetration (e.g., memory for threatening gossip). Low formidability males should possess these armaments for successful IA perpetration due to the high potential retaliation cost of engaging in direct aggression with comparatively larger and stronger rivals. Ultimately, for less formidable males facing intense mate competition, these armaments for IA presumably evolved to help them defeat large and intimidating rivals circuitously, using social networks rather than via intimidation and physical force.

If IA is sexually selected, than evolved modules for IA should be calibrated to the degree of mate competition that individuals face. Given that socio-sexuality is a proxy for mate competition, then links between physical formidability and male IA should be particularly pronounced among males who face particularly intense mate competition—that is, those who are sexually unrestricted. Thus, formidability is hypothesized to interact with socio-sexuality to shape male gossip outcomes. This Male Formidability hypothesis is tested in the present study:

Male Formidability Hypothesis: Relative to high formidability males, low formidability males should have more elaborate cognitive and behavioral armaments enabling successful use of IA in mate competition. This should be especially true for low formidability males who are also sexually unrestricted.

In sum, having outlined the important role that sexual selection plays in shaping individuals' personalities, physical features, sexual preferences, and ultimately their aggression, it becomes clear that an evolutionary approach is a very helpful way to identify and explain predictors of IA. For instance, while physical formidability and socio-sexuality may not appear to relate to IA on the surface, a consideration of sexual selection (i.e., mate competition) processes helps explain why these variables are likely to influence IA

perpetration. Further, by applying sexual selection theory and thinking about IA in a mating context, we have a potentially more complete understanding of the role that previously studied variables—such as sex and dark triad personality traits—play in shaping IA perpetration. While sexual selection allows us to make predictions about predictors of IA and gossip specifically, it also allows us to make predictions regarding gossip outcomes necessary for successful IA perpetration in a mate competition context. These hypothesized outcomes are elucidated below.

Sexual Selection & Gossip Outcomes

If it is true that IA—and gossip specifically—is a sexually selected adaptation in humans, then it must involve cognitive and behavioral systems, and those systems that produce IA must enhance individuals' success in mate competition, and ultimately the reproductive opportunities of the perpetrator at the expense of the victim. A few cognitions and behaviors that should be required for successful IA perpetration include the frequency of individuals' gossip sharing, their memory for threatening gossip about potential romantic rivals, and their perceptions of its juiciness (i.e., interestingness and entertainment value). These outcomes are tested in the present studies. These gossip-related outcomes can both be considered sexually selected armaments in that they should increase the mating success of those who possess them.

More frequent gossip sharing presumably aids in intrasexual competition by inflicting more damage on romantic rivals (e.g., as by spreading reputation-damaging information about him/her to a very wide audience). An acute memory for threatening gossip content should be helpful in mate competition in that it enables the successful tracking of rivals and the ability to share this threatening information with others later, when it is particularly

beneficial for the perpetrator to do so. Finally, perceiving threatening gossip to be juicy likely heightens one's success in mate competition, as seeing a gossip message as interesting and entertaining should facilitate attention to and memory for the message.

The aforementioned individual differences relevant to mate competition are hypothesized to moderate these cognitive and behavioral outcomes. In other words, the operation of the IA module should be shaped by the degree of mate competition that an individual faces, and the individual and sex differences cited above are all relevant to this competition. Accordingly, those who face more intense mate competition by virtue of their sex, dark triad personalities, and socio-sexualities should have up-regulated IA modules giving rise to more frequent gossip sharing, heightened memory for gossip, and amplified perceptions of its importance. Additional predictors of gossip cognitions tested in the present studies include the presence of a mating motive and exposure to high threat gossip (i.e., depicting promiscuous behaviors of a potential romantic rival). Both mating motives and exposure to high threat gossip should up-regulate the IA module should amplify gossip outcomes, because both should elicit a mating mindset and enhance perceptions of mate competition.

Given that these predictors and outcomes are tested in relation to gossip as a specific IA tactic, gossip is the focus of the coming section. Gossip is defined and literature pertaining to known predictors of gossip sharing and cognitions is reviewed, with the goal of highlighting the present study's contribution to this literature.

Chapter IV. Gossip

The present studies focus on gossip as a specific IA tactic. Gossip has been defined as “informal, evaluative talk about a member of the discussants’ social environment who is not present” (Wert & Salovey, 2004, p. 123). This evaluative talk can be positively, negatively, or neutrally valenced (Fine & Rosnow, 1978). However, gossip that is used to strategically manage reputations and relationships with others is considered an indirect aggression tactic. This can range from overtly malicious comments to damning others with faint praise. Gossip has been identified as an IA strategy in myriad studies (see Archer & Coyne, 2005 for a review) and has been linked to intrasexual mate competition in particular (e.g., Vallaincourt & Sharma, 2011), and as such is important to study with respect to its evolutionary role in intrasexual competition. As an IA tactic, gossip damages the target’s reputation and social standing while simultaneously serving a self-promotional function for the perpetrator, who is in effect advertising that he or she is not “horrible like so-and-so” (Campbell, 2004).

Gossip has been deemed a “valuable social commodity” (Rosnow, 1977) in that it can be used to attain mates and allies as well as punish enemies and rivals. Indeed, gossip is a particularly effective tool for reputation management because the structure of gossip allows for many opportunities to voice support for negative evaluative statements made early on, and limited subsequent opportunities to voice an opposing position, allowing dominant social norms (i.e., negative opinions of the target) to be reinforced (Eder and Enke, 1991). Further, encouraging responses to evaluative gossip are more common than neutral or discouraging responses, particularly among females (Leaper and Holliday; 1995). This reflects the key evolutionary functions of gossip, specifically its use in female intrasexual mate competition.

For those interested in IA, gossip is a tactic particularly important to examine due to the fact that much of humans' indirect aggression is comprised of gossip used for reputation management. More broadly, gossip is a critical topic in the study of human behavior due to its centrality in human social life. Indeed, the exchange of information about social events—albeit a somewhat broad definition of gossip—constitutes 70% of interpersonal communication (Emler, 1994). Given this, gossip is used as a case study in the present series of studies, used to assess predictors of IA behaviors and cognitions in a mate competition context.

Due to its theoretical and practical importance as a topic of study, dating back to the 1960s scholars have called for increased empirical attention to gossip (Gluckman, 1963; Wert & Salovey, 2004). Since then, gossip has received some empirical attention across disciplines ranging from psychology, sociology, and anthropology to linguistics and communication. Gossip has been examined quantitatively and qualitatively across myriad contexts and populations, including gossip about HIV/AIDs in an American communities (Smith, Lucas, & Latkin, 1999), and gossip among Hopi tribe members (Cox, 1970), villagers in Papa New Guinea (Brison, 1992), Maine lobster fishermen (Acheson, 1988), members of a university rowing team (Kniffin & Wilson, 2005), and cattle ranchers in Shasta County, California (Ellickson, 1991). Despite this methodological and topical breadth, most of this work is proximal in nature. This chapter focuses on demonstrating that gossip can be understood as at least partly under the control of sexual selection. As such, this chapter considers predictors of gossip sharing, sex differences in the content of gossip that is shared, and memory and attentional processes involved in gossip.

Predictors of Gossip Sharing

Some gossip research has identified predictors of gossip sharing, which is the key outcome explored in Study 1 of this dissertation, and as such will be reviewed here with the goal of highlighting empirical gaps that the present studies fill. As we will see, some of this work is proximal, and as such does not consider evolutionary functions of gossip. Further, while some evolutionary research has examined features of gossip targets, recipients, and the social environment, it has not considered individual difference features of the gossiper him/herself.

A small body of proximal scholarship has addressed predictors of gossip sharing as a specific IA tactic. Work in this area has focused on proximal questions such as personal relevance and the perceived veracity of gossip rather than evolutionary questions linking gossip sharing to mating concerns. Research in this vein has found that an individual's level of anxiety and their belief that the gossip they received is true increases rumor and gossip sharing (Jaeger, Anthony, & Rosnow, 1980; Rosnow, Yost, & Esposito, 1986). Further, uncertainty, lack of cognitive clarity (Rosnow, Esposito, & Gibney, 1988), and high thematic relevance (Esposito, 1987; cited in Rosnow, 1991) are also associated with increased gossip or rumor sharing. In contrast, low (versus high) personal relevance dampens one's proclivity to spread rumors (Rosnow, Esposito, & Gibney, 1988; for a review see Rosnow, 1991). While informative for understanding proximal processes, this work does not help us understand why these variables contribute to gossip sharing at all. An evolutionary framework helps us to better answer this why question, drawing on fundamental human concerns—namely survival and reproduction. Thus, the present studies draw from sexual selection theory to examine individual differences relevant to mate competition—including

socio-sexuality, dark triad personality traits, and physical formidability—in shaping IA behavior and cognitions in an intrasexual competition context.

To better understand gossip in evolutionary context, some research has drawn from kin selection theory (Smith, 1964), exploring features of gossip targets and recipients that are most likely to prompt gossip sharing. One strain of research in this area focuses on gossip sharing based on the gossip target, explaining differences in sharing gossip about relatives versus non-relatives. Kin selection theory maintains that individuals would be most likely to share damaging gossip about non-genetic relatives and positive gossip about genetic relatives, as such behavior helps maximize one's own inclusive fitness. While juicy gossip about relatives may be seen as interesting, sharing such gossip could pose a threat to one's social reputation. Accordingly, McAndrew and Milenkovic (2002) found that potentially damaging sexual reputation gossip (i.e., information about promiscuity and sexual difficulties) is less likely to be shared if it is about family members relative to friends and others, supporting these predictions arising from kin selection theory.

Additional work along these lines explains differences in sharing gossip about allies versus non-allies, loosely applying an evolutionary framework. It is predicted that if gossip assists individuals in attaining higher social status and the survival and reproductive benefits arising therefrom, then individuals should be more likely to share malicious gossip about enemies and rivals (to look superior in comparison), and positive gossip about friends and allies (as a means of sharing in their success). Supporting this notion that gossip is used in social competition, McAndrew, Bell and Garcia (2007) found that people are more likely to share gossip with allies (i.e., friends, romantic partners) than with non-allies. Further, McAndrew and Milenkovic (2002) and McAndrew et al. (2007) found that positive gossip—

gossip about receiving an inheritance or academic honors—is most likely to be shared and is rated most interesting when it is about friends and romantic partners, while negative gossip is most likely to be shared if it is about potential rivals (i.e., strangers, high status individuals). This all supports the idea that gossip is used selfishly, to enhance an individual’s fitness via social status, mates, and/or resources. However, it fails to consider how specific individual difference features of the gossiper related to mate competition might shape gossip sharing—a gap that Study 1 aims to fill.

Considering gossip in a mate competition context, other evolutionary research has considered the presence of romantic rivals as a predictor of gossip sharing. Generally speaking, this research maintains that because gossip is a sexually selected behavior, presence of especially threatening romantic rivals should contribute to increased gossip perpetration. Indeed, Vaillancourt and Sharma (2011) found that exposure to a same-sex romantic rival promoted gossip perpetration among other females—women reacted negatively to an attractive female peer dressed provocatively (i.e., promiscuously) but not conservatively, mocking the woman after she left the room and making negative verbal comments about her (i.e., gossiping). The authors argued that sexy dress is seen as threatening to other females because it signals sexual availability to males. Revealing dress could also signal intrasexual threat in that they index a female’s fertility status—Durante, Li, and Haselton (2008) found that fertile women prefer to dress in a sexy and revealing fashion so as to flaunt their appearance, both when single and when in satisfying romantic relationships, as a way to compete with rival females and avoid losing high quality long-term mates. This research indicates that gossip perpetration is closely tied to the degree of intrasexual competition that females face, but has generally examined features external to the

gossiper (e.g., the presence or absence of a rival) rather than individual differences that characterize the gossiper himself/herself. The present study addressed this limitation by exploring personality and physical attributes as predictors of gossip sharing among both males and females.

Ultimately, these gossip sharing studies address evolutionarily relevant features of the gossip *target* and *recipient* (e.g., ally, genetic relative) and of the social *environment* (e.g., the presence of a threatening female), but has yet to examine features unique to the gossiper that shape gossip sharing. In the empirical study of gossip, attention should be devoted to all parts of the communicative system: the sender, recipient(s), and target and message itself, in addition to features of the social context. We know from previous discussion that sex differences (e.g., Crick & Grotpeter, 1995; Lagerspetz et al., 1988) and dark triad attributes (e.g., Peeters et al., 2010; Baughman, et al., 2012) have been associated with general IA perpetration, but these attributes have not been linked to frequency of gossip perpetration. More importantly, the moderating role of socio-sexuality in relation to sex and dark triad effects has not been examined, which is important to consider due to its links to mate competition. Further, these predictors have not been examined with respect to male gossip specifically. Study 2 addresses all of these gaps.

Content of Gossip

An additional body of evolutionary work on gossip examines the content of reputation-damaging gossip among males and females. This work highlights the relevance of gossip in particular to successful mate competition. Perhaps unsurprisingly, common gossip content reflect key mating concerns of males and females, respectively, supporting the notion that gossip—as a specific IA tactic—is a sexually selected mate competition strategy.

If gossip is sexually selected for use in mate competition, then content of malicious gossip should dampen the social standing and ultimately the mating prospects of the victim at a comparative benefit to the gossiper, who should attain higher social standing and superior mating and reproductive opportunities. Given this, relevant topics likely include information about social alliances, health, one's access to resources, reputation for trustworthiness in resource exchange, and most importantly for mate competition, individuals' sexual behaviors (Barkow, 1992). In line with sexual selection theory, research indicates that gossip about same-sex, age-matched others (i.e., information about their academic integrity) is generally seen as most interesting, second to gossip about romantic partners, including negative information about infidelity and promiscuity (McAndrew, Bell, & Garcia, 2007; McAndrew & Milenkovic, 2002). This interest in same-sex, aged-matched peers (i.e., potential romantic rivals) and the sexual behaviors of romantic partners supports the idea that gossip serves an intrasexual social competition function among both males and females, used to attain and retain mates and status.

Not only are these gossip topics considered particularly interesting, they also appear frequently. In a content analysis of tabloid gossip, a number of mating and status-related topics emerged—approximately 54% of tabloid articles discussed long-term romantic relationships, 50% discussed wealth, and one third mentioned childrearing and health, respectively (De Backer, Charlotte, & Fisher, 2012). Additionally, in a content analysis of gossip topics across 186 societies worldwide, relatively common topics included gossip about adultery, sex, drinking, hunting, and laziness (Divale & Seda, 1999), all of which are relevant to the gossiper's and target's inclusive fitness, or the survival and reproductive prospects of both oneself and one's offspring. Relatedly, Levin and Arluke (1985) found that

common malicious gossip topics among males and females alike include discussion of ‘disgusting’ personal behaviors such as masturbation and nose picking, pretentious behavior of high status others (e.g., ‘Jewish American Princesses’), and talk about ‘ugly girls.’ In 16% of gossip conversations examined, males and females discussed dating and sex, and in 12% of gossip conversations they discussed others’ personal appearance (Levin & Arluke, 1985). These socially damaging topics all pose a threat to individuals’ status and mating prospects, and are therefore likely to give rise to success in intrasexual mate competition.

Female Gossip Content. Because males and females face specific adaptive pressures and mating concerns, a substantial body of research examining gossip from a mate competition perspective addresses gossip content by sex. This work teaches us a great deal about common gossip content, and about content seen as threatening to a female receiver in a mate competition context (e.g., depicting the behaviors of a potential romantic rival). Among females engaged in mate competition, the content of malicious gossip is used to derogate rival females to weaken their social reputation generally and lessen their attractiveness to potential male mates. Because IA—including gossip—is a product of sexual selection aiding in success in mate competition, female gossip often features a discussion of a targets’ qualities seen as especially desirable to potential mates (see Buss & Dedden, 1990). These qualities include physical attractiveness, social popularity among peers (as it is associated with attractiveness), and a “good” sexual reputation (i.e., limited sexual availability) (Merten, 1997; Symons, 1979). Accordingly, gossip content about rival females commonly features information about the rival’s physical attractiveness and sexual behavior (Archer & Coyne, 2005; Campbell, 2004; Owens, Shute, & Slee, 2000).

In general, females are more likely to derogate the physical appearance of their rivals than are males, saying the rival is fat and ugly (Buss & Dedden, 1990), and gossip involving physical appearance is more common among females than males (Watson, 2012). Further, in a study of tabloid celebrity gossip, more negative than positive gossip about celebrities' physical appearance was found (De Backer et al., 2012). The emphasis on negative physical appearance gossip among females can be explained by appealing to male mating psychology. Males place a high value on attractiveness in both long- and short-term female mates (Buss, 1989), valuing physically attractive women who are young, fertile, healthy, and therefore possess high quality genes to pass along to offspring (Symons, 1979). Indeed, sexually mature males compete with one another for access to high quality (young, attractive, fertile, and sexually mature) females as short- or long-term mates, as they are most likely to produce offspring of good genetic quality (Symons, 1979). Ultimately, while appearance related information can alter males' perceptions, rendering derogated females less attractive in the eyes of males (Fisher and Cox, 2009), on a more general level information that a female is unattractive may signal that she is somewhat unpopular or disliked among peers—that the target female is lower status than the gossip perpetrator or untrustworthy, and therefore less desirable as a mate.

Females also derogate rivals on the basis of promiscuity through gossip, calling their rivals “tramps” and “cheaters” for being sexually open, and “teases” if they do not provide men with sexual access (Buss & Dedden, 1990). Targeting promiscuous females through gossip and regulating contact with them is a useful female mate competition tactic, because “promiscuous women threaten [sexually restricted] women's efforts to attract and retain a desirable long-term mate by triggering men's desire for sexual variety and casual sex”

(Bleske & Shackelford, 2001, p. 411). On average, women are more likely to police and enforce female sexual reputation standards than are men, gossiping and spreading rumors about those women seen as “sluts” in an attempt to keep sex a scarce resource and maintain a competitive advantage on the mating market (Baumeister & Twenge, 2002). Males pursuing long-term relationships in particular should be interested in this information about the sexual reputation of potential female mates, as they likely do not want to invest in those women without a desire to reproduce (“teases”) or in children who are not biologically theirs, an outcome that could result from mating with a so-called “promiscuous” woman (Buss & Dedden, 1990; Gangestad & Simpson, 1990).

While common, gossip about attractive and/or promiscuous females is likely to be seen as highly threatening by fellow females who see attractive, sexually unrestricted women as a threat due to many males’ desire to mate with such women (Buss & Schmitt, 1993). Sexually restricted, long-term strategizing females—those pursuing enduring rather than short-term romantic relationships—are motivated to derogate and avoid friendships with females seen as promiscuous because these females may weaken their mating prospects when pursuing long-term male mates, tarnishing their reputations by virtue of association (see Baumeister & Twenge, 2002). Indeed, sexually restricted, long-term strategizing males are motivated to avoid pairing with women seen as promiscuous, as this could result in substantial paternity uncertainty and investment in children who are not their own (Buss & Dedden, 1990). Long-term strategizing females currently in romantic relationships should feel especially threatened by short-term strategizing females who could be mate poachers, who are perhaps making use of a short-term strategy to attract mates for the long term. Ultimately, this helps support the hypothesis that in a mating context, high threat female

gossip should feature descriptions of a rival females' promiscuity—this gossip is likely to be particularly damaging to the rival's romantic reputation, hindering her mating prospects.

Accordingly, females will likely take gossip featuring female promiscuity seriously and allocate attentional resources to this information. In line with this reasoning, McAndrew and Milenkovic (2002) found that females are most interested in gossip about other females when this gossip hinges on the target's promiscuity or infidelity, whereas males are generally equally interested in sexual gossip about both males and females. Relatedly, there is evidence to suggest that displays of promiscuity and physical attractiveness—qualities that may amplify the perceived threat level of a rival—heighten a female's likelihood of victimization. Vaillancourt and Sharma (2011) found that females were more likely to engage in IA (including derogatory gossip) about a female when she is seen as particularly threatening—when she is both attractive and dressed in a revealing manner. Further, Leenaars, Dane, and Marini (2008) found that recent sexual activity and more sexual partners increased chances of IA victimhood among older adolescents, and physical attractiveness increased teenage females' odds of IA victimization by 35%. Females primed with a mating motive and in their fertile windows—who are more likely to reproduce and hence particularly concerned with mate competition—judge attractive females to be less attractive, which constitutes IA against a perceived rival (Fisher, 2004). Further, young (vs. older) females tend to gossip more about those seen as potential romantic rivals (i.e., those who are attractive and promiscuous), and this relationship is mediated by younger women's higher self-perceived mate value (Massar, Buunk, & Rempt, 2011). Ultimately, this all aligns with Barkow's (1992) hypothesis that targets of gossip are most likely to be those who directly affect our fitness and the fitness of

our genetic relatives, including those holding high status positions, social exchange partners, relatives, offspring, mates, and most importantly for the present discussion, romantic rivals.

Male Gossip Content. Compared to female gossip, less is known about the typical content of male gossip. Fine (1977) observed that pre-adolescent males tend to gossip about aggressive and sexual acts, including “what happened on a first date, who is going with whom, [and] who chickened out of prearranged fights” (p. 181). Males tend to be particularly concerned with social dominance, and as such, receipt and sharing of social informational gossip can be a way to achieve a higher status position (Watson, 2012), and accordingly, more success in mating. In Buss and Dedden (1990), males reported derogating fellow males by questioning their sexual orientation and by calling them cowards and wimps, thereby threatening their strength, dominance, masculinity, and hence their mating prospects. In the study, undergraduate males rated the following derogation tactics as most effective in making a rival male look undesirable to a female: derogating the rival’s financial resources (saying “he is poor”), his strength (“I can defeat him physically”), his ambition (“he has no goals”), his social connectedness (“he is unpopular”), and his character—specifically, a lack of kindness and generosity (“he is exploitative and selfish”).

Additional qualities that may be seen as undesirable to females—and might serve as particularly effective derogatory insults in an intrasexual mate competition context—include those featuring a male’s sexual performance and his height. Indeed, males judge gossip about fellow males’ inability to perform sexually as particularly interesting (McAndrew & Milenkovic, 2002), perhaps because sharing this information would give them a competitive advantage on the mating market. Further, male height has been positively associated with interpersonal dominance (Stulp, Buunk, Verhulst, & Pollet, 2015), and females in their fertile

phase tend to prefer males who are comparatively taller than themselves, particularly when looking for a short-term mate (Pawlowski & Jasienska, 2005).

Given the above, we know that gossip content varies by sex, and these sex differences generally reflect differences in evolved mating psychologies. This research helps further confirm the hypothesis that gossip is (at least in part) a sexually selected armament for intrasexual mate competition among males and females alike, and as such should be studied in a mate competition context. Because we have a clearer empirical understanding of the types of gossip content seen as threatening among females than males, Study 2 built on this literature by focusing on cognitive outcomes (memory and juiciness perceptions) of female gossip varying in threat level. Given that information most relevant to mate competition—and hence most likely to appear in malicious gossip—includes information about rival females' sexual behaviors and physical appearance, Study 2 manipulated female gossip content to depict acts of a same-sex rival varying in promiscuity (i.e., threat). These ranged from somewhat benign acts (e.g., talking with an opposite-sex other), to moderately threatening (i.e., depicting an ambiguous or uncertain threat, such as holding hands with an opposite-sex other), and highly threatening ones (e.g., having sex with an opposite-sex other).

Memory for Gossip

Another substantial body of research on gossip—both proximal and evolutionary—explores memory for the content of gossip, largely focusing on features or contents of gossip messages that facilitate memory for these contents rather than the role of individual differences in this process. Study 2 expands upon this work by assessing how gossip threat level in combination with individual differences relevant to mate competition shape recall

and recognition memory for gossip. Study 2 also examines the perceived juiciness of gossip, as this presumably facilitates attention to and memory for fitness-relevant gossip.

Individuals' memory for gossip messages has interested scholars across several disciplines. Philosopher Ben-Ze'ev (1994) has said that the "typical gossipmonger is intelligent, with a good memory and an ability to discern connections between events" (p. 19). Similarly, sociologist Fine (1977) has stated that, "to be a successful gossip one must be able to recall what others have said or what has happened," asserting that gossip can help improve children's recall abilities (p. 5). These statements ultimately suggest that successful gossip perpetration requires reliable recollection of gossip content—that better gossips have better memories for gossip content.

While successful gossips may indeed have acute cognitive abilities enabling memory for the details of messages, others have noted that as it is shared, gossip becomes simplified, thereby enabling better memory for key parts of the message. As rumors and gossip messages are transmitted, these messages become simplified and more concise, presumably at least in part to facilitate better memory of the content. Indeed, in the classic 'grapevine' study in which subjects passed along messages in a chain, Allport and Postman (1947) found that the number of central details in the message decreased from 20 to 5 after several retellings, suggestive of leveling and sharpening process in which details are deleted and remaining details receive more attention, respectively. This research, ultimately beginning with Bartlett's (1932) research on memory, has typically assumed that proximal mechanisms involving simplification and shared cultural knowledge are responsible for the simplifying effects of shared narratives. From an evolutionary perspective, however, it is likely that this leveling and sharpening process filters out less important information and facilitates

improved memory for the fitness-relevant gossip content, including information regarding potential romantic rivals. Ultimately, careful attention to and recollection of the content of threatening gossip messages—if only the ‘gist,’ or information about central events and actors—is evolutionarily important in that the messages may have crucial fitness-relevant consequences, shaping one’s ability to acquire and retain mates.

Given the potentially serious reproductive costs of failing to remember social information about threatening sexual rivals, it follows that humans are particularly good at remembering social information (i.e., gossip) compared with non-social information (i.e., non-gossip). Redhead and Dunbar (2013) found that people better recall stories containing social information (about social relationships, betrayal, and romantic relationships) than those containing ecological information (about honey extraction from beehives). Reysen, Talbert, Dominko, Jones, and Kelley (2011) echoed these findings—subjects better recalled passages containing social information (e.g., a college student having an affair with a professor; a private email between friends becoming public) than those containing non-social information (e.g., seeing bears when hiking; the travels of a cicada). In a follow-up study, it was found that recall for gossip (information about someone cheating on a spouse or a test) was superior to that for non-gossip (non-threatening information about tennis players or the daily life of college students; Reysen et al., 2011). This may be due to the gossip’s threat level—more specifically, the intrasexual threat posed by the gossip target and her/his ability to hinder one’s mating prospects. As such, it appears as though particularly threatening gossip (i.e., gossip with the strongest fitness consequences) is best recalled. Indeed, some research indicates that individuals more closely attend to threatening versus non-threatening information: in a reaction time task, Frey, Weyers, Pauli, and Muhlberger (2012) found that

subjects are quicker to respond to threat-related social cues (i.e., angry vs. happy faces). Thus, individuals should be most likely to closely attend to highly threatening romantic gossip, which could in turn facilitate memory for gossip content.

Some proximal research indicates that memory for messages is linked with its perceived personal relevance and entertainment value. For example, interest in the topic of an expository text (i.e., textbook content) enhances recall of the information (measured with idea units), regardless of an individuals' intelligence or their knowledge of the topic (Schiefele & Krapp, 1996). In a study assessing individuals' memory for biographical messages, Wade and Adams (1990) found that when comparing four categories of content—'seductive details,' main ideas, supporting details, and common life events unrelated to main ideas—high interest content such as 'seductive details' (juicy gossip) and main ideas were best recalled. This is reminiscent of the leveling and sharpening process highlighted by Allport and Postman (1947), suggesting that individuals best remember juicy, threatening, and fitness-relevant details and main events. Presumably, in a mating context females are most interested in threatening gossip about rivals, see it as particularly juicy, and are thus motivated to remember it.

A small body of work on memory for gossip has taken an evolutionary perspective, addressing individuals' memory for gossip in a mating context. In one such study, memory for mating-relevant gossip messages about hypothetical future colleagues was examined, along with the role of sex in this process (De Backer, Nelissen, & Fisher, 2007). De Backer et al. (2007) found that when a target was described as physically attractive in gossip, this particular attribute was better remembered when the gossip target was female rather than male. Further, females remembered more reputational gossip content about potential female

rivals than males remembered about potential same-sex rivals (De Backer et al., 2007). These results may reflect sex differences in the use of gossip to damage rivals' reputations, as well as the higher importance of mate attractiveness to males versus females.

In another study involving a mating context, gossip about romantic infidelity was manipulated into high- vs. low-interest such that high-interest gossip featured age-matched individuals, discussing the behaviors of college students rather than older individuals. It was found that high interest gossip resulted in superior gossip recall, as assessed by raters who determined how many propositions in the text were correctly recalled (Reysen et al., 2011). Presumably, romantic information about age-matched individuals who may become rivals or potential mates is more relevant to one's mating prospects than romantic information about older individuals, which likely explains these findings.

While instructive, this work on individuals' memory for romantic gossip made use of a single manipulated gossip message, and accordingly did not consider whether the same results might be observed across diverse, albeit thematically related gossip content. Further, these studies did not examine how different gossip messages about age-matched *peers* varying in threat level might affect cognitive outcomes. This is particularly important to consider, as individuals are particularly likely to share gossip with peers, including romantic partners and same-sex friends (McAndrew, Bell, & Garcia, 2007).

Additional evolutionary gossip research has considered gossip sharing as a function of the severity of the transgression depicted in the message and accordingly, the threat posed by the gossip target. Studying gossip in an academic competition context, Hess and Hagen (2002) manipulated competition levels by describing a classmate as an academic rival or not, and found that females shared more negative and less positive information about the

classmate under conditions of high academic competition. Examining gossip in a mate competition context, Sutton (2014) asked participants whether they would share gossip about a romantic rival, and this information varied in severity (e.g., she was observed “flirting/kissing/sleeping with a man other than her partner,” p. 85). While important work, the two aforementioned studies again make use of variations in a single gossip message, and as such it cannot be determined whether these results would generalize across other, similar types of gossip messages varying in threat level. Further, while the above studies assessed gossip sharing as an outcome variable, they did not examine the role of gossip threat level on cognitive outcomes including individuals’ memory for gossip and their perceptions of its juiciness, nor have they assessed the moderating role of individual difference variables relevant to mate competition—including socio-sexuality and dark triad personality attributes—in this process.

Addressing these limitations, Study 2 used three different gossip messages, distinct but topically related, to assess whether general cognitive effects hold even when specific content of gossip varies. Each message, involving a romantic scenario, was manipulated to feature a same-sex peer who would be seen as a low, moderate, or high threat in a mate competition context. Considering females’ memory for gossip and perceptions of its juiciness as outcome variables, Study 2 tested for effects of threat level in interaction with individual differences relevant to mate competition.

Overview of the Present Studies

The present studies draw from and extend upon the gossip literature discussed above to further our understanding of gossip as a sexually selected tactic for use in mate competition. Study 1 addressed one key gossip behavior: frequency of self-reported gossip sharing. Hypothesized predictors of gossip sharing included sex, dark triad personality traits, physical formidability, and socio-sexuality. Because socio-sexuality shapes the degree of mate competition one faces, this variable was examined as a moderator shaping relationships between the dark triad, sex, and formidability on the one hand, and frequency of gossip sharing on the other. Exploring male gossip behavior specifically, the Male Formidability hypothesis for gossip perpetration was also forwarded and tested.

Study 2 was an experiment designed to examine predictors of two hypothesized gossip cognitions: (1) enhanced memory for threatening romantic gossip and (2) heightened perceptions of its juiciness. Following a romantic prime or control prime, participants were exposed to gossip with specific message characteristics—namely, low, moderate, and highly threatening descriptions of a same-sex target who was depicted as a romantic rival. Highly threatening targets engaged in romantic behaviors seen as threatening (e.g., kissing another females' boyfriend), whereas low-threat targets engaged in less threatening behaviors (e.g., being friendly toward a potential male mate). Female cognitions in response to threat were measured using free and aided recall measures and a self-reported gossip importance measure. In addition to gossip threat level and the salience of mating motives, the moderating role of individual difference variables relevant to mate competition in shaping gossip cognitions were assessed. These individual differences included socio-sexuality and the possession of dark triad personality traits.

Taken together, these studies address two key issues that remain understudied in the gossip literature: (1) male gossip perpetration, and (2) the moderating role of socio-sexuality in combination with other predictors, both familiar (i.e., dark triad, sex) and novel (i.e., formidability), in shaping gossip behavior and cognitions. Overall, by adopting an evolutionary perspective, this work provides us with a more nuanced view of indirect aggression in a mate competition context.

Chapter V. Study 1 – Self-Reported Gossip Sharing

Gossip Behaviors: Males’ and Females’ Self-Reported Gossip Sharing

Study 1 was a survey with two major aims. The first was to test the moderating role of socio-sexuality in shaping effects of sex, dark triad personality traits, and physical formidability on individuals’ self-reported gossip sharing. All of these attributes—and socio-sexuality in particular—are closely related to mate competition, and as such should moderate gossip behavior. More specifically, if it is true that rates of gossip are sexually selected for use in intrasexual competition, then these predictors should affect the frequency of individuals’ gossip sharing. While some research has addressed sex and the dark triad as predictors of IA, these attributes have not been linked to gossip specifically, and have not been examined in interaction with other variables relevant to mate competition—notably, socio-sexuality. The present study fills this gap. The second key goal of the present study was to address predictors of male gossip—notably, physical formidability—which remain understudied in the literature due to a focus on gender differences and female IA.

Ultimately, if gossip is a key conduit for intrasexual competition, then individuals who face and engage in more intense intrasexual competition (e.g., sexually restricted females, sexually unrestricted males, and those who possess dark triad personality traits) should rely more heavily on gossip. Further, those for whom direct aggression is too costly (i.e., low formidability males) should also engage in more frequent gossip. Accordingly, these individuals should have behavioral armaments enabling successful gossip perpetration, including more frequent gossip sharing, which would give rise to success in mate competition. In the sections that follow, each hypothesized predictor of gossip sharing tested

in Study 1 will be explained briefly, and hypotheses for each of the predictors—including hypothesized interactions between them—will be introduced.

Sex

Sexual selection theory predicts that there should be sex differences in rates of gossip perpetration. Supporting sexual selection theory, previous research has found that females—particularly teenage and young adult females—tend to indirectly aggress more than males (Lagerspetz et al., 1988; Crick & Grotpeter, 1995; Hess & Hagen, 2006; Österman et al., 1998). In terms of gossip specifically, research confirms that females tend to gossip more than males overall (Watson, 2012), and sexual gossip about females is more likely to be spread by females than males (McAndrew & Milenkovic, 2002). The primary evolutionary explanation for these sex differences is Campbell's (1999, 2004) vulnerability cost explanation for female IA. Campbell maintains that due to their parental investment duties, direct aggression is particularly costly for females, and so IA tactics such as gossip are an important tool for intrasexual competition among females.

Hess and Hagen (2002) provide another, complementary explanation for female IA perpetration. Because gossip attacks private and unverifiable dimensions of females' reputations, including their sexual behaviors, Hess and Hagen (2002) argue that it may be a more effective intrasexual mate competition tactic among females than among males. If this is true, then females should have evolved capabilities for particularly effective IA perpetration (Hess & Hagen, 2002), and should therefore use gossip more frequently than males on average. Domains in which males might be derogated—including their fighting and hunting abilities—are easily verifiable and hence less susceptible to inaccuracy (Hess and Hagen, 2002). This means that males may use gossip less frequently than females. Thus:

H1: On average, females will report more frequent gossip sharing than males.

Socio-sexuality

A second hypothesized predictor of gossip sharing is socio-sexuality (or sexual restrictedness), which reflects an individual's attitude toward and willingness to engage in casual sexual encounters (Penke, 2011). As discussed earlier, females tend to be more sexually restricted than males (Clark & Hatfield, 1989). Indeed, sexual strategies theory predicts that on average, females tend to prefer committed long-term relationships versus casual sexual encounters due to parental investment concerns (Buss & Schmitt, 1993). Given the discrepancy in sexual desires and behaviors between heterosexual males and females—the latter generally seeking out unrestricted females and the latter often seeking out restricted, committed males—females who are sexually restricted should face more intense mate competition. Males willing to commit to long-term relationships are a somewhat scarce resource, and competition for access to them should give rise to increased IA (i.e., gossip) perpetration.

Further, it is predicted that male intrasexual mate competition and resulting aggression, including gossip sharing, will be amplified for sexually unrestricted males who face competition for access to different partners. In this environment, numerous unrestricted, short-term strategizing males are competing for access to comparatively few fertilizable females, who tend to be more “choosy” than males about their mate selection due to their parental investment duties and comparatively lower potential reproductive rate (Clutton-Brock & Vincent, 1991). Due to the competition they face, sexually unrestricted males and restricted females pay a higher cost (e.g., failure to find a mate) if they opt not to use IA—including gossip—in mate competition. They are also likely to perceive potential rivals

(including those depicted in gossip) to be more threatening, giving rise to more frequent gossip sharing about these perceived rivals. Ultimately, sexual selection theory predicts more frequent gossip perpetration for sexually unrestricted males and sexually restricted females:

H2: Sex and socio-sexuality will interact such that (a) unrestricted males and (b) restricted females will report more frequent gossip sharing.

Physical Formidability and Male Indirect Aggression

As was previously discussed, direct aggression is more widely used as a mate competition strategy among young males, whereas young females tend to prefer IA tactics including gossip. Despite findings that comport with this view, gossip is relatively common among adults of both sexes. Considering males' physical formidability and potential retaliation costs associated with physical fighting, we can develop predictions about male IA, and specifically gossip sharing. Extending Campbell's (1999, 2004) reasoning that females typically engage in indirect rather than direct aggression due to the vulnerability cost paid by females engaging in direct aggression (i.e., the possibility of harmful physical retaliation) and the comparatively lower cost of engaging in IA, it follows that males for whom physical retaliation is particularly costly are also more likely to opt for indirect rather than direct aggression tactics. Males who are lower in physical formidability would pay a higher retaliation cost in physical combat and may therefore engage in IA such as gossip due to its covert and anonymous nature, minimizing the likelihood of incurring physical injury in competition, particularly with larger male rivals. Accordingly, the Male Formidability Hypothesis maintains that the less physically formidable males are, the more likely they are to engage in indirect rather than direct forms of aggression, including gossip.

Further, these effects should be amplified for low formidability males who are

sexually unrestricted. Whereas highly formidable males may opt to use direct forms of aggression when faced with the intense mate competition associated with an unrestricted sexual strategy, low formidability males who are sexually unrestricted may use IA tactics including gossip to succeed in the competitive mating market of which they are a part. Unrestricted males experience more intrasexual competition, so they are motivated to compete. But their low formidability means that direct aggression is likely to be too physically costly, so an alternative strategy would be worthwhile. Indirect aggression, and gossip specifically, is one such tactic. Thus:

H3: Physical formidability will interact with sex and socio-sexuality such that (a) Among males but not females, lower physical formidability will predict more frequent self-reported gossip sharing, (b) and this effect will be amplified among sexually unrestricted males.

Dark Triad Personality Traits

The final hypothesized predictor of self-reported gossip sharing is the possession of dark triad attributes, including narcissism, Machiavellianism, and psychopathy. Due to their interest and success in both social competition and manipulation, those with dark triad attributes are expected to engage in more frequent gossip sharing. Perceived costs of IA perpetration are likely lower for those with dark triad personality traits, whose identities are less likely to be discovered by targets due to their strong social manipulation skills. Benefits of IA are likely heightened for those with dark triad attributes, who are able to inflict more severe reputational damage on their targets due to their wily personalities. Further, perceived intrasexual threat may be heightened among those with dark triad attributes, as evidenced by the finding that dark triad personalities have been associated with romantic competitiveness (Carter et al., 2015). This supports the notion that dark triad attributes are sexually selected

for success in mate competition—this mate competition benefit explains how dark triad attributes can be evolutionarily stable.

Based on the discussion above, it follows that skilled social manipulators—those possessing high levels of Machiavellianism, narcissism, and psychopathy—are particularly likely to engage in IA as a mate competition tactic. Socio-sexuality is also expected to moderate links between dark triad attributes and gossip sharing due to its role in shaping levels of mate competition faced by males and females. It is predicted that for females, restricted socio-sexualities paired with dark triad attributes should be associated with increased gossip sharing, whereas for males, unrestricted socio-sexualities together with dark triad attributes should associate with increased gossip sharing. Thus:

H4: Dark triad personality traits will interact with sex and socio-sexuality such that (a) Possession of dark triad personality traits will contribute to more frequent self-reported gossip sharing, and these effects will be particularly evident among (b) sexually restricted females and (c) sexually unrestricted males.

A final research question assessed which of the three dark triad attributes—narcissism, Machiavellianism, or psychopathy—would have the strongest effect on self-reported gossip sharing. Extant literature shows that each of the subscales behaves somewhat differently, but as it is not clear which specific trait or constellation of traits is most likely to impact gossip sharing, a research question is posed:

RQ1: Which dark triad personality trait(s) will be most influential in shaping self-reported gossip sharing?

Method

Participants

Two hundred and fifty six American undergraduate students (186 female, 65 male, and 5 unknown sex who were not retained in analyses featuring sex as a predictor) from a large public university participated in this study in exchange for course credit (age $M = 19.8$, $SD = 1.69$, $n = 6$ did not respond). Of those who responded ($n = 251$), participants' racial/ethnic background was as follows: 35.1% White, 25.5% Asian American, 20.3% Hispanic/Latino, 13.9% multiple races, 2.4% African American, 1.6% Other, and 1.2% Hawaiian/Pacific Islander. Of the participants who responded ($n = 251$), 56.6% were not in a relationship, 33.1% were in a committed relationship, and 10.4% were casually dating. Among males, 86.2% identified as heterosexual, 10.8% identified as homosexual, and 3.1% identified as bisexual. Among females, 94.6% identified as heterosexual, 3.2% identified as homosexual, and 2.2% identified as bisexual.

Due to the present study's focus on heterosexual mate competition and its role in self-reported gossip sharing, homosexual ($n = 13$) and bisexual ($n = 6$) participants were removed from the sample. After this, participants consisted of 232 undergraduate students: 56 male, 176 female (age $M = 19.83$, $SD = 1.71$, $n = 1$ did not respond). In terms of racial/ethnic background, 36.2% identified as White, 25.4% Asian American, 20.3% Hispanic/Latino, 13.4% multiple races, 1.7% African American, 1.7% Other, and 1.3% Hawaiian/Pacific Islander. Of the participants, 55.6% were not in a relationship, 34.1% were in a committed relationship, and 10.3% were casually dating.

Design and Procedure

Study 1 was a one-hour online survey administered using Qualtrics survey software. Participants received a survey link through the university's research participation website and those who consented completed the study remotely. Participants were asked about their gossip sharing behavior, personality traits, and attitudes, including questions related to sexual behavior and attitudes.

Measures

Socio-sexuality. Participants' socio-sexuality was measured using the nine-item Revised Sociosexual Orientation Inventory, assessing three sub-components of socio-sexuality: past behavior (number of casual sex partners), explicit attitudes toward casual sex, and sexual desire for others with whom one is not in a relationship (SOI-R; Penke, 2011). Behavior, attitude, and desire items were all averaged together for use in this study. This measure has been shown to be reliable ($\alpha = .83$ for both males and females in Penke and Asendorpf (2008); $\alpha = .89$, $M = 2.54$, $SD = .93$ in the present study) and to map onto individuals' mating behaviors. For instance, single individuals who are sexually unrestricted are more likely to stay single in the coming year, whereas restricted individuals are more likely to stay in their existing relationships in the next year (Penke & Asendorpf, 2008). Sample items (1 = *Totally disagree*, 5 = *Totally agree*) included: "I can imagine myself being comfortable and enjoying casual sex with different partners" and "Sex without love is okay." Higher scores indicated *less* sexual restrictedness.

Physical Formidability. Self-reported physical formidability was assessed with a single item created for use in the present study: "How physically strong would you say that you are?" (1 = *Not at all*, 7 = *Extremely*; $M = 4.06$, $SD = 1.27$).

Dark Triad. Machiavellianism, narcissism, and psychopathy—the three so-called “Dark Triad” traits—were measured using Jonason and Webster’s (2010) Dirty Dozen scale. Each subscale had acceptable reliability (Machiavellianism: $\alpha = .80$, $M = 3.52$, $SD = 1.63$; Narcissism: $\alpha = .83$, $M = 4.64$, $SD = 1.68$; Psychopathy: $\alpha = .74$; $M = 2.25$, $SD = 1.27$). Subscale items (1 = *Strongly disagree*, 9 = *Strongly agree*) included: “I tend to want others to admire me/pay attention to me” (narcissism), “I tend to lack remorse/be callous or insensitive” (psychopathy), and “I tend to manipulate others/have used flattery to get my way” (Machiavellianism).

Gossip sharing. Frequency of self-reported gossip sharing was assessed using the question “In your everyday conversations, how often would you say that you share information about people who aren’t physically present?” (1 = *Never*, 7 = *Very often*; $M = 4.30$, $SD = 1.54$). “Information about people not physically present” was used in place of the word “gossip” in questionnaire items, as the latter could arouse potentially negative affect and result in social desirability bias.

Demographics. Demographic attributes measured included age, sex (coded 0 = *Female*, 1 = *Male*), race/ethnicity, height and weight (used to calculate BMI), and relationship status (i.e., in a committed relationship, casually dating, or not in a relationship).

Results

Data Screening

Variables used in analyses were screened for normality, linearity, homogeneity of error variance (i.e., homoscedasticity), independence of errors, multicollinearity, and outliers. Bivariate correlations between all variables were computed, and correlations were not problematically high, indicating that multicollinearity was not a concern (see Table 1 below for correlation matrix). Indeed, all correlations were lower than .70, save for correlations between dark triad subscales, all of which were retained due to the interest in comparing the subscales. Little's MCAR test, computed with all variables included in analyses, indicated that the data were missing at random, $\chi^2(44) = 56.77, p = .09$, and given the relatively large sample size, missing data were excluded from analyses.

Using a cutoff value of 3.2 for significant skew and kurtosis (Field, 2009; Kim, 2013) due to the moderate size of the sample ($50 < n < 300$), Machiavellianism ($z_{skew} = 4.25$) and psychopathy were skewed ($z_{skew} = 8.5$), while psychopathy was kurtotic ($z_{kurtosis} = 5.65$). Further, psychopathy residual plots appeared to be positively skewed, indicating that data transformation was necessary for this variable. Machiavellianism was square root transformed, reducing skew ($z_{skew} = .92$). Psychopathy was log transformed, reducing skew ($z_{skew} = 2.04$). All continuous independent and dependent variables were standardized and z-scores were used in analyses for ease of comparability.

Table 1
Correlation matrix of transformed variables

Variable	1	2	3	4	5	6
1. Formidability	--					
2. SOI (socio-sexuality)	.24***	--				
3. Machiavellianism	.03	.37***	--			
4. Psychopathy	.11	.30***	.47***	--		
5. Narcissism	.04	.33***	.51***	.34***	--	
6. Gossip sharing	-.10	.12	.26***	.10	.27***	--

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Data Analysis Overview

All hypotheses were tested using univariate general linear model (GLM) analyses in SPSS (version 24), followed up with simple slopes analyses to assess the nature of interactions when appropriate. Analyses for formidability and dark triad attributes—and their interactions with socio-sexuality and sex—were both conducted separately. This analytical approach was deemed the most theoretically and conceptually appropriate due to the overlapping nature of the variables.

For instance, if physical formidability and dark triad personality traits are both sexually selected then they may frequently co-occur among males facing frequent or intense intrasexual mate competition to aid in such competition. As such, these predictors should share substantial variance with respect to IA perpetration. Additionally, IA perpetration should be amplified among sexually unrestricted men who face increased mate competition due to these sexual preferences. The role of SOI and its potential link with sex, formidability, and the dark triad is tested in the present study, by examining the potential moderating role of socio-sexuality in shaping gossip outcomes. In doing so, this study takes a first step toward determining the nature of associations between the dark triad, physical formidability, and socio-sexuality. Ultimately, given conceptual overlap and potential relationships between

predictors, it was deemed conceptually and theoretically inappropriate to include all predictors as covariates in analyses, as this could mask significant effects.

To correct for potential Type I errors that can arise due to the number of models tested, Bonferroni corrections were applied to post-hoc simple slope analyses when interaction effects diverged from predictions. The normal p values are reported in each analysis, and these values are evaluated against Bonferroni-adjusted criteria for significance (i.e., more conservative alpha levels are required for significance).

H1: Gossip and Sex

H1 predicted more frequent self-reported gossip sharing among women than men. To test H1, a GLM was computed with sex entered as a predictor of gossip sharing. The GLM showed no evidence for a main effect of sex on gossip sharing, $F(1, 230) = 1.67, p = .20, \eta_p^2 = .01$. Thus, H1 was not supported in this model. However, this hypothesis is addressed in the models that follow, some of which show effects of sex on gossip sharing.

H2: Gossip and Socio-sexuality

H2 predicted that sex and socio-sexuality would interact such that males who were less sexually restricted and females who were more sexually restricted would report more frequent gossip sharing. H2 was tested using a GLM with socio-sexuality, sex, and their interaction entered as predictors of gossip sharing. The GLM showed no evidence for a main effect of SOI on gossip sharing, $F(1, 228) = 2.18, p = .14, \eta_p^2 = .01$, or for a main effect of sex on gossip sharing, $F(1, 228) = 1.63, p = .20, \eta_p^2 = .01$. However, the sex x SOI interaction was statistically significant, $F(1, 228) = 4.16, p = .04, \eta^2 = .02$ (see Figure 1 below).

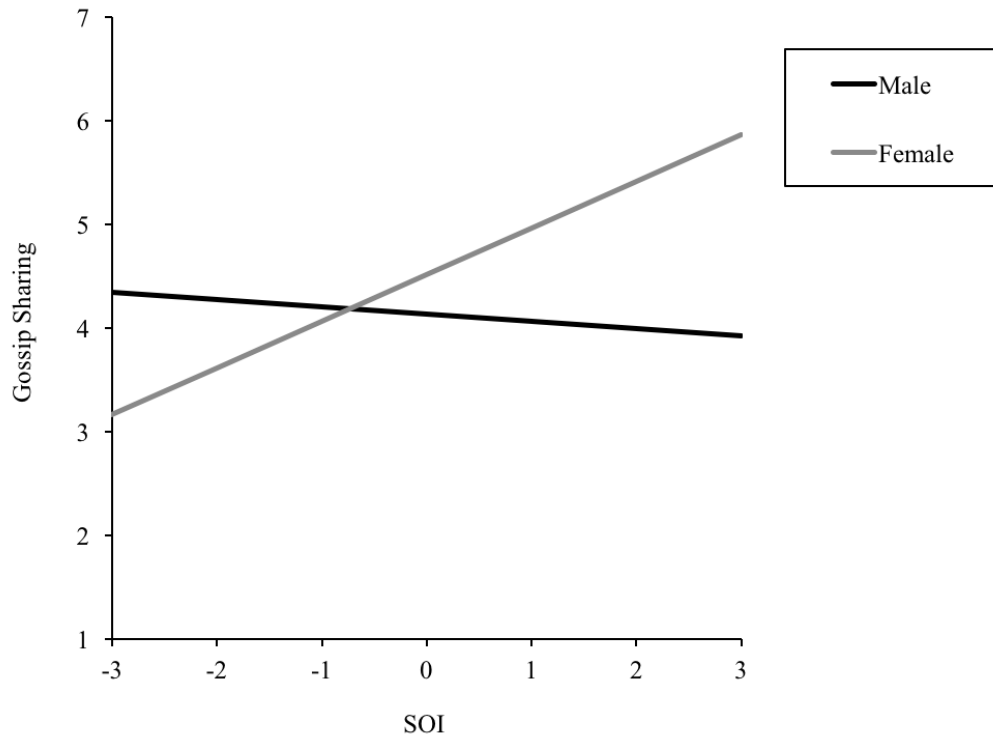


Figure 1. Test of H2, assessing the relationship between socio-sexuality (standardized scores) and gossip sharing by sex.

As can be seen in Figure 1, the pattern of results is contrary to H2. To further probe the interaction, simple slopes were computed with Bonferroni corrections. Sex, SOI, and their interaction were entered as predictors of gossip sharing in a series of simultaneous regressions, comparing gossip sharing among males and females at high (1 *SD* above the mean) and low (1 *SD* below the mean) levels of SOI. Given that four models were run, tests were evaluated at a Bonferroni adjusted alpha level of $p = .013$.

Effects for females were assessed first. Contrary to prediction, there was a significant effect of SOI on gossip sharing among women ($B = .45$, $SE_B = .13$, $\beta = .29$, $t(228) = 3.39$, $p = .001$) indicating that as female SOI increased (as females became more sexually *unrestricted*), self-reported gossip sharing increased. Next, effects were assessed for males.

There was no effect of SOI on gossip sharing for males, $B = -.07$, $SE_B = .22$, $\beta = -.05$, $t(228) = -.33$, $p = .74$. Further, there was no significant effect of sex on gossip sharing among those of low SOI ($B = .15$, $SE_B = .47$, $\beta = .04$, $t(228) = .31$, $p = .76$), but there was a sex effect at high levels of SOI ($B = -.91$, $SE_B = .29$, $\beta = -.25$, $t(228) = -3.11$, $p = .002$). At high SOI levels, males reported significantly less frequent gossip sharing than did females, in support of H1, which predicted more frequent gossip sharing among women. Ultimately, H2 was contradicted—SOI and sex interacted, but the direction of effects was the opposite of the prediction for females, and effects were non-significant for males.

H3: Gossip and Physical Formidability

H3a, the Male Formidability Hypothesis, predicted that less formidable males (but not females) would engage in more gossip sharing. Further, H3b predicted that sex, socio-sexuality, and physical formidability would interact such that sexually unrestricted males who were low in physical formidability would report more frequent gossip sharing. The hypothesis was tested using a GLM with sex, formidability, socio-sexuality, and all of their possible interactions entered as predictors of gossip sharing.

The GLM revealed a main effect of formidability, $F(1, 224) = 7.50$, $p = .01$, $\eta_p^2 = .03$. A follow-up linear regression was computed to assess the direction of effects, finding that lower formidability was associated with more frequent gossip sharing ($B = -.19$, $SE_B = .10$, $\beta = -.12$, $t(230) = -1.86$, $p = .06$). No evidence emerged for a main effect of sex, $F(1, 224) = .16$, $p = .69$, $\eta_p^2 = .001$, or socio-sexuality, $F(1, 224) = .06$, $p = .81$, $\eta_p^2 < .001$. However, a significant sex by formidability interaction was found, $F(1, 224) = 4.66$, $p = .03$, partial $\eta^2 = .02$ (see Figure 2 below), and as in the test of H2, a significant sex by SOI interaction emerged, $F(1, 224) = 4.58$, $p = .03$, partial $\eta^2 = .02$. There was no evidence for a

formidability by SOI interaction, $F(1, 224) = 1.33, p = .25$, partial $\eta^2 = .01$., or for a sex by formidability by SOI interaction, $F(1, 224) = 1.64, p = .20$, partial $\eta^2 = .01$.

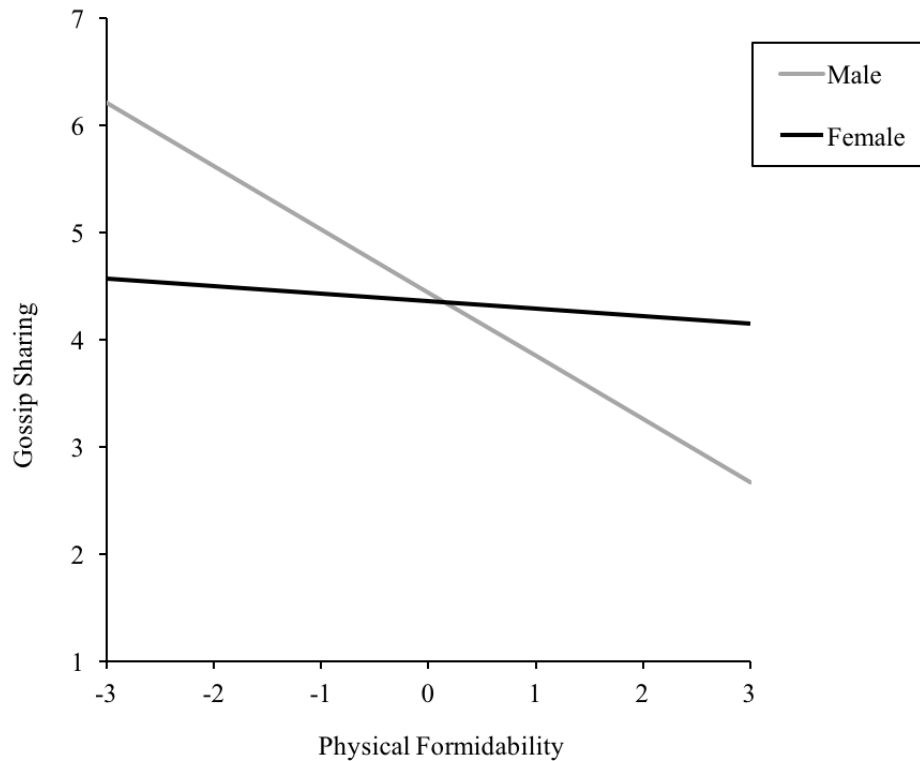


Figure 2. Test of H3, the Male Formidability Hypothesis of gossip sharing, assessing the interaction of sex and physical formidability (standardized score) on frequency of gossip sharing.

To further probe the sex by formidability interaction, simple slopes were computed. Sex, formidability, and their interaction were entered as predictors of gossip sharing in a series of simultaneous regressions, comparing gossip sharing among males and females at low (1 *SD* below the mean) and high (1 *SD* above the mean) levels of physical formidability. For males, as predicted, there was a significant effect of formidability on gossip sharing ($B = -.59, SE_B = .26, \beta = -.38, t(228) = -2.28, p = .02$), indicating that as male formidability decreased, self-reported gossip sharing increased. For females, as predicted, there was no evidence for an effect of formidability on gossip sharing, $B = -.07, SE_B = .12, \beta = -.05, t(228)$

= -.61, $p = .54$. There was no effect of sex on gossip sharing among those of low ($B = -.60$, $SE_B = .49$, $\beta = -.17$, $t(228) = -1.22$, $p = .22$), or high formidability ($B = .44$, $SE_B = .29$, $\beta = .12$, $t(228) = 1.52$, $p = .13$). Given this, H2a—predicting a sex by formidability interaction—was supported. H2b, predicting a sex by formidability by SOI interaction, was not supported.

H4: Gossip and Dark Triad Personality Traits

H4a predicted more frequent self-reported gossip sharing among those with dark triad personality traits. Moderation by sex and socio-sexuality was expected such that sexually restricted females with dark triad attributes (H4b) and sexually unrestricted males with dark triad attributes (H4c) would report more frequent gossip sharing. Further, RQ1 asked which dark triad attribute(s) would emerge as the strongest predictor of self-reported gossip sharing. H4 and RQ1 were tested using all three dark triad sub-scales: narcissism, Machiavellianism, and psychopathy. To test H4 and answer RQ1, a series of three univariate GLMs were computed, each focusing on one of the three dark triad attributes, with the remaining two dark triad traits entered as covariates. Thus, the following were entered as predictors in each model: sex, SOI, all dark triad subscales, SOI by sex, dark triad target trait by sex, dark triad target trait by SOI, and dark triad target trait by sex by SOI.

Psychopathy. The psychopathy GLM revealed no significant main effect of sex, $F(1, 222) = 1.45$, $p = .23$, $\eta_p^2 = .01$, SOI, $F(1, 222) = .002$, $p = .96$, $\eta_p^2 < .001$, or psychopathy, $F(1, 222) = .02$, $p = .88$, $\eta_p^2 < .001$. Of the remaining two dark triad traits included as covariates, significant effects were found for both Machiavellianism, $F(1, 222) = 7.54$, $p = .01$, $\eta_p^2 = .03$, and narcissism, $F(1, 222) = 6.37$, $p = .01$, $\eta_p^2 = .03$. In terms of interaction effects, sex by SOI was marginally significant, $F(1, 222) = 3.64$, $p = .06$, $\eta_p^2 = .02$, in line

with results from H2. All other interactions were non-significant: SOI by psychopathy, $F(1, 222) = .01, p = .93, \eta_p^2 < .001$, sex by psychopathy, $F(1, 222) = .17, p = .68, \eta_p^2 = .001$, and sex by SOI by psychopathy, $F(1, 222) = .75, p = .39, \eta_p^2 = .003$. Thus, H4a-c were unsupported for psychopathy.

Narcissism. On narcissism, the GLM revealed no significant main effect of sex, $F(1, 222) = 1.05, p = .31, \eta_p^2 = .01$, or SOI, $F(1, 222) = .003, p = .96, \eta_p^2 < .001$. However, a main effect of narcissism was found, $F(1, 222) = 8.29, p = .004, \eta_p^2 = .04$. A follow-up linear regression assessing the direction of the effect indicated that higher narcissism was associated with more frequent self-reported gossip sharing, $B = .44, SE_B = .10, \beta = .29, t(230) = 4.56, p < .001$. Of the remaining dark triad attributes included as covariates, an effect was found for Machiavellianism, $F(1, 222) = 8.66, p = .004, \eta_p^2 = .04$, but not for psychopathy, $F(1, 222) = .25, p = .62, \eta_p^2 = .001$. Turning to interaction effects, sex by SOI approached significance, $F(1, 222) = 2.97, p = .09, \eta_p^2 = .01$, in line with H2. No effects were found for SOI by narcissism, $F(1, 222) = .25, p = .62, \eta_p^2 = .001$, or for sex by narcissism, $F(1, 222) = .08, p = .78, \eta_p^2 < .001$. However, a significant sex by SOI by narcissism interaction emerged, $F(1, 222) = 4.27, p = .04, \eta_p^2 = .02$ (see Figure 3 below).

As can be seen in Figure 3, the pattern of results diverges from predictions. Thus, to further probe the sex x narcissism x SOI interaction, simple slopes were computed with Bonferroni corrections. Slopes were computed for narcissism among males and females separately and at low and high levels of SOI (i.e., one SD above and below the mean of SOI). Given that four models were run, tests were evaluated at a Bonferroni adjusted alpha level of $p = .01$.

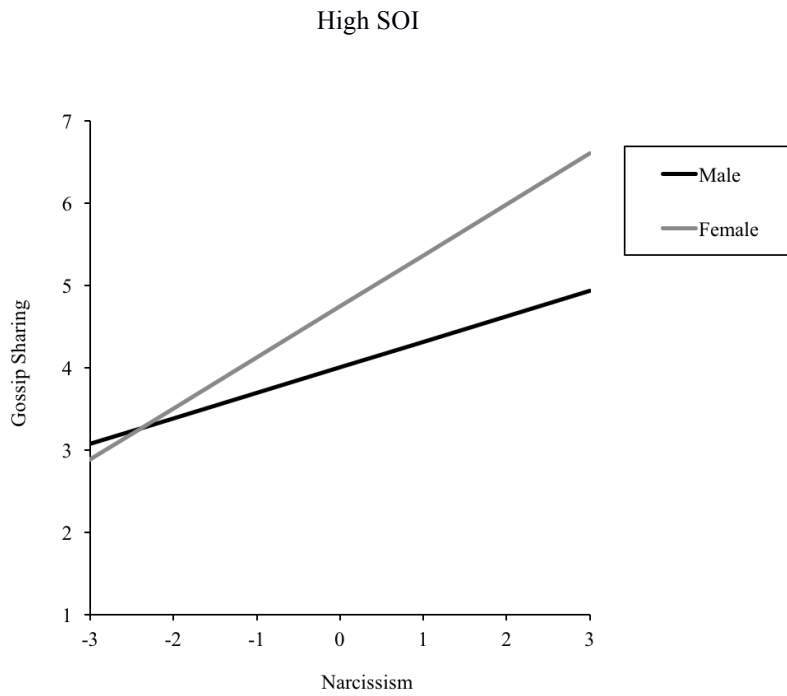
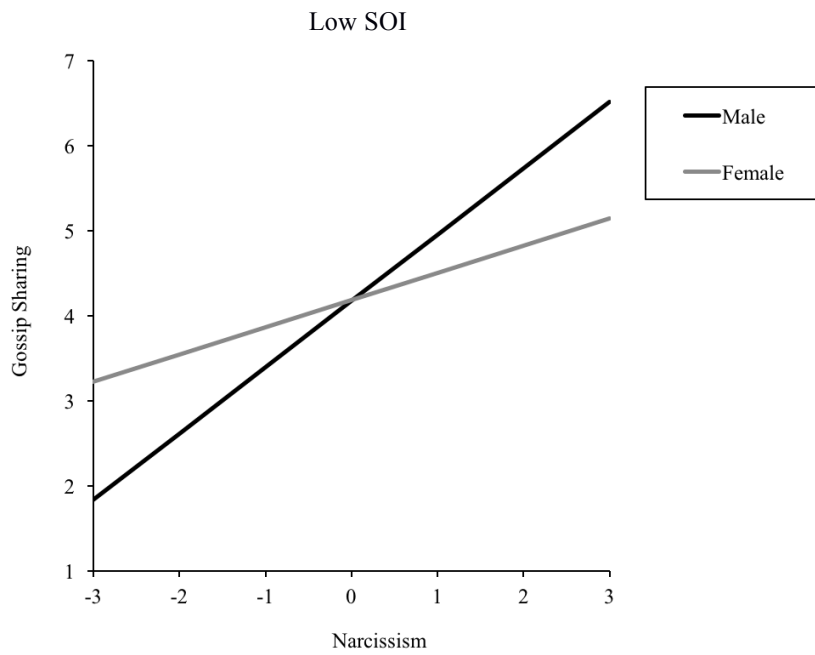


Figure 3. Test of H4, assessing frequency of gossip sharing as a function of narcissism (standardized scores) and sex at low levels of SOI (-1 SD; panel on top) and high levels of SOI (+1 SD; panel on bottom). For the low SOI graph, neither of the slopes are significant. For the high SOI graph, the slope for females is significant.

For males, the simple slopes of narcissism on gossip frequency were not significant at low SOI levels ($B = .78$, $SE_B = .34$, $\beta = .51$, $t(224) = 2.34$, $p = .02$) or at high SOI levels ($B = .31$, $SE_B = .22$, $\beta = .20$, $t(224) = 1.40$, $p = .16$). For females, the simple slope of narcissism at low SOI was not significant ($B = .32$, $SE_B = .14$, $\beta = .21$, $t(224) = 2.28$, $p = .02$), but the slope of narcissism at high SOI was significant, $B = .62$, $SE_B = .21$, $\beta = .41$, $t(224) = 3.01$, $p = .003$. Given all of this, H4a—predicting a main effect of narcissism—was supported. However, H4b-c was not supported: while a sex by narcissism by SOI interaction was found, the direction of sex and socio-sexuality effects were contrary to expectations.

Machiavellianism. On Machiavellianism, the GLM revealed no main effect of sex, $F(1, 222) = 1.21$, $p = .27$, $\eta_p^2 = .01$, or SOI, $F(1, 222) = .06$, $p = .80$, $\eta_p^2 < .001$. However, a main effect of Machiavellianism was found, $F(1, 222) = 5.11$, $p = .03$, $\eta_p^2 = .02$. A follow-up linear regression assessing the direction of the effect indicated that higher Machiavellianism was associated with more frequent self-reported gossip sharing, $B = .41$, $SE_B = .10$, $\beta = .27$, $t(230) = 4.23$, $p < .001$. Of the remaining two dark triad attributes included as covariates, no effect of psychopathy was found, $F(1, 222) = .19$, $p = .67$, $\eta_p^2 = .001$, but a main effect of narcissism emerged as reported previously, $F(1, 222) = 6.45$, $p = .01$, $\eta_p^2 = .03$. None of the interaction terms in the model were significant: sex by SOI, $F(1, 222) = 2.46$, $p = .12$, $\eta_p^2 = .01$, SOI x Machiavellianism, $F(1, 222) = .07$, $p = .80$, $\eta_p^2 < .001$, sex by Machiavellianism, $F(1, 222) = .02$, $p = .89$, $\eta_p^2 < .001$, and sex by SOI by Machiavellianism, $F(1, 222) = 1.31$, $p = .25$, $\eta_p^2 = .01$. Thus, H4a—predicting a main effect of Machiavellianism on frequency of self-reported gossip sharing—was supported. However, H4b-c, predicting interaction effects with sex and socio-sexuality, were not supported. Answering RQ1, given the above analyses,

narcissism and Machiavellianism emerged as the most influential predictors of self-reported gossip sharing.

Discussion

The primary goal of Study 1 was to examine the role of intrasexual competition on individuals' frequency of self-reported gossip sharing. More specifically, this study assessed the moderating role of socio-sexuality in combination with sex and dark triad personality traits on self-reported gossip sharing. Socio-sexuality (SOI) can be considered a proxy for the degree of mate competition faced by males and females, and was therefore hypothesized to shape the frequency of male and female gossip perpetration as an IA strategy used in mate competition. Further, given evidence that dark triad attributes are sexually selected to enable successful use of IA—including gossip sharing—in intrasexual competition, here it was predicted that those possessing dark triad personality traits would also engage in more self-reported gossip sharing. Given the comparative lack of research on male gossip, a secondary goal of this study was to take a first step toward testing whether there are individual differences among males that shape the frequency of their gossip sharing. A Male Formidability hypothesis was devised and tested, positing that due to higher potential retaliation costs for low formidability males, they are more likely to engage in gossip as an IA tactic.

Sex

Results from H1 analyses provided no evidence for sex differences in gossip sharing, failing to confirm Campbell's vulnerability cost hypothesis of female indirect aggression. However, a sex effect *did* emerge when considering sex in combination with socio-sexuality

(H2): among those who were sexually unrestricted, females engaged in more frequent self-reported gossip sharing than males. The failure to detect a sex effect in the H1 GLM analysis may be the result of low statistical power. However, this finding does align with research indicating that in adulthood, sex differences in IA diminish or disappear (e.g., Forrest, Eatough, & Shevlin, 2005; Green, Richardson, & Lago, 1996). The sex effect found in H2 indicated that perhaps it is not sex per se, but sex in combination with other variables relevant to mate competition that are most impactful in shaping female IA perpetration, and gossip sharing in particular.

Socio-sexuality

The role of socio-sexuality was assessed next. Among males, degree of sexual restrictedness had no effect on self-reported gossip sharing (H2), failing to support the prediction that unrestricted males would engage in more gossip sharing due to the enhanced mate competition they face. It may be that unrestricted men use other IA tactics or direct forms of aggression to aid them in competition instead, due to the lower vulnerability cost associated with males' direct aggression, and the higher mate competition faced by males in general (Clutton-Brock & Vincent, 1991). Supporting this idea that unrestricted males use direct aggression in mate competition, research indicates that males who are physically stronger tend to be more sexually unrestricted and have more previous sexual partners (Lukaszewski et al., 2014).

With respect to female socio-sexuality, it was found that *unrestricted* females shared more gossip, counter to the prediction that more sexually restricted women would share more gossip. This may be due to a sex-ratio bias in the sample: perhaps there are more sexually available females than males in the environment in which data collection took place, leading

to intense female intrasexual competition. In this environment, females may adopt unrestricted strategies due to the presence of more females than males in the mating pool. This finding also aligns with some evidence suggesting that female intrasexual competitiveness can be amplified when females are sexually unrestricted. For instance, promiscuous females who have had more sexual partners in the recent past are more likely to be victims of indirect aggression (Leenaars et al., 2008), suggesting that sexually unrestricted women are seen as a threat by fellow females and accordingly may face substantial mate competition. Research indicates that unrestricted females are particularly attuned to potential rivals, perhaps due to the enhanced competition they face: Maner, Gailliot, Rouby, and Miller (2007) found that attention directed toward threatening same-sex rivals was enhanced especially among sexually unrestricted females following a mating prime. Further, Cashdan (1996) notes that environments with many sexually unrestricted females can result in heightened intrasexual aggression, stating that, “A larger number of sexually unrestricted competitors, rather than just a shortage of desirable men, may lie behind the greater female-female aggression found in communities with low male parental investment” (p. 139). The evidence cited above could reflect increased intrasexual competition among unrestricted females seeking access to a variety of males with good genes, particularly when such men are in short supply. However, from this evidence it remains unclear whether unrestricted females face more intense competition relative to restricted females, or whether they are simply victimized more often due to being seen as a threat on the mating market. It may be the case that unrestricted females engaged in more self-reported gossip as a defensive maneuver, to protect threatened reputations, or as an offensive strategy to obtain and retain mates. Here it was predicted that sexually restricted females would engage in more frequent gossip sharing

due to the differing sexual strategies of males and females (Buss & Schmitt, 1993), rendering restricted, parental investing, long-term male mates a relatively scarce resource for which females compete.

Physical Formidability

Supporting the proposed Male Formidability hypothesis, it was found that among males but not females, as formidability decreased, gossip sharing increased (H3). Importantly, this suggests that while high formidability males may opt to select direct aggression tactics in mate competition on average, less formidable males pay a higher retaliation cost to do this, so they elect to use IA strategies such as malicious gossip instead. This indicates that males consciously or subconsciously consider vulnerability and retaliation costs, weighing them against potential benefits of winning when selecting their preferred aggression tactics, ultimately selecting IA when the costs of direct aggression are too high. It also aligns with Campbell's (1999, 2004) explanation for female IA, suggesting that because direct aggression is relatively uncommon among females due to the high cost of such aggression, physical size and strength is relatively unimportant in shaping females' aggression strategies. Presumably because physical aggression is relatively uncommon among females, physical formidability was unrelated to females' self-reported gossip sharing, as expected.

Interestingly, this male formidability effect emerged regardless of socio-sexuality—regardless of the level of mate competition they face due to their sexual attitudes and behaviors, it appears as though less formidable males tend to engage in more gossip sharing on average. This suggests that low formidability males engage in more gossip sharing across a range of contexts, including in competition for mates, status, and material resources.

Ultimately, this sex difference reflects the distinct evolutionary pressures faced by males and females on the mating market: while formidability is relevant to aggressive strategies employed by males due to the more extreme mate competition they face relative to females, this is less relevant to females who engage in less physical fighting due to their substantial parental investment duties and the lower intrasexual competition they face on average.

Dark Triad Personality Traits

With respect to the role of dark triad attributes in predicting gossip sharing (H4), more narcissistic and Machiavellian individuals reported more frequent gossip sharing, in line with predictions. Regarding the main effect of narcissism that emerged, it may be that highly narcissistic individuals report frequent gossip sharing—even if they do not gossip frequently—because doing so reflects positively on their social connectedness and social standing, helping narcissists protect their fragile egos. Machiavellian individuals presumably report more frequent gossip sharing because they use gossip as a social manipulation tactic. This finding indicates that males and females possessing dark triad personality traits (i.e., keen social manipulation skills) tend to engage in more gossip sharing than those who do not. However, there was no main effect of psychopathy on self-reported gossip sharing, suggesting that each dark triad subscale is somewhat unique, and that not all of the dark triad personality traits shape IA perpetration identically (or at all). Due to their interpersonal coldness and a lack of social connection (Baughman, Dearing, Giammarco, & Vernon, 2012), perhaps those high in psychopathy do not receive large amounts of gossip, and if they do receive it, perhaps they are more likely to withhold it. Further, it may be that psychopathic individuals are more likely to engage in more direct forms of aggression instead, including verbal and physical attacks. These results, differing based on the specific dark triad sub-scale

examined, index the importance of considering each dark triad subscale separately in future studies of indirect aggression. They also indicate that dark triad personality traits are important predictors of frequency of gossip sharing.

The significant sex by narcissism by SOI interaction indicated that the simple slopes of narcissism was significant for sexually unrestricted females, but not for restricted females or males, regardless of their SOI. Thus, females' sexual attitudes and behaviors do moderate the link between dark triad personality traits and self-reported gossip sharing, but in an unexpected direction. Because SOI can be considered a proxy for intrasexual competition, this effect of SOI reflects the importance of mate competition in shaping rates of gossip sharing. However, narcissism was particularly important in shaping gossip sharing among sexually unrestricted females. While all women likely face some degree of intrasexual competition, it may be the case that high SOI women actually face more competition than do low SOI women, a possibility that was discussed above. Alternatively, it may be that relative to restricted females, unrestricted females are simply more inclined to use gossip sharing in romantic competition because they have more juicy romantic gossip to share by virtue of the friendships and social connections with other sexually unrestricted females. Additional research is needed to test this possibility.

Among males, dissection of the three-way interaction revealed no significant effects of narcissism on gossip sharing, regardless of SOI. This effect diverged from the prediction that more narcissistic and sexually *unrestricted* males would engage in more frequent gossip sharing. This is surprising, particularly in light of the fact that dark triad traits have been associated with short-term mating strategies for men (Jonason, Li, Webster, & Schmitt, 2009). Further, given that sexual strategies and sexual selection theories together make clear

that males engage in and have evolved armaments for more intense mate competition due to their seeking more frequent access to more potential mates, and given that there is empirical evidence to suggest that unrestricted males indeed behave more aggressively, engaging in more direct aggression (e.g., delivering a loud noise blast) against potential same-sex rivals under a mating motive (Ainsworth & Maner, 2012), it is highly unlikely that this finding indicates a lack of mate competition among unrestricted males. Instead, it may be the case that regardless of SOI, males are more likely to use direct (i.e., physical fighting) rather than indirect forms of aggression (e.g., gossip) in mate competition. Ultimately, this three-way interaction indicates that links between the dark triad and gossip sharing are indeed moderated by females' sexual behaviors and attitudes. More specifically, the narcissism-gossip sharing link appears to be moderated by the degree of mate competition females face by virtue of their socio-sexual attitudes and behaviors. This suggests that the use or activation of dark triad attributes in IA is indeed shaped by sexual selection, and that gossip sharing is used as a tool in intrasexual mate competition.

Here we have evidence that gossip sharing is an IA tactic used by males and females alike, uniquely shaped by individual differences relevant to mate competition. Taken together, these findings indicate that socio-sexuality, sex, physical formidability, Machiavellianism, and narcissism are all predictors of gossip perpetration. Each of these predictors helps fill in our understanding of IA—and gossip more specifically—from an evolutionary perspective.

Limitations and Directions for Future Research

The present study provides new insights regarding predictors of male and female gossip from a mate competition perspective, including how sex interacts with formidability, socio-sexuality, and narcissism to shape self-reported gossip sharing. It paves the way for future work examining the operation of these individual differences with respect to other IA tactics, including social exclusion, contemptuous facial expressions, and rumor spreading.

Despite its merits, this study is not without limitations. One limitation is the use of single-item measure for self-reported gossip sharing. This measure was deemed appropriate due to shortcomings of existing scales—namely, Nevo et al.'s (1993) tendency to gossip questionnaire (TGC)—which uses the word “gossip” in several items (e.g., “I tend to gossip”), which could lead to substantial response bias insofar as individuals do not want to admit to gossiping. The TGC also has low face validity in that it measures some behaviors that many would not consider gossip (e.g., “I read gossip columns in newspapers,” “I like reading biographies of famous people,” “Usually I feel I know what is going on, who is going out with whom, etc.”). In the present study, the gossip sharing item did not explicitly include the word “gossip,” which was designed to eliminate potential social desirability biases. This may be especially important when studying males in particular, who may not want to admit to performing what could be seen as a stereotypically ‘female’ activity. Indeed, scholars have suggested that males may underreport their gossip behavior due to social expectations (Nevo et al., 1993). To address limitations of both existing measures and the single-item measure used in the present study, future research should develop alternative measures for both gossip sharing, a suggestion echoed by Foster (2004).

Study 2 aims to address some of these measurement limitations by making use of human coding and composite scales rather than single item measures to assess gossip cognitions. While the measurement of gossip is difficult due to a lack of conceptual clarity in the field (Wilson, Wilczynski, Wells, & Weiser, 2000), it could be made more precise if measures were developed for gossip sharing in different contexts, including in competition for mates, status, and resources, and for “benign” versus “malicious” gossip sharing (that is, sharing gossip with or without an intent to harm the target). Future research on gossip as an intrasexual competition strategy should also use gossip measures specific to the mating context, for example, “how often do you share information about the romantic lives of people who are not physically present in the conversation?” Not doing this in the present study was not deemed problematic due to the fact that many individuals may not be cognizant of precisely why they are gossiping, as it may serve mating needs indirectly and/or below conscious awareness. Further, the results from this study identifying links between individual differences such as socio-sexuality and gossip rates do indicate that frequency of general self-reported gossip sharing is indeed important in intrasexual mate competition processes. Finally, in addition to gossip sharing, *seeking out* malicious gossip to later pass along could also be an adaptive behavior, and as such should be explored in future studies.

Another measurement-related limitation in this study is the use of a self-perceived formidability measure rather than objective measures of physical size and strength, including height, weight, bicep circumference, and handgrip strength. In the context of the present study, perceptions of one’s physical formidability are believed to serve as an appropriate measure insofar as one’s perceptions of his size and strength likely directly shapes his evolved responses to social competition, including his use of IA versus physical aggression.

Indeed, perceptions may be more important than objective reality in shaping one's cost-benefit aggression analyses. For instance, a male who believes that he is smaller and weaker than others in his environment will behave accordingly, even if this belief is not true. Despite this, the results found here should be replicated with physical measures of formidability collected in a laboratory environment.

Future work examining the role of physical formidability in shaping gossip outcomes should also consider males' *comparative* formidability. In real-world competition, individuals 'size up' their competitors and use this information about their relative size and strength to determine which aggression strategies to use (i.e., direct versus indirect aggression). To address this reality, experimental studies should manipulate the comparative formidability of a hypothetical romantic rival and then ask male participants which types of aggression strategies they are most likely to employ, given the appearance of their rival. Further, these studies should also compare frequency and likelihood of using gossip versus direct aggression tactics, to assess the hypothesis that low formidability males tend to choose indirect *rather than* direct forms of aggression, and vice versa for high formidability males.

Further, while self-reported gossip sharing is measured in the present study, it would be interesting to examine precisely who the recipients of this gossip are likely to be. Future studies could assess the number of recipients, along with their sex, sexual orientation, and relationship to the sender. We might expect that females will actually share gossip with *fewer* same-sex others than will males due to the nature of female friendships, which tend to be more exclusive and tight-knit than male friendships (Björkqvist, Österman, & Kaukiainen, 1992; Lagerspetz, et al., 1988). Further, relative to males, females expect more symmetrical reciprocity, loyalty, self-disclosure, intimacy, and companionship on average (for a meta-

analysis, see Hall, 2011). This suggests that females may share equal amounts of gossip with one another, and equally “juicy” or malicious gossip. Further, those exhibiting this “gossip symmetry” might have stronger relational bonds than those with asymmetrical gossip sharing behavior. In line with this suggestion, gossip has been found to strengthen social bonds (Ellwardt, Steglich, & Wittek, 2012), so it is possible that relational intimacy increases as a function of gossip juiciness.

Finally, while the present research explores frequency of gossip sharing, future research might examine whether or not gossip is a *successful* mate competition strategy in evolutionary terms, meaning it helps the sender obtain more/higher quality mates, and more/higher quality offspring. If gossip accomplishes these goals, this provides further evidence that it is a sexually selected adaptation in humans, beneficial in mate competition. It may be the case that ‘successful’ gossips are those who prize quality (i.e., maliciousness) over quantity of gossip shared. Indeed, sharing gossip too frequently could damage an individual’s reputation and call its veracity into question (Foster, 2004).

Considering the above, it is clear that the present study has opened the door to abundant and exciting avenues for future exploration in the study of indirect aggression in evolutionary context. All in all, this work constitutes an important step forward in the study of IA, by assessing the role of socio-sexuality as a moderator of gossip sharing and highlighting the importance of physical formidability in male gossip perpetration, ultimately lending empirical credence to the popular expression, “small but mighty.”

Chapter VI. Study 2 – Gossip Cognitions

Gossip Females' Memory for and Perceptions of Gossip Varying in Threat Level

Study 2 had two central aims. The first was to examine two gossip-related cognitions that should enable success in female intrasexual mate competition: (1) enhanced memory for threatening romantic gossip messages, and (2) heightened perceptions of its juiciness (i.e., importance, entertainment value). While these outcomes have yet to be examined with respect to romantic gossip about a rival peer varying in threat level, both are important to consider, as they are likely required for future gossip sharing. If an individual does not react differently to different levels of gossip threat, and does not react to this intrasexual competition (i.e., not remembering who said what to whom, not perceiving threatening romantic messages to be juicy), then they are not likely to be successful in mate competition.

Further, given that previous studies assessing memory for gossip have not considered the role of individual differences relevant to mate competition as predictors, the second major goal of this study was to assess how socio-sexuality and dark triad attributes moderate these cognitive outcomes following exposure to a romantic prime and romantic gossip varying in threat level (i.e., depicting the behavior of a potential romantic rival). In line with the sexual selection account of gossip, these specific individuals who face intense mate competition should have better memory for threatening gossip and enhanced perceptions of its importance.

Beyond individual differences, features of the social context and gossip message itself should also play a role in shaping mate competition levels and thus IA outcomes. According to sexual selection theory, the aforementioned cognitive outcomes should be most likely to emerge when individuals are primed with a mating motive and when they are exposed to

highly threatening (versus moderately threatening or non-threatening) gossip about a potential romantic rival, both of which should amplify mate competition. For purposes of the present study, high threat gossip depicted promiscuous behaviors of a potential same-sex rival (i.e., having sex with a male), moderate threat gossip depicted moderately or ambiguously promiscuous behaviors of a potential same-sex rival (i.e., holding hands with a male), and low threat gossip depicted non-promiscuous behaviors of a potential same-sex rival (i.e., dancing with a male). Further, gossip threat level also varied as a function of attributions the speakers made for the target's behavior. The speakers made negative attributions for the target's behavior in the high threat gossip, insinuating the target had dishonorable motives (i.e., calling her a "bitch"). Attributions for the target's behavior were ambiguous in the moderate threat gossip (i.e., saying, "I'm not sure that that's something she would do"), whereas the speakers made positive attributions for the target's behavior in low threat gossip, insinuating the target had honorable motives (i.e., "she's just doing it to be friendly").

Ultimately, if gossip is a key conduit for intrasexual competition among women, then individual women who face and engage in more intense intrasexual competition (i.e., are sexually restricted and possess dark triad personality traits) should rely more heavily on gossip, and accordingly should have cognitive armaments enabling successful gossip perpetration, including a superior memory for more threatening romantic gossip, and heightened perceptions of its juiciness, the latter giving way to greater attendance to and memory for such messages. These effects should be further amplified for those exposed to a mating prime and high threat gossip. Ultimately, the hypothesized cognitive outcomes would

aid in effective tracking of rivals and successful future IA perpetration, giving rise to success in mate competition.

To test this, an experiment with a 3 (Gossip threat level: low/moderate/high threat) x 2 (Prime: romantic/control prime) factorial design was conducted. Following a romantic or control prime, female participants were exposed to gossip containing low, moderate, or highly threatening descriptions of a same-sex target who could be seen as a potential romantic rival. Threat was manipulated on the basis of the target's behaviors and hence her perceived sexual accessibility (i.e., hooking up, holding hands, or dancing), as well as speakers' explanations for these behaviors (i.e., she did it because she is 'a bitch,' enjoys attention from males, or is just a friendly person). Females' cognitive response to threat was assessed using free recall and recognition memory tests, as well as items assessing the perceived juiciness of the gossip (i.e., its importance and entertainment value).

Hypotheses

The hypotheses in the present study all rest on the assumption that humans possess cognitions enabling the successful use of IA, including gossip, in mate competition. These cognitions include heightened memory for the content of threatening gossip, and amplified perceptions of its juiciness. Both of these outputs are likely adaptive: they should facilitate successful IA perpetration by helping individuals closely attend to information relevant to mating, track rivals' behavior and relationships, and then retain and strategically share this damaging information when it is useful to do so.

This reasoning aligns with Smith, Jones, and Allan's (2013) proposed "adaptive mating mode"—a cognitive mode triggered by mating motives hypothesized to shape women's episodic memory for interactions with males whose physical characteristics (i.e.,

degree of facial masculinity) best match their mating strategy. Smith et al. found that sexually unrestricted women better remember details of the male source (specifically, the color of the picture frame containing his facial photograph) when he is highly masculine, whereas sexually restricted women better remember source details when he is more feminine-looking (Smith, Jones, & Allan, 2013).

The general logic underlying the “adaptive mating mode” for females’ episodic memory mirrors the present argument: because more threatening rivals are more relevant to females’ mating prospects, especially under a mating motive, information about particularly threatening female rivals should be better remembered and considered most interesting and important (i.e., juicy). Thus, it is hypothesized that as gossip threat level increases, so too will females’ memory for the content of gossip messages and their perceptions of its juiciness. These effects should be moderated by exposure to a romantic prime, as romantic primes have been found to amplify female mate competition (Maner, Gailliot, Rouby, & Miller, 2007; Maner, Miller, Moss, Leo, & Plant, 2012), further increasing one’s memory for threatening romantic gossip and amplifying their perceptions of its juiciness:

H1: Gossip threat level and prime will interact such that receipt of more threatening gossip will contribute to (a) superior recall of gossip, (b) superior recognition memory for gossip, and (c) heightened perceptions of gossip juiciness. Further, (d) these effects will be amplified among those exposed to a romantic compared to a control prime.

As in Study 1, it is proposed that individual differences linked with amplified mate competition moderate the functioning of the IA module, ultimately giving rise to adaptive cognitive responses to gossip messages. As was outlined earlier, relevant individual difference variables include socio-sexuality and dark triad attributes (i.e., Machiavellianism, narcissism, and psychopathy). Socio-sexuality reflects the level of intrasexual mate

competition one faces (e.g., Buss & Schmitt, 1993; Clutton-Brock & Vincent, 1991), and dark triad attributes are arguably a product of sexual selection meant to enable success in mate competition (e.g., Carter et al., 2015).

In general, restricted, long-term strategizing females—those seeking out committed long-term relationships—face more intense intrasexual mate competition (Campbell, 1995, 2004), and therefore engage in more IA (Griskevicius et al., 2009). This follows from sexual strategies theory, which states that females tend to prefer long-term strategies and are more sexually restricted, whereas males tend to prefer short-term strategies and are more sexually unrestricted (Buss & Schmitt, 1993; Schmitt, 2003; Symons, 1979). These competing sexual strategies result in intense female competition for access to like-minded restricted, long-term strategizing males, who are in relatively short supply.

Thus, compared to relatively sexually unrestricted females, those who are sexually restricted should face more competition over long-term mates, thereby increasing the motivation to use IA. Given this, long-term strategizing females likely have evolved memory and perceptual advantages aiding in the successful use of gossip as a mate competition tactic. Gossip messages depicting particularly threatening (i.e., promiscuous) same-sex rivals are likely to be best remembered and perceived as most juicy because this gossip has the most severe potential consequences for females' mating prospects. Exposure to a romantic prime, activating mate competition motives (long-term motives for sexually restricted females and short-term motives for sexually unrestricted females), should increase these cognitive outcomes further. Thus, H2 proposes that for females with restricted socio-sexualities, exposure to more threatening gossip should increase their memory for and perceived juiciness of gossip, particularly when paired with a romantic prime:

H2: Socio-sexuality, gossip threat level, and prime will interact such that relative to sexually unrestricted females, sexually restricted females will exhibit (a) superior recall of gossip, (b) superior recognition memory for gossip, and (c) heightened perceptions of gossip juiciness. Further, (d) these effects will be amplified as gossip threat level increases and (e) under a romantic prime.

A final predictor examined in this study is the dark triad—the cluster of distinct but related personality traits including Machiavellianism, narcissism, and psychopathy (Paulhus & Williams, 2002). Recall that broadly speaking, research on the dark triad indicates that those possessing dark triad attributes enjoy and are skilled at social manipulation (Byrne & Whiten, 1997; Christie & Geis, 2013), are competitive (Carter, Mantanaro, Linney, & Campbell, 2015), and are prone to indirect aggression perpetration (Baughman, Dearing, Giammarco, & Vernon, 2012; Bushman & Baumeister, 1998; Kerig & Stellwagen, 2010; Peeters, Cillseen, & Scholte, 2010). Further supporting the notion that dark triad attributes are sexually selected for success in mate competition, dark triad attributes have also been linked to romantic competitiveness (Carter et al., 2015) and seeking romantic revenge using tactics such as rumor spreading (Brewer et al., 2015).

Given that dark triad attributes appear to be sexually selected, here it is hypothesized that those with dark triad attributes should have cognitive armaments for successful use of gossip as an IA tactic in mate competition, including enhanced memory for gossip and heightened perceptions of its juiciness. For those with dark triad traits, costs associated with IA perpetration should be reduced and benefits increased due to the keen social manipulation abilities of Machiavellian, narcissistic, and psychopathic individuals, who are more likely to succeed in inflicting serious reputational damage through gossip and whose identities are less likely to be discovered by the target. These cognitive outcomes should be amplified for those with dark triad personalities who are also primed with a mating motive and exposed to highly

threatening gossip. Accordingly, H3 proposes that dark triad attributes will interact with gossip threat level and prime condition to shape individuals' cognitive responses to gossip:

H3: Dark triad personality traits will interact with gossip threat level and prime such that individuals who are higher on Dark Triad (Machiavellian, narcissistic, psychopathic) personality traits will exhibit (a) superior recall of gossip, (b) superior recognition memory for gossip, and (c) heightened perceptions of gossip juiciness. Further, (d) these effects will be amplified as gossip threat level increases and (e) under a romantic prime.

Evidence provided earlier detailing links between dark triad personality traits and IA perpetration suggests that each of the three traits operates slightly differently. For example, Machiavellianism associates with direct but not indirect aggression in children (Kaukianien et al., 1999), whereas psychopathy has been linked to both direct and indirect bullying in adults (Baughman, Dearing, Giammarco, & Vernon, 2012). Further, motivations underlying gossip perpetration as an IA tactic differ somewhat across dark triad traits, indicating that different environmental features of and/or psychological responses to the mate competition context might stimulate IA perpetration among narcissistic, psychopathic, and Machiavellian individuals respectively. For example, among psychopathic individuals, social enjoyment and harming others have been identified as motivations for gossip (Lyons & Hughes, 2015), whereas scholars have suggested that narcissistic individuals are driven to aggress (i.e., gossip) when faced with ego threats (Bushman & Baumeister, 1998). Despite this, extant research does not point to precisely which dark triad trait(s) will be most influential in shaping cognitive outcomes enabling successful gossip perpetration, including superior memory for gossip and heightened perceptions of its juiciness. Given this, a research question involving the dark triad is posed:

RQ1: Which dark triad personality trait(s) will be most influential in shaping gossip recall, recognition memory for gossip, and perceptions of gossip juiciness?

Methods

Participants

Four hundred and forty nine undergraduate students from a large public university in the U.S. participated in exchange for course credit. Males did not participate in this study due to the focus on female mate competition. The following participants were removed from analysis: male participants who had accidentally participated in the all-female study ($N = 2$), and non-heterosexual female participants, due to the study's interest in mate competition among heterosexual females ($N = 27$). Further, those who did not respond to any of the questionnaire items and/or were not exposed to a gossip condition because they had not progressed far enough in the study were removed from analysis ($N = 25$). This left a total of three hundred ninety five participants for data analysis, ranging in age from 18 to 34 years old (age $M = 19.34$, $SD = 1.45$). Of those who responded ($N = 392$), participants' racial/ethnic background was as follows: 37.2% White, 23.5% Asian American, 15.8% Hispanic/Latino, 15.1% multiple races, 4.8% Other, 2.6% African American, .8% Hawaiian/Pacific Islander, and .3% Native American/Alaska Native. In terms of relationship status, of those who responded ($N = 393$), 35.9% were in a committed relationship, 13.2% were casually dating, and 50.9% were not in a relationship.

Design and Procedure

Participants were randomly assigned to one condition of a 2 (Prime: control/mating prime) by 3 (Gossip threat: low, moderate, high) between-subjects factorial design, with $N = 60$ to 70 participants per cell. The one-hour online experiment was administered using Qualtrics software. Participants received a link to the experiment through the university's

research participation website and those who consented completed the study remotely. Participants were told they would complete a writing task, read a conversation, and then answer questions about their reactions to the message, their behaviors, attitudes, and feelings, including questions related to sexual behaviors and attitudes.

At the beginning of the study, participants were primed using a five-minute writing task and answered prime manipulation check questions immediately afterward. They were then instructed to carefully read one of nine (threat level and message content were counterbalanced) putative gossip conversations varying in threat level (details described below), imagining that it was a conversation shared between two of their close friends. To allow some time to pass before memory was assessed, a variety of items were presented next, including measures of socio-sexuality (i.e., sexual restrictedness), Machiavellianism, psychopathy, narcissism, and demographic attributes. After this was an unaided recall task: participants were asked to re-write the conversation exactly as they had seen it previously and in as much detail as possible. Following this, recognition memory for the gossip message was assessed using multiple-choice questions.

Motive Primes. To elicit a mating motive, participants completed a writing exercise. First, they were instructed to “list 5 things that make you feel sexual desire;” they were then told to “take the next 5 minutes to write in detail about a specific time when you felt intense sexual desire.” Those in the control prime condition wrote a list of five things that made them happy and then spent five minutes writing about a specific time they felt intense happiness. This control prime was designed to ensure that resulting perceptions and cognitive performance do not simply result from strong positive affective arousal. The writing primes were inspired by Maner, Gailliot, Rouby, and Miller (2007), and have been successfully

utilized to elicit mating motives in other studies (e.g., Maner, Miller, Moss, Leo, & Plant, 2012).

Two items assessing whether the mating prime aroused romantic feelings were scaled to create a manipulation check measure (1 *Not at all*, 7 *Very much*): “Right now, to what extent do you feel romantically aroused?” and “Right now, to what extent are you motivated to attract a romantic partner?” These items were inspired by those used in other mating prime studies (Maner, Gailliot, Rouby, and Miller, 2007). To assess the effectiveness of the prime, GLM was computed with the prime manipulation check score entered as the dependent variable and threat, prime, and their interaction entered as predictors. Results indicated that prime manipulation check scores were independent of threat level $F(2, 388) = 2.00, p = .14, \eta_{p2} = .01$, and were not significantly associated with prime condition, $F(1, 388) = .31, p = .58, \eta_{p2} = .001$. While non-significant, prime manipulation mean scores trended in the expected direction, with those in the mating prime condition reporting slightly more arousal ($M = 3.63, SD = 1.57$) than those in the control (i.e., happiness prime) condition ($M = 3.55, SD = 1.67$). Additionally, the prime by threat level interaction was not significant, $F(2, 388) = .14, p = .87, \eta_{p2} = .001$. Given all of this, analyses including the prime manipulation were still conducted.

Threat Level Manipulation. Three romantic gossip messages produced by participants in a previous study were used as inspiration and were further developed by the researcher to create nine gossip conversations—three versions of each of the three messages, varying in the level of perceived threat of the romantic rival in a mate competition context. Threat level was manipulated through the severity of the gossip target’s transgression (e.g., hanging out vs. flirting, vs. making out with another female’s boyfriend) and through

descriptions of the target's personality and interpretations of her behavior (e.g., "OMG. I totally knew she was up to something. That slut!" vs. "I've noticed she's pretty flirty...but I'm not sure she'd do that" vs. "I bet they were just catching up. [She's] a really nice, friendly person").

All gossip messages were approximately the same length, ranging from 61 to 112 words, and were divided into between 7 and 14 idea unit chunks, where longer messages contained more idea units. Word counts and the number of total idea units tended to be slightly higher for higher threat messages (see Appendix for all gossip messages used in the study, along with the number of idea units contained in each message). To assess the magnitude of the association between number of idea units and threat level, a GLM was computed with threat level predicting number of idea units. Results indicated that threat level was significantly associated with number of idea units, $F(2, 392) = 59.85, p < .001, \eta_{p2} = .23$. Further, in a multivariate GLM with number of idea units predicting gossip juiciness, recall, and recognition memory, small but significant effects were found for recall ($F(5, 351) = 5.61, p < .01, \eta_{p2} = .07$) and juiciness perceptions ($F(5, 351) = 5.56, p < .01, \eta_{p2} = .07$), but not for recognition memory ($F(5, 351) = 1.69, p = .14, \eta_{p2} = .02$). Including number of idea units as a covariate in analyses introduced a confound due to its link with gossip threat level: controlling for idea units could remove any effects of the threat manipulation. Importantly, however, the fact that higher threat messages contained more idea units actually worked *against* the hypothesis that high threat messages would be better remembered, and so provided a conservative test of this hypothesis. Further, results of analyses with and without the number of idea units as a covariate were nearly identical. Given all of this, number of

idea units was not retained as a covariate, and results including the idea unit variable are only reported when they differ from results gleaned without this covariate.

Pilot Study

A pilot study ($N = 75$) was conducted to determine whether the gossip messages indeed varied in perceived threat level among the target population, and hence were suitable stimuli for study 2. Pilot study participants consisted of 75 female undergraduate students who did not participate in study 2, age range 18-30 ($M = 19.61$, $SD = 1.77$), from diverse ethnic backgrounds (37.3% Hispanic, 24% white, 20% Asian American, 4% African American). Using a within-subjects design, nine gossip messages—three basic storylines each varying in threat level (low, moderate, and high) were tested for perceived help or harm to the gossip target's reputation (1 = harms a lot, 7 = helps a lot), and anger level of the speakers in the conversation (1 = not at all angry, 7 = very angry).

To assess whether the threat manipulation worked, a repeated measures GLM was computed with gossip threat level (i.e., low, moderate, high) entered as the independent variable and reputational damage to the target as the dependent variable. Because there were three different gossip storylines, storyline version and the storyline x threat level interaction were also included as independent variables in the model. Results revealed a significant effect of message threat level on perceived reputational damage to target ($F(2, 292) = 482.0$, $p < .001$, $\eta_p^2 = .87$), a main effect of storyline ($F(2, 292) = 4.22$, $p = .02$, $\eta_p^2 = .06$), and a significant threat by storyline interaction ($F(4, 292) = 17.27$, $p < .001$, $\eta_p^2 = .19$, see Figure 4 below). The magnitude of the interaction effect was very small compared with the magnitude of the threat level effect, and so was not a concern. Further assessing the effect of threat level condition on target reputation, pairwise contrasts indicated that means were in the expected

direction and pairwise comparisons between gossip threat levels were all significant at $p < .001$ (see Table 2 below). In general, high threat messages garnered the lowest scores (indicating the gossip target's reputation was likely harmed), followed by the moderate then low threat messages, which received the highest scores (indicating the gossip target's reputation was neither helped nor harmed, or even helped slightly by the gossip). This indicated that the threat level manipulation was successful across all three storyline variations, conceptualizing threat level as the degree to which a conversation helps or harms the target's reputation.

Further assessing the main effect of storyline, pairwise contrasts indicated that storyline 3 invoked more reputational harm relative to storyline 1 ($p = .01$) and storyline 2 ($p = .03$). However, there was no significant contrast in reputations between storylines 2 and 3 ($p = .52$). See Table 2 below for all descriptive statistics.

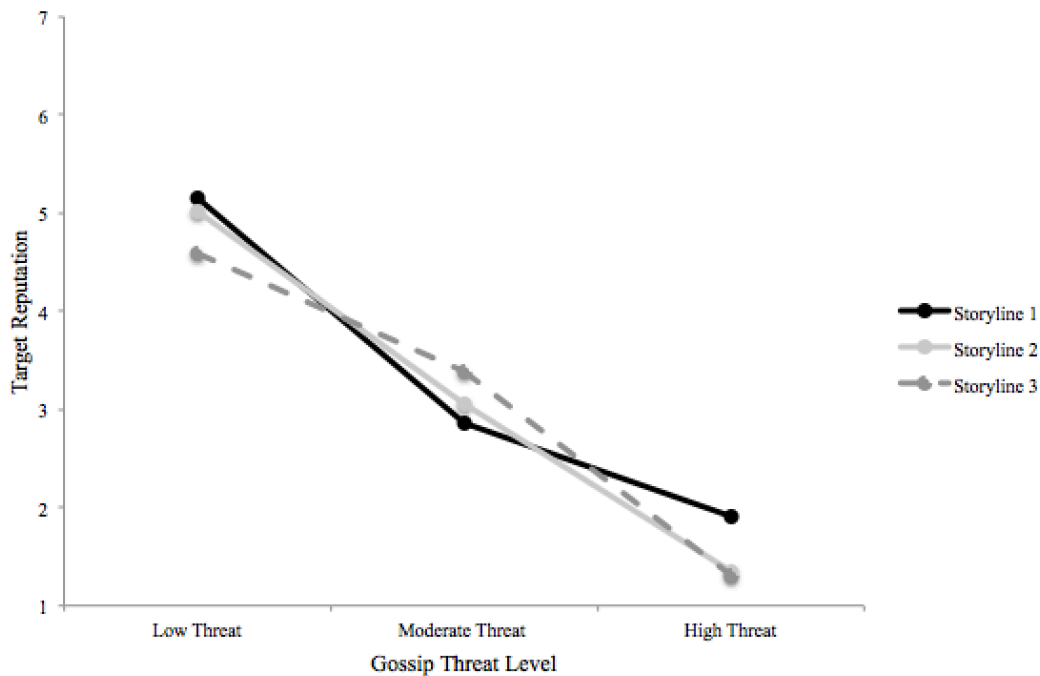


Figure 4. Assessing target reputation (1 = Harms a lot, 7 = Helps a lot) as a function of gossip threat level and storyline.

Table 2

Pilot Study Descriptive Statistics: Perceived reputational help or harm to target

Condition	<i>M</i>	<i>SD</i>
High threat storyline 1	1.91	0.74
Moderate threat storyline 1	2.86	0.75
Low threat storyline 1	5.15	1.3
High threat storyline 2	1.35	0.58
Moderate threat storyline 2	3.05	0.83
Low threat storyline 2	5.01	1.18
High threat storyline 3	1.31	0.57
Moderate threat storyline 3	3.38	1.08
Low threat storyline 3	4.58	1.32
Scores averaged across storylines		
	<i>M</i>	<i>SD</i>
High threat	1.52	0.47
Moderate threat	3.1	0.65
Low threat	4.91	1.03
Scores averaged across threat levels		
	<i>M</i>	<i>SD</i>
Storyline 1	3.31	.66
Storyline 2	3.14	.55
Storyline 3	3.09	.74

Note. 1 = Harms a lot, 7 = Helps a lot. $n = 74$.

A similar pattern was found when conceptualizing gossip threat level as the degree to which speakers were perceived to be angry during their conversation. Another repeated measures GLM was computed with gossip threat level (i.e., low, moderate, high) entered as the independent variable and speaker anger as the dependent variable. As in the previous analysis, because there were three different gossip storylines, storyline version and the storyline x threat level interaction were also included as independent variables in the model. Results revealed a very large and significant main effect of message threat level on speaker anger ($F(2, 292) = 660, p < .001, \eta_p^2 = .90$), a main effect of storyline ($F(2, 292) = 16.39, p < .001, \eta_p^2 = .18$), and a significant threat by storyline interaction ($F(4, 292) = 43.37, p < .001, \eta_p^2 = .37$, see Figure 5 below). The magnitude of the interaction effect was small compared

with the magnitude of the threat level effect, and so was not a concern. Further assessing the effect of threat level condition on speaker anger, pairwise contrasts indicated that means were all in the expected direction and all contrasts were all significant at $p < .001$, with high threat messages eliciting most anger, followed by moderate threat then low threat messages (see Table 3 below). Overall, converging evidence from target reputation and anger variables indicates that the threat level manipulation was successful across storylines. Given this, it was deemed appropriate to compile the three storylines based on their threat level in study 2, resulting in three low threat gossip messages, three moderate threat gossip messages, and three high threat gossip messages.

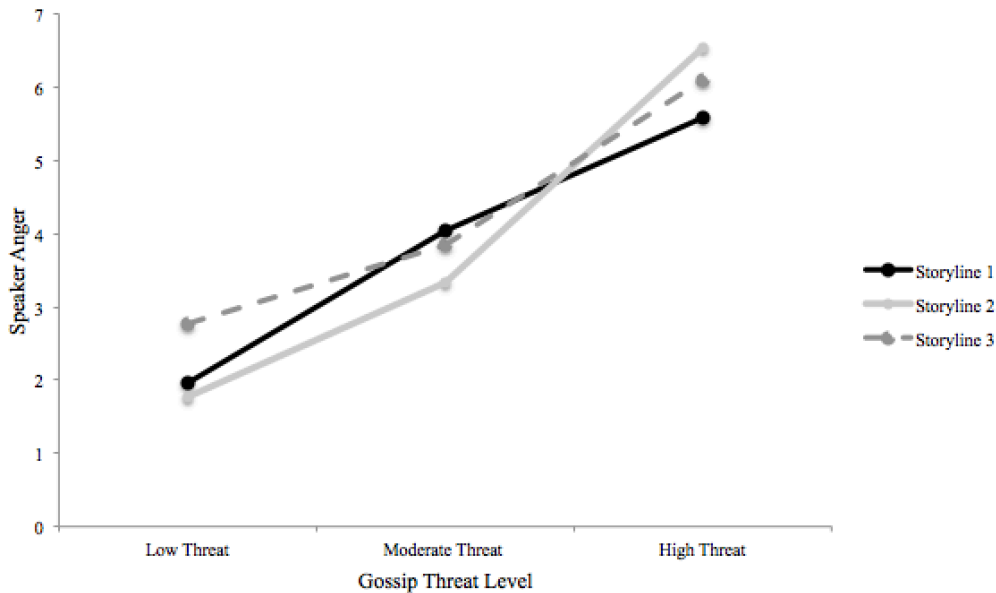


Figure 5. Assessing target reputation (1 = Not at all angry, 7 = Very angry) as a function of gossip threat level and storyline.

Table 3

Pilot Study Descriptive Statistics: Perceived anger of speakers in the conversation

Condition	<i>M</i>	<i>SD</i>
High threat storyline 1	5.58	0.99
Moderate threat storyline 1	4.05	1.06
Low threat storyline 1	1.96	0.96
High threat storyline 2	6.53	0.83
Moderate threat storyline 2	3.34	1.1
Low threat storyline 2	1.77	1
High threat storyline 3	6.09	1.06
Moderate threat storyline 3	3.84	1.12
Low threat storyline 3	2.77	1
<hr/>		
Scores averaged across storylines	<i>M</i>	<i>SD</i>
High threat	6.07	0.84
Moderate threat	3.74	0.87
Low threat	2.17	0.82
<hr/>		
Scores averaged across threat levels	<i>M</i>	<i>SD</i>
Storyline 1	3.87	.79
Storyline 2	3.88	.66
Storyline 3	4.23	.78

Note. 1 = Not at all angry, 7 = Very angry. *n* = 74

Recall Coding Procedure

Two research assistants who were blind to gossip message condition independently coded responses to tabulate a recall memory score for each participant, who were asked to re-write the gossip message they had seen earlier in as much detail and as completely as possible. Following the procedure used by Wissman and Rawson (2015) and Moè (2016), the researcher and research assistants divided gossip stimuli into idea units corresponding to key ideas or phrases. When an idea unit from the stimulus appeared anywhere in a participant's free recall response, they received 1 point for that idea, and when that idea unit was absent,

they received a zero for that idea. Coders were trained to assign credit to content that captured the “gist” of a given idea unit—that was semantically the same or nearly the same if not lexically or syntactically identical to the original. This was considered appropriate given that the most evolutionarily relevant information encoded in the conversations is likely who did what to whom, rather than specific grammatical details of the conversations. Participants’ phrases could not be “double counted,” or assigned credit for multiple idea units from the original stimulus message. During training, coders were instructed to count central actions from the message (e.g., flirting vs. making out vs. hooking up) as correct only if subjects remembered that specific central action. After three rounds of practice recall coding using subsets of the dataset, reliability was established on 50 cases, or 12% of the dataset ($ICC = .81$, 95% CI from .68 to .89). The remaining gossip conversations were then divided between the two research assistants for coding. Conversations from practice coding—to which final scores were assigned following discussion—were retained in the dataset.

Measures

Dark Triad. As in study 1, dark triad attributes were measured using Jonason and Webster’s (2010) Dirty Dozen scale. Items were on a 1-9 scale, with higher scores indicating the possession of more Dark Triad Attributes. Each of the subscales were reliable:

Machiavellianism: $\alpha = .81$, $M = 3.55$, $SD = 1.69$, narcissism: $\alpha = .82$, $M = 4.91$, $SD = 1.76$, psychopathy: $\alpha = .74$, $M = 2.39$, $SD = 1.43$.

Socio-Sexuality. Participants’ socio-sexuality was measured with the 9-item revised socio-sexual orientation inventory (SOI-R; Penke, 2011). Items reflecting causal sexual behavior, attitudes toward causal sex, and desire for romantic encounters with others were all averaged together for use in this study, as in study 1. On a scale of 1 = *Totally disagree* to 5 =

Totally agree, higher scores indicate less restricted socio-sexualities. The scale was reliable, $\alpha = .88$, $M = 2.37$, $SD = .86$.

Gossip Juiciness. Perceived gossip juiciness was assessed using a 6-item Gossip Juiciness scale created for use in the present study. On a scale of 1 = *Not at all*, 7 = *Very much*, items included: “How juicy/interesting/scandalous/exciting/shocking was this conversation?” and “How fun was it to read this conversation?” The scale was reliable, $\alpha = .92$, $M = 3.47$, $SD = 1.43$.

Recognition Memory for Gossip. Participants’ recognition memory for the gossip message presented in the study was measured using a 3-item multiple-choice test assessing subjects’ memory of information contained in the gossip message: “Which of the following is a sentence/phrase directly from the conversation you saw earlier?,” “Which of the following best describes what happened in the conversation?,” and “How did the conversation end?” Responses for each item were scored by research assistants based on gossip condition (1 = *Correct*, 0 = *Incorrect*), using an answer key devised by the researcher, and were summed to yield a total recognition memory score for each participant, ranging from 0 to 3 ($M = 2.29$, $SD = .78$).

Gossip Recall. Participants’ memory for the content of gossip messages was assessed using an open-ended recall measure in which participants were asked to re-write the gossip message they had seen earlier in as much detail and as completely as possible. Research assistants coded these open-ended responses using the idea-unit method described above, taking into account the specific gossip conversation version to which the subject had been exposed. The percentage of idea units correctly recalled (scores ranging from 0 to 1) was then computed for each participant ($M = .47$, $SD = .19$).

Additional items measured included demographics such as age, sexuality, relationship status, and race/ethnicity. Further, the study included a single item sleepiness measure as used by Akerstedt and Gillberg, 1990, assessing subjects' subjective level of sleepiness versus alertness (1 = *Extremely alert*, 9 = *Very sleepy, great effort to keep awake*; $M = 4.30$, $SD = 2.01$). Because sleepiness did not affect results of analyses (see correlations between sleepiness and dependent variables in Table 3 below), sleepiness was not retained as a covariate.

Results

Data Screening

Variables were screened for missing data, normality, linearity, homogeneity of error variance (i.e., homoscedasticity), independence of errors, multicollinearity, and outliers. Little's MCAR test, computed with all variables included in analyses, indicated that the data were missing at random, $\chi^2(242) = 208.79, p = .94$. Given this, along with the relatively large sample size without missing cases (N ranging from 369 to 395 cases remaining after excluding missing data for each variable) missing data were excluded from analyses. Bivariate correlations between all variables were computed (see Table 4 below), and correlations were not problematically high—all were well below $p = .70$ —indicating that multicollinearity was not a concern. No outliers were identified using the z -score cutoff of positive or negative 3.29 (Tabachnick & Fidell, 2013).

Using a cutoff value of positive or negative 3.2 for significant skew and kurtosis (Field, 2009; Kim, 2013), socio-sexuality was substantially skewed ($z_{skew} = 3.82$), as was psychopathy ($z_{skew} = 8.41$), and Machiavelianism ($z_{skew} = 3.76$). Socio-sexuality was square

root transformed, which brought skew to acceptable levels but increased kurtosis somewhat ($z_{skew} = 1.24$, $z_{kurtosis} = -3.39$). Psychopathy was \log_{10} transformed, improving skew but also increasing the kurtosis value ($z_{skew} = 2.15$, $z_{kurtosis} = -4.48$). Machiavellianism was square root transformed to reduce skew, but this resulted in increased kurtosis as well ($z_{skew} = .08$, $z_{kurtosis} = -3.35$). In cases where the transformation did not bring both skew and kurtosis to the 3.2 cut-off point, the transformation optimizing both skew and kurtosis was retained in analyses. All independent variables used in analyses were standardized for ease of comparability (i.e., z-scores were computed for dark triad attributes and socio-sexuality).

All hypotheses were tested using the general linear model. Significant interactions were followed up with simple slopes and simple effects analyses. All analyses were run both with and without number of idea units in the gossip message (a measure of the length of the message) as a covariate. Including the covariate did not change results in the vast majority of cases, so results of analyses including this covariate are only reported below when doing so affected the results of analyses. In these cases, results are reported both with and without the covariate. Results for each hypothesis in turn are described below.

To correct for potential Type I errors that can arise due to the number of models tested, Bonferroni corrections were applied to post-hoc simple slope analyses when interaction effects diverged from predictions. The normal p values are reported in each analysis, and these values are evaluated against Bonferroni-corrected criteria for significance (i.e., more conservative alpha levels required for significance).

Table 4
Correlation matrix of transformed variables

Variable	1	2	3	4	5	6	7	8	9
1. Juiciness	--								
2. Gossip recognition memory	.12*	--							
3. Gossip recall	.10	.37***	--						
4. SOI (socio-sexuality)	-.02	.06	-.02	--					
5. Psychoopathy	.09	-.07	-.02	.21***	--				
6. Machiavellianism	.13*	.01	.01	.29***	.49***	--			
7. Narcissism	.17**	-.01	.03	.22***	.27***	.54***	--		
8. Sleepiness	-.12*	-.01	-.02	-.03	.05	.04	-.06	--	
9. Gossip idea units	.04	-.09	-.24***	.02	.01	-.04	.002	-.01	--

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Prime and Threat Level Analyses

H1 predicted a main effect of gossip threat level and a significant prime by threat level interaction, with higher threat gossip together with a romantic prime leading to superior memory for gossip and heightened perceptions of its juiciness. To test H1, a series of univariate GLM analyses were computed, one for each of the three dependent variables—gossip recall, recognition memory for gossip, and perceptions of gossip juiciness. In each model, gossip threat level, prime condition, and their interaction were entered as predictor variables.

Recall. For recall the GLM revealed a significant main effect of gossip threat level on gossip recall, $F(2, 374) = 4.83, p = .01, \eta_p^2 = .03$, but no evidence for a main effect of prime condition, $F(1, 374) = .32, p = .58, \eta_p^2 = .001$, and no evidence for a threat level by prime interaction, $F(2, 374) = .17, p = .85, \eta_p^2 = .001$. Pairwise comparisons assessing the main effect of threat level on recall indicated that those in the low threat condition ($M = .51, SD = .20$) had better recall than those in the moderate ($M = .45, SD = .19, p = .01$) and high threat conditions ($M = .45, SD = .16, p = .01$). In an identical analysis including number of idea units as a covariate, this main effect of threat level disappeared: $F(2, 373) = 2.61, p = .08, \eta_p^2 = .01$. Given this, H1a was not supported, nor was H1d (predicting an effect of the romantic prime) for recall.

Recognition Memory. For recognition memory the GLM indicated a significant main effect of gossip threat level, $F(2, 362) = 4.46, p = .01, \eta_p^2 = .02$. However, there was no evidence for a main effect of prime condition, $F(1, 362) = .04, p = .84, \eta_p^2 < .001$, and no evidence for a prime by threat level interaction, $F(2, 362) = .61, p = .54, \eta_p^2 = .003$. Follow-up pairwise comparisons for the threat level main effect indicated that participants in the

moderate threat condition ($M = 2.43$, $SD = .71$) had higher recognition memory scores than those in the high threat condition ($M = 2.13$, $SD = .89$), $p = .003$. No other contrasts were significant (all $p > .05$), including contrasts with the low threat condition ($M = 2.30$, $SD = .72$). Thus, H1b was not supported, nor was H1d (predicting an effect of romantic prime) for recognition memory.

Juiciness. For gossip juiciness, the GLM again showed a main effect of gossip threat level, $F(2, 387) = 11.79$, $p < .001$, $\eta_p^2 = .06$. Follow-up pairwise comparisons for the threat level main effect indicated that high threat messages ($M = 3.98$, $SD = 1.37$) were perceived to be juicier than both low threat ($M = 3.13$, $SD = 1.40$, $p < .001$) and moderate threat messages ($M = 3.33$, $SD = 1.41$, $p = .001$). This supports H1c, predicting that higher threat gossip would associate with higher perceived juiciness. There was no evidence for a main effect of prime condition, $F(1, 387) = .86$, $p = .35$, $\eta_p^2 = .002$. However, there was a significant threat level by prime interaction, $F(2, 387) = 5.31$, $p = .005$, $\eta_p^2 = .03$ (see Figure 6 below).

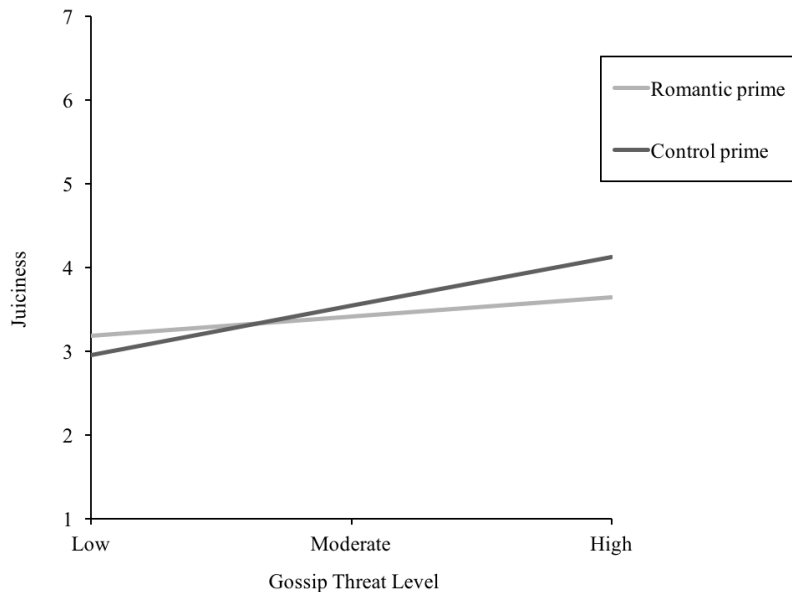


Figure 6. Test of H1, assessing gossip juiciness as a function of gossip threat level and prime condition.

As can be seen in Figure 6, results deviated from predictions. To probe the significant threat level x prime interaction, simple effects were computed with Bonferroni corrections. A total of three models were tested, so results were evaluated at an adjusted alpha level of $p = .017$. Within the control prime, the perceived juiciness of the message was greater in the high than low threat condition, $B = 1.16$, $SE_B = .23$, $\beta = .38$, $t(387) = 5.04$, $p < .001$, and greater in the high than moderate threat condition, $B = 1.14$, $SE_B = .23$, $\beta = .37$, $t(387) = 4.94$, $p < .001$. Further, there was an effect of prime among those exposed to high threat gossip, such that the romantic prime (relative to the control prime) contributed to *lower* gossip juiciness scores, $B = -.74$, $SE_B = .24$, $\beta = -.26$, $t(387) = 3.02$, $p = .003$.

Within the romantic prime condition, there was no evidence for any significant pairwise comparisons for perceived gossip juiciness (all $p > .08$). Given that effects were found in the control but not romantic prime condition, H1d, predicting that the *romantic* prime would moderate effects, was not supported for gossip juiciness perceptions. Indeed, the data contradicted the hypothesis.

Socio-sexuality Analyses

H2 predicted that more sexually restricted females would exhibit increased memory for gossip, particularly when exposed to threatening gossip and a romantic prime. A series of univariate GLM analyses were computed for each dependent variable—gossip recall, recognition memory for gossip, and perceptions of gossip juiciness. Each GLM was a three-factor between-subjects factorial model with socio-sexuality added as a continuous, standardized moderator of threat and prime.

Recall. On recall the GLM revealed a main effect of threat level, $F(2, 366) = 4.73$, $p = .01$, $\eta_p^2 = .03$ as reported in H1, and as in H1, including number of idea units as a covariate

rendered this effect non-significant: $F(2, 366) = 2.49, p = .08, \eta_p^2 = .01$. No evidence was found for an effect of socio-sexuality, $F(1, 366) = .32, p = .57, \eta_p^2 = .001$, or prime condition, $F(1, 366) = .12, p = .73, \eta_p^2 < .001$. Thus H2a, predicting a main effect of socio-sexuality on recall, was not supported. Further, no evidence of significant interactions emerged, including prime by socio-sexuality, $F(1, 366) = .54, p = .47, \eta_p^2 = .001$, threat level by socio-sexuality, $F(2, 366) = 1.03, p = .36, \eta_p^2 = .01$, threat level by prime, $F(2, 366) = .18, p = .84, \eta_p^2 = .001$, and prime by threat by socio-sexuality, $F(2, 366) = .52, p = .60, \eta_p^2 = .003$. Given this, H2d-e, predicting interactions with threat level and romantic prime condition, were not supported for recall.

Recognition Memory. On recognition memory the GLM revealed a significant main effect of threat level as reported in H1, $F(2, 354) = 4.93, p = .01, \eta_p^2 = .03$. However, there was no evidence for main effects of prime condition, $F(1, 354) = .18, p = .67, \eta_p^2 = .001$, or socio-sexuality, $F(1, 354) = 1.98, p = .16, \eta_p^2 = .01$. Thus H2b, predicting an effect of socio-sexuality on recognition memory for gossip, was not supported. Further, none of the interactions in the model were significant: prime by socio-sexuality, $F(1, 354) = .12, p = .74, \eta_p^2 < .001$, threat level by socio-sexuality, $F(2, 354) = 1.10, p = .33, \eta_p^2 = .01$, threat level by prime, $F(2, 354) = .76, p = .47, \eta_p^2 = .004$, or prime by threat by socio-sexuality, $F(2, 354) = 2.04, p = .13, \eta_p^2 = .01$. Therefore, H2d-e, predicting interactions with threat level and romantic prime condition, were not supported for recognition memory.

Juiciness. Finally, on gossip juiciness the GLM revealed a main effect of threat level as observed in H1, $F(2, 377) = 11.58, p < .001, \eta_p^2 = .06$. However, main effects for prime condition, $F(1, 377) = 1.40, p = .24, \eta_p^2 = .004$, and socio-sexuality, $F(1, 377) = .63, p = .43, \eta_p^2 = .002$, were non-significant. Thus H2c, predicting an effect of socio-sexuality on gossip

juiciness, was not supported. A significant prime by threat level interaction was found as reported in H1, $F(2, 377) = 4.33, p = .01, \eta_p^2 = .02$. The remaining two-way interactions were non-significant: threat by socio-sexuality, $F(2, 377) = 2.04, p = .13, \eta_p^2 = .01$, and prime by socio-sexuality, $F(1, 377) = .66, p = .42, \eta_p^2 = .002$. However, a significant three-way interaction emerged, $F(2, 377) = 3.10, p = .046, \eta_p^2 = .02$ (see Figure 7 below).

As can be seen in Figure 7, effects diverged from predictions. Based on the figure, targeted simple slopes analyses were conducted to decompose the significant three-way interaction, and Bonferroni corrections were applied to these analyses. Slopes were computed for those exposed to the romantic prime and moderate threat gossip, the control prime and high threat gossip, and the control prime and low threat gossip, each at both high and low levels of SOI (+1 and -1 SD, respectively). Thus, a total of six models were run, and effects were evaluated at a Bonferroni adjusted alpha level of $p = .008$.

Among those exposed to the control prime (top panel of Figure 7), there was no effect of SOI for those in the low threat condition, $B = -.32, SE_B = .16, \beta = -.22, t(377) = -2.00, p = .046$, or for those in the high threat condition, $B = .24, SE_B = .15, \beta = .17, t(377) = 1.60, p = .11$. Simple slopes of threat were next conducted for those in the control prime condition at low and high levels of SOI (i.e., 1 SD above and below the mean).

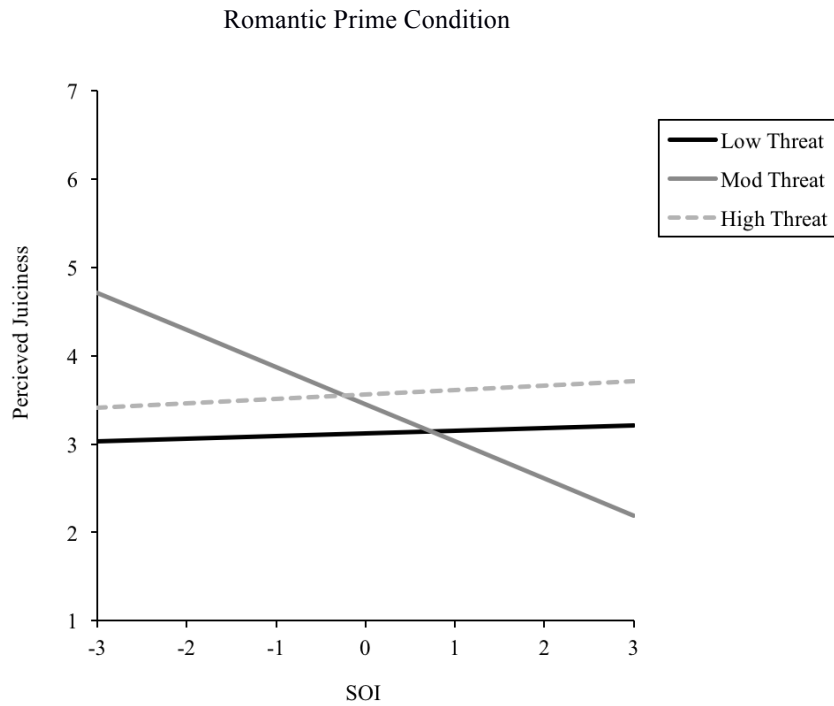
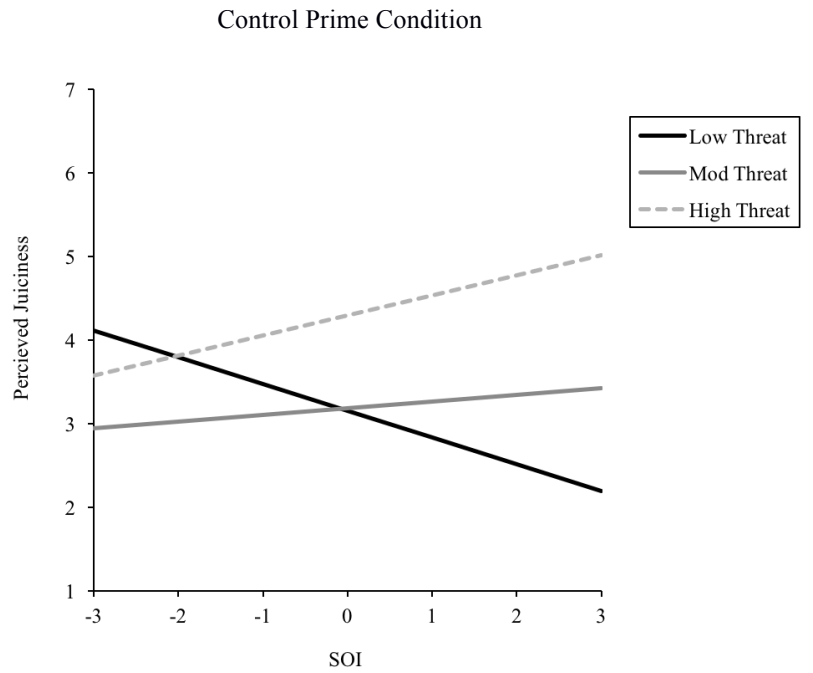


Figure 7. Test of H2, assessing gossip juiciness as a function of SOI (standardized scores) and threat level under the control prime (top) and romantic prime (bottom).

For participants who were high on SOI (i.e., sexually unrestricted), the simple slope contrasting the moderate and low threat conditions was not significant ($B = -.43$, $SE_B = .33$, $\beta = -.14$, $t(377) = -1.30$, $p = .20$), but the simple slope contrasting the high versus moderate threat conditions was significant ($B = 1.27$, $SE_B = .33$, $\beta = .42$, $t(377) = 3.88$, $p < .001$), as was the simple slope contrasting the high versus low threat conditions ($B = 1.70$, $SE_B = .31$, $\beta = .56$, $t(377) = 5.47$, $p < .001$), indicating that high threat gossip was perceived to be juicier than both moderate and low threat gossip. For those low on SOI (i.e., sexually restricted), the simple slope contrasting the moderate and low threat conditions was not significant ($B = -.37$, $SE_B = .32$, $\beta = -.12$, $t(377) = -1.16$, $p = .25$), nor was the simple slope contrasting the high and low threat conditions ($B = .57$, $SE_B = .33$, $\beta = .19$, $t(377) = 1.76$, $p = .08$). However, the simple slope contrasting the high versus moderate threat conditions was significant ($B = .94$, $SE_B = .32$, $\beta = .31$, $t(377) = 2.99$, $p = .003$), indicating that high threat gossip was perceived to be juicier than moderate threat gossip.

Among those exposed to the romantic prime, the simple slope of SOI was not significant in the moderate threat condition, $B = -.42$, $SE_B = .20$, $\beta = -.30$, $t(377) = -2.10$, $p = .04$. Simple slopes of threat were next conducted for those in the romantic prime condition at low and high levels of SOI (i.e., 1 SD above and below the mean). For participants who were high on SOI (i.e., sexually unrestricted), the simple slope contrasting the low and moderate threat conditions was not significant ($B = -.13$, $SE_B = .39$, $\beta = -.04$, $t(377) = -.33$, $p = .75$), nor was that contrasting the moderate and high threat conditions ($B = .58$, $SE_B = .39$, $\beta = .19$, $t(377) = 1.49$, $p = .14$). For those low on SOI (i.e., sexually restricted), the simple slope contrasting the moderate versus low threat conditions was not significant ($B = .79$, $SE_B = .35$,

$\beta = .26, t(377) = 2.23, p = .03$), nor was the simple slope contrasting the moderate versus high threat conditions ($B = -.36, SE_B = .38, \beta = -.12, t(377) = -.97, p = .33$).

Given all of this, H2d, predicting an interaction between socio-sexuality and threat level in shaping gossip juiciness, was partially supported. Among those exposed to the control prime, sexually restricted females perceived high threat gossip to be juicier than moderate threat gossip as predicted. However, unexpectedly, a similar effect was found for sexually unrestricted females, who also perceived high threat gossip as juicier than low threat gossip. Further, no effects were found for those exposed to the romantic prime. Ultimately, H2e—predicting amplified juiciness perceptions for restricted females exposed to the romantic versus control prime—was not supported.

Dark Triad Analyses

H3 predicted that individuals higher on dark triad attributes would have stronger memory for gossip and higher juiciness perceptions, particularly when gossip was threatening and provided under a romantic prime. Further, RQ1 asked which dark triad attribute(s) would have the strongest effect on the hypothesized cognitive outcomes. To test H3 and answer RQ1, a series of univariate GLM analyses were computed, one for each dependent measure: recall, recognition memory, and gossip juiciness. Each analysis treated one dark triad subscale as a moderator of threat and prime, while controlling for the other two subscales, for a total of nine analyses. As was noted previously, results of analyses including number of idea units as a covariate are reported only when they affected the results of analyses.

Recall. The GLM assessing affects of psychopathy on recall was computed first. Results revealed a significant main effect of threat level as reported in H1, $F(2, 364) = 4.10$,

$p = .02$, $\eta_p^2 = .02$, which disappeared when including number of idea units as a covariate in the model as described in H1, $F(2, 363) = 2.17$, $p = .12$, $\eta_p^2 = .01$. No main effects of prime, $F(1, 364) = .14$, $p = .71$, $\eta_p^2 < .001$, or psychopathy emerged, $F(1, 364) = .02$, $p = .89$, $\eta_p^2 < .001$. Further, the dark triad attributes included as controls were both non-significant (narcissism: $F(1, 364) = .13$, $p = .72$, $\eta_p^2 < .001$; Machiavellianism: $F(1, 364) = .03$, $p = .87$, $\eta_p^2 < .001$). Thus, H3a—predicting an effect of the dark triad on recall—was not supported for psychopathy. No significant interaction effects were found for prime by threat level, $F(2, 364) = .12$, $p = .89$, $\eta_p^2 = .001$, or prime by psychopathy, $F(1, 364) = 1.51$, $p = .22$, $\eta_p^2 = .004$. However, there was a borderline significant threat by psychopathy interaction, $F(2, 364) = 2.95$, $p = .054$, $\eta_p^2 = .02$ (see Figure 8 below). The three-way prime by threat by psychopathy interaction was not significant, $F(2, 364) = 1.32$, $p = .27$, $\eta_p^2 = .01$.

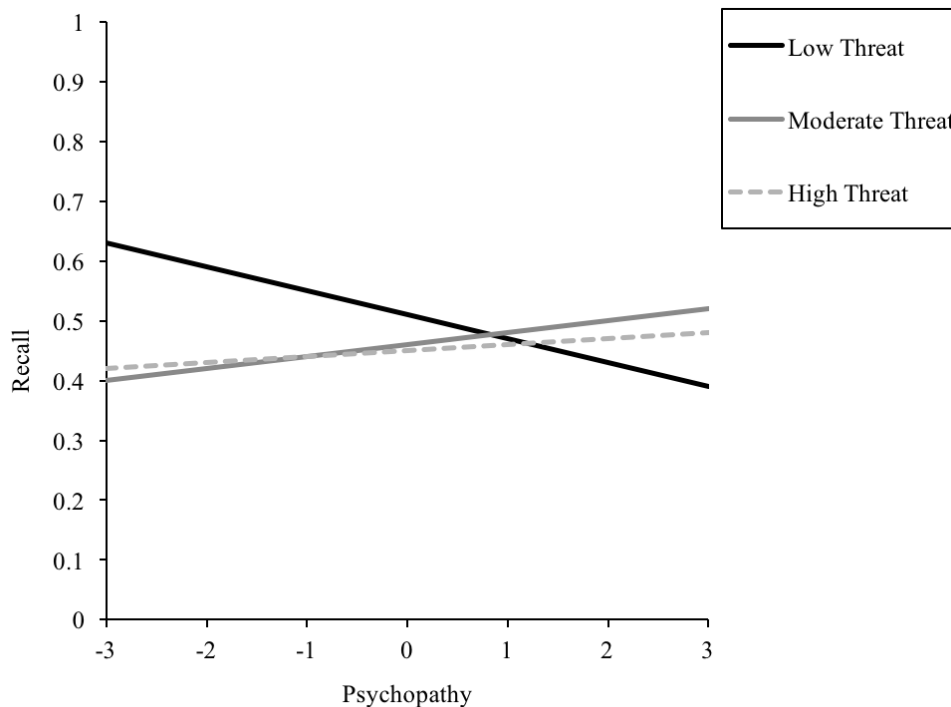


Figure 8. Test of H3, assessing gossip recall as a function of psychopathy (standardized scores) and gossip threat level.

Due to an unexpected pattern of results (See Figure 8 above), the significant interaction effect of threat level by psychopathy on recall was followed up with targeted simple slopes analyses with Bonferroni corrections. A total of 2 models were computed (psychopathy slopes for low threat gossip at high and low psychopathy levels), so effects were evaluated at an adjusted alpha level of $p = .025$. Among those in the low threat condition, the simple slope of psychopathy on recall was not significant, $B = -.04$, $SE_B = .02$, $\beta = -.19$, $t(375) = -2.23$, $p = .03$. Simple slopes of threat were next conducted at low and high levels of psychopathy (i.e., 1 SD below and above the mean). For those who were low on psychopathy, there was a significant simple slope contrasting the low versus high threat conditions ($B = -.11$, $SE_B = .03$, $\beta = -.27$, $t(375) = -3.31$, $p = .001$), indicating that low threat gossip was better recalled than high threat gossip, and a significant simple slope contrasting the moderate versus low threat conditions ($B = .12$, $SE_B = .03$, $\beta = .30$, $t(375) = 3.62$, $p < .001$), indicating that low threat gossip was better recalled than moderate threat gossip. In contrast, for those high on psychopathy, the simple slope contrasting the low versus high threat conditions was not significant ($B = -.03$, $SE_B = .03$, $\beta = -.07$, $t(375) = -.80$, $p = .43$), nor was the simple slope contrasting the moderate versus low threat conditions ($B = -.003$, $SE_B = .04$, $\beta = -.01$, $t(375) = -.10$, $p = .93$). Ultimately, this fails to support H3d, predicting that those higher in psychopathy and exposed to higher threat gossip would have superior recall. Similarly, H3e—predicting interaction effects with prime condition, was not supported.

The GLM assessing the effect of narcissism on recall was computed next. Results revealed a significant main effect of threat level as reported in H1, $F(2, 364) = 4.25$, $p = .02$, $\eta_p^2 = .02$, but as in H1 this effect disappeared when controlling for number of idea units in the message, $F(2, 364) = 2.48$, $p = .09$, $\eta_p^2 = .01$. No main effects of prime, $F(1, 364) = .30$, $p =$

.59, $\eta_p^2 = .001$, or narcissism emerged, $F(1, 364) = .21, p = .65, \eta_p^2 = .001$. Further, the dark triad attributes included as controls were both non-significant (psychopathy: $F(1, 364) = .04, p = .85, \eta_p^2 < .001$; Machiavellianism: $F(1, 364) = .05, p = .82, \eta_p^2 < .001$). Thus, H3a—predicting a main effect of the dark triad on recall—was not supported for narcissism. No significant interaction effects were found for prime by threat level, $F(2, 364) = .09, p = .91, \eta_p^2 < .001$, or prime by narcissism, $F(1, 364) = .04, p = .84, \eta_p^2 < .001$. However, a significant threat by narcissism interaction emerged, $F(2, 364) = 4.15, p = .02, \eta_p^2 = .02$ (see Figure 9 below). The three-way interaction was not significant, $F(2, 364) = .93, p = .40, \eta_p^2 = .01$.

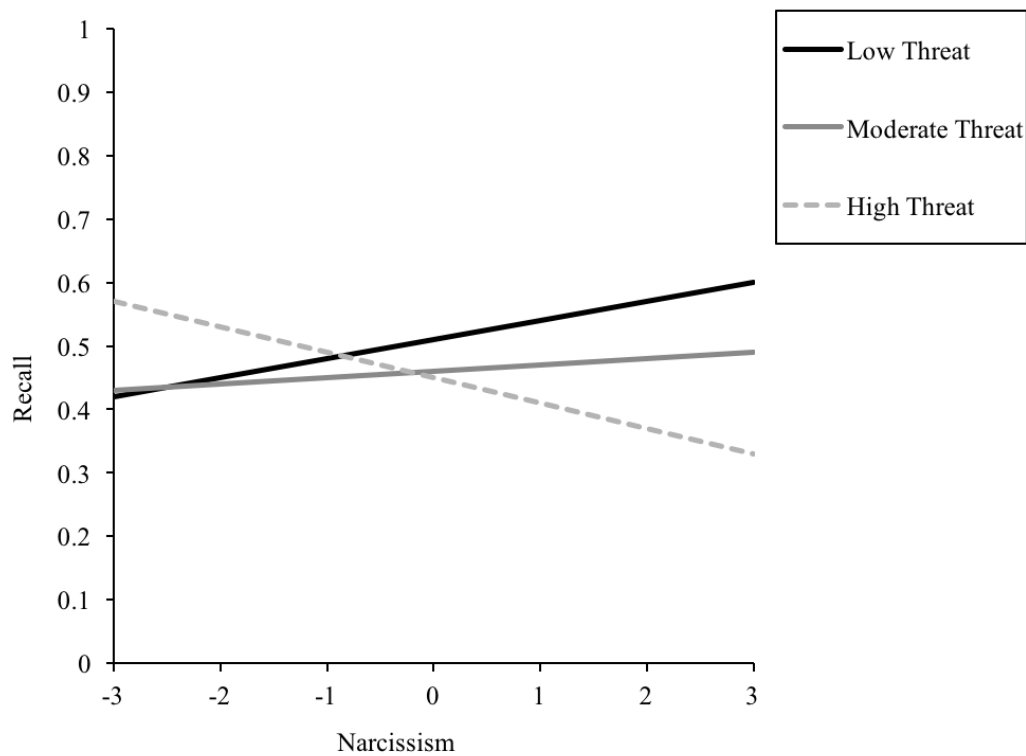


Figure 9. Test of H3, assessing gossip recall as a function of Narcissism (standardized scores) and gossip threat level.

As can be seen in Figure 9, interaction effects diverged from predictions. Given this, the significant interaction effect of threat level by narcissism on recall was followed up with targeted simple slopes analyses with Bonferroni corrections. Simple slopes were computed for narcissism at low and high gossip threat levels, and at low and high levels of narcissism (1 SD above and below the mean). Thus, a total of 4 models were run, and results were evaluated at a Bonferroni corrected alpha of $p = .013$. Within the low threat condition, the simple slope of narcissism was not significant, $B = .03$, $SE_B = .02$, $\beta = .17$, $t(374) = 1.97$, $p = .049$. Further, within the high threat condition, the simple slope of narcissism was not significant, $B = -.04$, $SE_B = .02$, $\beta = -.19$, $t(374) = -2.07$, $p = .04$. Simple slopes of threat were next conducted at low and high levels of narcissism. For those who were high on narcissism, the simple slope contrasting high and low threat gossip conditions was significant ($B = -.13$, $SE_B = .03$, $\beta = -.33$, $t(374) = -4.05$, $p < .001$), indicating that low threat gossip was better recalled than high threat gossip. The simple slope comparing low versus moderate threat conditions was not significant, $B = .07$, $SE_B = .03$, $\beta = .19$, $t(374) = 2.24$, $p = .03$, nor was the slope comparing the high versus moderate threat conditions, $B = .06$, $SE_B = .03$, $\beta = .14$, $t(374) = 1.70$, $p = .09$. For those who were low on narcissism, the simple slope contrasting high and low threat gossip was not significant ($B = .003$, $SE_B = .03$, $\beta = .01$, $t(374) = .09$, $p = .93$), nor was that contrasting the low versus moderate threat conditions ($B = .04$, $SE_B = .03$, $\beta = .10$, $t(374) = 1.23$, $p = .22$), or that contrasting the moderate versus high threat conditions ($B = .04$, $SE_B = .03$, $\beta = .11$, $t(374) = 1.29$, $p = .20$). Ultimately, this does not support H3d, predicting that those higher in narcissism and exposed to higher threat gossip would have superior recall. Higher narcissism was associated with increased recall for *low* relative to

high threat gossip. Additionally, H3e—predicting interaction effects with prime condition, was not supported.

A GLM assessing the effect of Machiavellian personality traits on recall was computed next. Results revealed a significant main effect of threat level as reported in H1, $F(2, 364) = 4.33, p = .01, \eta_p^2 = .02$, but as in H1 this effect disappeared when controlling for number of idea units $F(2, 363) = 2.34, p = .10, \eta_p^2 = .01$. No main effects of prime, $F(1, 364) = .30, p = .58, \eta_p^2 = .001$, or Machiavellianism emerged, $F(1, 364) = .06, p = .80, \eta_p^2 < .001$. Further, the dark triad attributes included as controls were both non-significant (psychopathy: $F(1, 364) = .10, p = .75, \eta_p^2 < .001$; narcissism: $F(1, 364) = .34, p = .56, \eta_p^2 = .001$). Thus, H3a—predicting an effect of dark triad attributes on recall—was not supported for Machiavellianism. No significant interaction effects were found: for prime by threat level, $F(2, 364) = .09, p = .91, \eta_p^2 = .001$, prime by Machiavellianism, $F(1, 364) = .03, p = .88, \eta_p^2 < .001$, threat by Machiavellianism, $F(2, 364) = .54, p = .59, \eta_p^2 = .003$, or threat by prime by Machiavellianism, $F(2, 364) = .41, p = .66, \eta_p^2 = .002$. Given this, H3d and H3e—predicting interaction effects with threat level and prime condition, respectively, were not supported.

Recognition Memory. A GLM assessing the affect of psychopathy on recognition memory was computed first. Results revealed a significant effect of threat level as in H1, $F(2, 353) = 4.67, p = .01, \eta_p^2 = .03$. No significant main effects were found for prime, $F(1, 353) = .02, p = .88, \eta_p^2 < .001$, or psychopathy, $F(1, 353) = 2.55, p = .11, \eta_p^2 = .01$. Further, the remaining two dark triad traits included as controls were both non-significant (narcissism: $F(1, 353) = .08, p = .78, \eta_p^2 < .001$; Machiavellianism: $F(1, 353) = .45, p = .50, \eta_p^2 = .001$). Thus, H3b—predicting a main effect of dark triad attributes on recognition memory—was not supported for psychopathy. No significant interaction effects were found: prime by threat

level, $F(2, 353) = .53, p = .59, \eta_p^2 = .003$, prime by psychopathy, $F(1, 353) = 2.66, p = .10, \eta_p^2 = .01$, threat by psychopathy, $F(2, 353) = .39, p = .68, \eta_p^2 = .002$, or prime by threat by psychopathy, $F(2, 353) = .06, p = .95, \eta_p^2 < .001$. Given this, H3d and H3e—predicting interaction effects with threat level and prime condition—were not supported when considering the effect of psychopathy on recognition memory.

The GLM assessing affects of narcissism on recognition memory revealed a significant effect of threat level as in H1, $F(2, 353) = 4.03, p = .02, \eta_p^2 = .02$. However, this effect was rendered borderline significant when including number of idea units as a covariate: $F(2, 353) = 2.69, p = .07, \eta_p^2 = .02$. No main effects of prime, $F(1, 353) = .12, p = .73, \eta_p^2 < .001$, or narcissism emerged, $F(1, 353) = .22, p = .64, \eta_p^2 = .001$. Further, the remaining two dark triad traits included as controls were both non-significant (psychopathy: $F(1, 353) = 2.23, p = .14, \eta_p^2 = .01$; Machiavellianism: $F(1, 353) = .57, p = .45, \eta_p^2 = .002$). Thus, H3b—predicting an effect of dark triad attributes on recognition memory—was not supported for narcissism. No significant interaction effects were found for prime by threat level, $F(2, 353) = .66, p = .52, \eta_p^2 = .004$, prime by narcissism, $F(1, 353) = .64, p = .42, \eta_p^2 = .002$, threat by narcissism, $F(2, 353) = .55, p = .58, \eta_p^2 = .003$, or threat by prime by narcissism, $F(2, 353) = 1.23, p = .30, \eta_p^2 = .01$. Given this, H3d and H3e—predicting interaction effects with threat level and prime condition—were not supported when considering the effect of narcissism on recognition memory.

A GLM assessing the affect of Machiavellian personality traits on recognition memory was computed next. A significant main effect of threat level was found as in H1, $F(2, 353) = 4.87, p = .01, \eta_p^2 = .03$, but no main effects of prime, $F(1, 353) = .19, p = .66, \eta_p^2 = .001$, or Machiavellianism emerged, $F(1, 353) = .40, p = .53, \eta_p^2 = .001$. Further, the

remaining two dark triad traits included as controls were both non-significant (psychopathy: $F(1, 353) = 2.25, p = .14, \eta_p^2 = .01$; narcissism: $F(1, 353) = .09, p = .76, \eta_p^2 < .001$). Thus, H3b—predicting an effect of dark triad attributes on recognition memory—was not supported for Machiavellianism. No significant interaction effects were found for prime by threat level, $F(2, 353) = .74, p = .48, \eta_p^2 = .004$, prime by Machiavellianism, $F(1, 353) = 1.07, p = .30, \eta_p^2 = .003$, threat by Machiavellianism, $F(2, 353) = 1.39, p = .25, \eta_p^2 = .01$, or threat by prime by Machiavellianism, $F(2, 353) = 1.37, p = .26, \eta_p^2 = .01$. Given this, H3d and H3e—predicting interaction effects with threat level and prime condition—were not supported when considering the effect of Machiavellianism on recognition memory.

Juiciness. A GLM assessing the effect of psychopathy on perceived gossip juiciness revealed a significant main effect of threat level as in H1, $F(2, 375) = 11.38, p < .001, \eta_p^2 = .06$. No effects were found for prime, $F(1, 375) = .51, p = .47, \eta_p^2 = .001$, or psychopathy, $F(1, 375) = .86, p = .35, \eta_p^2 = .002$. Further, of the remaining two dark triad traits included as controls, narcissism was significant but Machiavellianism was not (Machiavellianism: $F(1, 375) = .20, p = .662, \eta_p^2 = .001$; narcissism: $F(1, 375) = 4.06, p = .045, \eta_p^2 = .01$). Thus, H3c—predicting a main effect of dark triad attributes on perceived gossip juiciness—was not supported for psychopathy. A significant prime by threat level interaction was found as in H1, $F(2, 375) = 5.37, p = .01, \eta_p^2 = .03$, as was a significant threat by psychopathy interaction, $F(2, 375) = 4.79, p = .01, \eta_p^2 = .03$ (see Figure 10 below). The prime by psychopathy interaction was not significant, $F(1, 375) = .03, p = .87, \eta_p^2 < .001$, nor was the three-way prime by threat by psychopathy interaction, $F(2, 375) = 1.26, p = .29, \eta_p^2 = .01$.

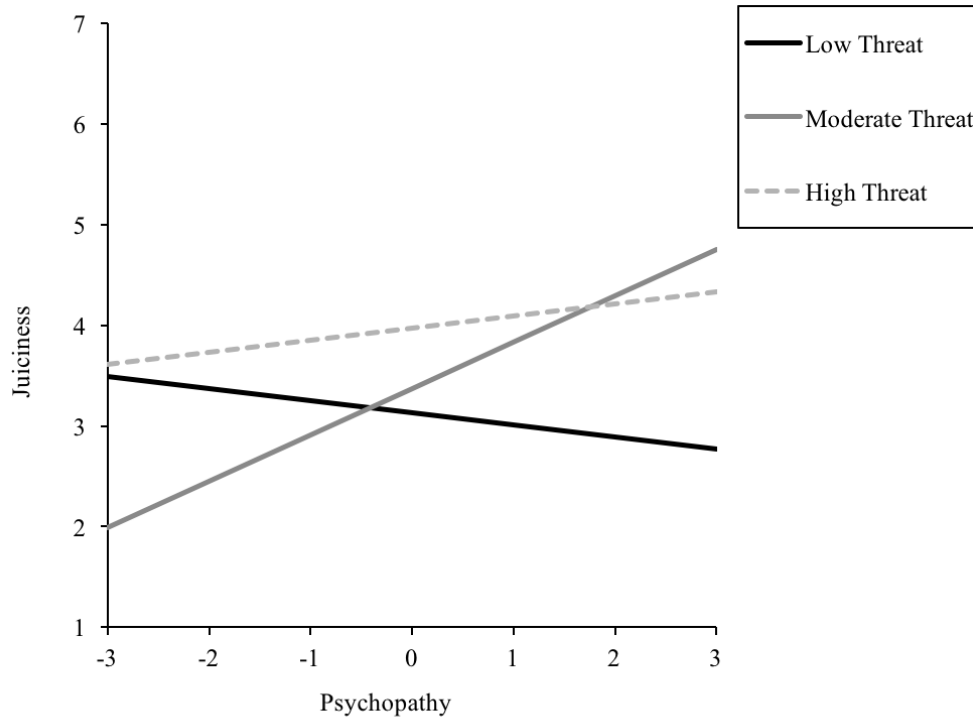


Figure 10. Test of H3, assessing gossip juiciness as a function of psychopathy (standardized scores) and gossip threat level. The simple slope for moderate threat gossip is significant.

As can be seen in Figure 10, the nature of the interaction effect deviated from predictions. Thus, the threat level by psychopathy interaction with respect to gossip juiciness perceptions was followed up with targeted simple slopes analyses with a Bonferroni correction. Effects were assessed at low and moderate threat levels, and at low and high levels of psychopathy. Thus, a total of 4 models were tested, so results were evaluated at a Bonferroni adjusted alpha level of $p = .013$. Among those in the low threat condition, no effect of psychopathy was found, $B = -.12$, $SE_B = .11$, $\beta = -.08$, $t(386) = -1.04$, $p = .30$. Among those in the moderate threat condition, a significant effect of psychopathy emerged ($B = .46$, $SE_B = .13$, $\beta = .32$, $t(386) = 3.51$, $p = .001$), indicating that increases in psychopathy associated with increased juiciness perceptions. Simple slopes of threat were next conducted at low and high levels of psychopathy (i.e., 1 SD above and below the mean). For those who

were high on psychopathy, the simple slope contrasting the low versus high threat gossip conditions was significant ($B = -1.08, SE_B = .23, \beta = -.36, t(386) = -4.66, p < .001$), as was that contrasting the moderate and low threat conditions ($B = .82, SE_B = .25, \beta = .27, t(386) = 3.33, p = .001$), indicating that high and moderate threat gossip were both judged to be juicier than low threat gossip. However, the simple slope contrasting the high and moderate threat conditions was not significant ($B = -.26, SE_B = .25, \beta = -.09, t(386) = -1.05, p = .29$). For those who were low on psychopathy, the simple slope contrasting the high versus low threat gossip conditions was significant ($B = .60, SE_B = .24, \beta = .20, t(386) = 2.53, p = .01$), as was that contrasting the high and moderate threat conditions ($B = -.94, SE_B = .24, \beta = .31, t(386) = -3.85, p < .001$), together indicating that high threat gossip was judged as juicier than both low and moderate threat gossip. The simple slope contrasting the moderate and low threat conditions was not significant ($B = .34, SE_B = .24, \beta = .11, t(386) = 1.42, p = .16$).

Ultimately, this provides partial support for H3d, predicting a psychopathy x threat level interaction with respect to perceived gossip juiciness. As predicted, higher psychopathy associated with higher juiciness perceptions, albeit only in the moderate threat condition. Also in line with predictions, among those high in psychopathy, high and moderate threat gossip were judged as juicier than low threat gossip. Finally, H3e—predicting interaction effects with prime condition, was not supported.

A GLM assessing the effect of narcissism on juiciness perceptions was computed next. There was a significant main effect of threat level as reported in H1, $F(2, 375) = 11.32, p < .001, \eta_p^2 = .06$, and narcissism, $F(1, 375) = 5.26, p = .02, \eta_p^2 = .01$. To assess the direction of the narcissism main effect, a follow-up regression indicated that increases in narcissism associated with increases in juiciness ratings, $B = .24, SE_B = .07, \beta = .17, t(389) =$

3.33, $p = .001$. Thus, H3c—predicting a main effect of dark triad attributes on perceived gossip juiciness—was supported for narcissism. No main effect of prime emerged, $F(1, 375) = .62, p = .43, \eta_p^2 = .002$. Further, the remaining two dark triad traits included as controls were both non-significant (Machiavellianism: $F(1, 375) = .39, p = .53, \eta_p^2 = .001$; psychopathy: $F(1, 375) = .12, p = .73, \eta_p^2 < .001$). A significant effect was found for prime by threat level as reported in H1, $F(2, 375) = 4.96, p = .01, \eta_p^2 = .03$, but none of the other interactions were significant: prime by narcissism, $F(1, 375) = .70, p = .41, \eta_p^2 = .002$, threat by narcissism, $F(2, 375) = 1.30, p = .27, \eta_p^2 = .01$, or threat by prime by narcissism, $F(2, 375) = .06, p = .95, \eta_p^2 < .001$. Given all of this, H3d-e—predicting interactions with threat and prime condition, respectively, were not supported.

A GLM assessing the effect of Machiavellianism on juiciness perceptions was computed next. A significant main effect of threat level was found, as reported in H1, $F(2, 375) = 9.43, p < .01, \eta_p^2 = .05$, but no main effects of prime, $F(1, 375) = .23, p = .63, \eta_p^2 = .001$, or Machiavellianism emerged, $F(1, 375) = .19, p = .66, \eta_p^2 = .001$. Further, of the remaining two dark triad traits included as controls, narcissism was significant but psychopathy was not (narcissism: $F(1, 375) = 5.25, p = .02, \eta_p^2 = .01$; psychopathy: $F(1, 375) = .16, p = .69, \eta_p^2 < .001$). Thus, H3c—predicting a main effect of dark triad attributes on perceived gossip juiciness—was supported for Machiavellianism. A significant interaction effect was found for prime by threat level as in H1, $F(2, 375) = 5.36, p = .01, \eta_p^2 = .03$, but no evidence for a significant prime by Machiavellianism interaction was found, $F(1, 375) = 2.34, p = .13, \eta_p^2 = .01$. Further, the threat by Machiavellianism interaction was not significant, $F(2, 375) = 1.36, p = .26, \eta_p^2 = .01$, nor was threat by prime by Machiavellianism,

$F(2, 375) = 1.48, p = .23, \eta_p^2 = .01$. Given all of this, H3d-e—predicting interactions with threat and prime condition, respectively, were not supported.

Answering RQ1, results from the analyses above indicate that narcissism and psychopathy had the strongest effect on both gossip recall and perceptions of gossip juiciness. None of the dark triad attributes were significantly associated with recognition memory for gossip.

Discussion

In Study 2, cognitive outcomes associated with successful gossip perpetration in a mate competition context were assessed. If it is true that gossip is a sexually selected armament aiding in the acquisition and retention of mates, it follows that females who face more intense mate competition (i.e., those who are sexually restricted) and those with psychological armaments for successful indirect aggression perpetration (i.e., dark triad personality traits) would have cognitive adaptations for successful gossip perpetration specifically, and hence more success in mating. In line with this logic, the central goal of this experiment was to assess predictors of two gossip-related cognitions: (1) perceptions of gossip juiciness, and (2) memory for gossip messages. Both of these cognitive outputs likely enable successful future gossip perpetration, thereby conferring a competitive advantage on the mating market. For instance, perceiving threatening messages to be juicy (i.e., exciting, interesting) should facilitate closer attention to the message, thereby allowing females to gather important social information and track potential rivals and allies on the mating market. Similarly, enhanced memory for gossip seen as threatening is also evolutionarily advantageous, as it allows females to store damaging social information about others and strategically share it later, when beneficial to the sender.

A second goal of this study was to assess the potential moderating role of individual difference variables relevant to heightened female intrasexual competition (i.e., SOI, dark triad personality attributes) in shaping gossip cognitions. It was hypothesized that females possessing attributes, which serve as proxies for mate competition, would exhibit amplified gossip-related cognitions (i.e., heightened juiciness perceptions and memory for gossip), particularly under a mating motive and when exposed to threatening gossip.

To accomplish these goals, the perceived threat level of gossip messages was manipulated, with more threatening messages depicting more threatening romantic behaviors of female rivals (e.g., mate poaching vs. flirting vs. simply holding hands with someone). It was predicted that threatening gossip, together with a romantic prime eliciting mating motives, would enhance females' gossip cognitions, specifically their perceptions of gossip juiciness and memory for gossip. The moderating role of socio-sexuality and the dark triad were also assessed.

Gossip Threat Level and Prime Condition

Results of H1, assessing the role of experimental and prime condition on cognitive outcomes, failed to support predictions with respect to recall. Neither gossip threat level (when controlling for number of idea units in the message), prime condition, nor prime x threat level significantly impacted gossip recall, which may reflect the difficulty of the recall task, assessing the accuracy of subjects' memory for all content of the message rather than simply the gist. It may be that selection does not favor memory for specific conversational turns, but instead for the gist of messages, as the latter is less cognitively costly and presumably still relatively accurate on average. Alternatively, these results may reflect the idea that selection favors cognitive biases rather than complete accuracy. With respect to

memory, here the assumption was made that selection should be for accuracy of gossip content, particularly for threatening gossip and among those facing more intense intrasexual competition. In other words, the more accurately the details of a message are recalled, the better. This fidelity argument maintains that there are fitness benefits for accurately recalling and sharing details of threatening gossip with others, including thwarting romantic rivals and maintaining the trust of allies. Further, there are fitness costs for engaging in unnecessary aggression that results from a failure to correctly recall gossip. For instance, when individuals recall gossip as more threatening than it actually was, and they pass this incorrect information along to others, the sender risks losing allies' trust and gaining unnecessary enemies. In contrast, remembering gossip as less threatening than it actually was could result in a failure to share the gossip or a failure to sufficiently damage a rival's reputation, ultimately dampening the gossip's mating prospects. Ultimately, in assessing the threat level of a given gossip message, the fidelity argument maintains that recollection of details is important, including accurate recall of specific conversational turns.

An alternative to the fidelity argument is the error management argument, which considers receivers' impressions the message and its threat level filtered through human biases in cognition. This argument is based on error management theory (EMT), which maintains that cognitive biases have arisen in our evolutionary history and are adaptively beneficial when they minimize the cost of potentially fitness-damaging errors (Haselton & Buss, 2000; Haselton & Nettle, 2006). The EMT argument maintains that people will over-perceive threat within gossip, and that individuals who are particularly likely to experience costs by not attending to such gossip (i.e., those who face and make use of more intense intrasexual competition) will be more likely to over-perceive aggressive intent. This "better

safe than sorry” approach might work particularly well for those with keen IA perpetration abilities, including those high in dark triad traits and physical formidability who can fend off potential enemies using tactics such as gossip. Indeed, over-perceiving threat and engaging in more subsequent aggression as a result could help demonstrate to others that you are a dangerous enemy to steer clear from. Future research should address gossip perpetration from the perspective of EMT, examining conditions under which individuals will over-perceive threat within gossip.

With respect to H1 results for recognition memory, it was found that threat level *did* impact recognition memory, but not in the expected direction: content of moderately threatening gossip was better recognized than content of high threat gossip. This may be because ambiguous threats are potentially most damaging of all, and are thus particularly important to recognize and track. This finding aligns with the error management explanation outlined above, suggesting that individuals over-perceived the threat level of moderately threatening gossip. Another possibility is that due to its ambiguity, moderately threatening gossip is particularly mutable—it can be molded into lower or higher threat gossip as it is retold, depending on the needs of the gossip sharer. As such, it could be particularly useful to remember moderate threat gossip. There was also a significant main effect of threat level on perceptions of gossip juiciness as predicted: high threat gossip was seen as juicier than both low and moderate threat gossip, presumably because high threat gossip depicts the most scandalous, promiscuous acts (e.g., mate poaching). Counter to predictions, though, moderate threat gossip was not seen as juicier than low threat gossip on average, perhaps due to the ambiguity of the threat depicted in moderate threat gossip (e.g., “flirting” may be considered more or less scandalous depending on the gossip recipient). Ultimately, this suggests that

heightened juiciness perceptions may not directly improve recognition memory, as recognition memory was superior for moderate versus high threat gossip, but the later was seen as juicier.

Finally, the hypothesized prime x threat level interaction with respect to perceived gossip juiciness was significant, but the direction of effects ran counter to predictions: in the high threat condition, those exposed to the romantic prime reported significantly *lower* juiciness scores on average than those in the control prime condition. This result may have emerged because the romantic prime—asking participants to recount a time they felt romantically aroused—was juicier than even the high threat gossip messages, contributing to a dampening effect that lowered gossip juiciness perceptions across gossip threat level conditions. Indeed, the romantic prime manipulation may not have elicited strong romantic motives for all participants, because it may have come as a surprise to participants when they were asked to recount romantic experiences. This dampening effect may have contributed to the lack of significant findings with respect to prime condition. However, in the control prime condition, effects aligned with expectations, with high threat gossip perceived as juicier than both low and moderate threat gossip.

Socio-sexuality

Analyses featuring socio-sexuality (H2) indicated that unexpectedly, SOI had no effect on recall or recognition memory, nor did SOI in combination with prime condition and gossip threat level. It may be that even though restricted females face more intrasexual competition on average and hence are likely to make more frequent use of gossip as an IA tactic, sexually unrestricted females also make use of romantic gossip about peers, and are hence also motivated to remember it, regardless of its threat level.

The significant 3-way prime condition x threat level x SOI interaction with respect to gossip juiciness perceptions indicated that for sexually unrestricted females exposed to the control prime, high threat gossip was deemed juicier than both low and moderate threat gossip, which aligns with predictions. However, for sexually restricted females exposed to the control prime, high threat gossip was also judged to be juicier than moderate threat gossip. This suggests that gossip threat level can shape juiciness perceptions regardless of SOI. It appears as though females' juiciness perceptions (i.e., the perceived interestingness, scandal, and excitement of gossip) reflect distinctions between more and less severe threats depicted in gossip, or between more and less *certain* threats, given that moderately threatening gossip was depicted a more ambiguous threat compared with high and low threat gossip.

Unexpectedly, no effects of gossip threat level or SOI were found for juiciness perceptions among those exposed to the romantic prime. The relatively explicit nature of the romantic prime may have lowered the perceived interestingness, excitement, and scandal of moderately and highly threatening gossip among females whose written responses to the prime may have been juicier than the gossip messages to which they were exposed in the study. Indeed, the explicit nature of the romantic prime may have desensitized all participants somewhat, contributing to relatively low juiciness ratings across threat conditions (Romantic prime and low threat: $M = 3.12$, moderate threat: $M = 3.53$, high threat $M = 3.56$; Compared with control prime and low threat: $M = 3.14$, moderate threat: $M = 3.16$, high threat: $M = 4.30$).

Dark Triad Personality Traits

Analyses featuring dark triad attributes (H3 and RQ1) indicated that dark triad traits did not influence recognition memory for gossip, alone or in combination with gossip threat level and prime condition. The relative lack of findings with respect to recognition memory in these analyses and across the study might reflect the notion that recognizing gossip content is less evolutionarily advantageous than recalling gossip content. Indeed, in real world contexts, individuals often must recall the content of gossip they previously received to pass it to others, without the help of prompts (i.e., multiple choice responses) to assist them in remembering. Additionally, the lack of findings with respect to recognition memory across hypotheses may also be partially due to the low variance in recognition scores (scores all ranged from 1 to 3, with roughly 85% of participants scoring a 2 or 3 out of 3).

Several dark triad attributes (i.e., narcissism and psychopathy) significantly interacted with threat level to impact gossip recall and juiciness perceptions, but in ways that diverged from predictions. For instance, the threat x psychopathy interaction with respect to recall indicated that for those low in psychopathy, low threat gossip was better recalled than both moderate and high threat gossip. This effect was not found for those high in psychopathy. Perhaps those lower in psychopathy are less interested in reputation-damaging gossip because they are less inclined to use malicious gossip as an IA tactic, and are instead more interested in positive, pro-social messages (e.g., that so-and-so is friendly) that could help them identify potential allies. In contrast, perhaps highly psychopathic individuals have particularly low motivation to remember mundane, low threat information, perhaps because they are much more interested in threatening information that could be used for social manipulation.

Psychopathy also interacted with gossip threat level to shape juiciness perceptions. In the moderate threat condition, juiciness perceptions increased as psychopathy increased as expected, suggesting that psychopathic individuals in particular are interested in information about those who pose an ambiguous—and potentially very dangerous—threat on the mating market. Perhaps the lack of clarity regarding whether or not the person poses a serious threat makes this information appear particularly important, in line with the error management perspective outlined earlier. As noted previously, it may also be that ambiguously threatening gossip is particularly useful and hence seen as important to psychopathic individuals, who can shape the messages to be more or less damaging—whichever is most useful to the gossip—upon retelling. Moderate threat gossip was perceived to be juicier than low threat gossip for those high in psychopathy only, and high threat gossip was perceived to be juicier than moderate threat gossip among those low in psychopathy only, suggesting that psychopaths are particularly concerned with tracking ambiguous threats to succeed in mate competition.

Ultimately, it appears as though highly psychopathic individuals are especially interested in moderately threatening gossip, perhaps because it could turn out to be most threatening of all. That more psychopathic individuals found moderately threatening gossip to be juicier (and hence more threatening) appears to run counter to Brankley and Rule's (2014) finding that due to their callous affect, psychopathic individuals possess a cognitive bias in which they tend to see others as non-threatening. In light of Brankley and Rule's (2014) findings, an alternative interpretation of the psychopathy results reported here is that while psychopathic individuals found moderately threatening gossip juicy—that is, interesting, scandalous, exciting, shocking, and fun, perhaps due to its ambiguity—they may

not have found the gossip to be dangerous or threatening to themselves personally. Given that psychopathy has been linked with thrill-seeking behaviors (Paulhus & Williams, 2002), it may also be that moderately threatening gossip is seen as particularly exciting and interesting to psychopathic individuals due to the thrill associated with hearing and possibly sharing mysterious and sensitive information about a target that is potentially very damaging. Regardless, the finding that psychopathy associates with perceived juiciness and recall of romantic gossip indexes the importance of psychopathy in particular, suggesting that this dark triad subscale is indeed a sexually selected armament for use in mate competition.

Analyses featuring narcissism found that gossip threat level interacted with narcissism to influence gossip recall. Among those high in narcissism, low threat gossip was better recalled than high threat gossip. This aligns with the error management perspective, as it appears as though those high in narcissism over-perceived the threat level of low threat gossip. Perhaps narcissistic individuals are particularly motivated to remember low threat information about those seen in a positive social light (i.e., gossip depicting others as “friendly” or “nice”), because these individuals could be considered competitors for affection from potential mates and allies. Accordingly, at high (but not low) narcissism levels, increases in gossip threat level (i.e., from low to high threat) resulted in decreases in recall scores. There was also a main effect of narcissism: more narcissistic individuals found gossip to be juicier—more interesting and exciting—on average. This may be because gossip allows for social comparisons that help narcissists assess their relative standing on the mating market and in the social sphere more generally, thereby providing information to help them maintain a sense of positive self-regard. This explanation coheres with the notion that narcissists value dominance and superiority over others (Paulhus & Williams, 2002). Further,

the finding that narcissism emerged as one of the most influential in shaping cognitive gossip outcomes align with Carter et al.'s (2015) finding that of the dark triad subscales, narcissism is the most strongly associated with competitiveness in a romantic context.

Analyses featuring Machiavellianism indicated that Machiavellianism did not influence any of the hypothesized cognitive outcomes, failing to support predictions. This may be because Machiavellian individuals concoct fictional gossip messages as in IA tactic, rather than waiting to hear gossip messages from others and allocating valuable cognitive resources to closely attending to and remembering gossip that they receive. Indeed, Machiavellian individuals may be able to inflict the most reputational harm by using their cognitive resources to craft a particularly malicious fictional story about a romantic rival, and using this story at the precise moment when it is most convenient to do so.

Taken together, these results paint a rather complex picture. Gossip-related cognitions each operate differently, emerging under unique sets of conditions (i.e., under low but not moderate threat, under a control but not romantic prime). These findings indicate that juiciness perceptions are not clearly linked with memory for gossip—in many cases cognitive effects were found for one but not the other. This highlights the point that messages we find most important, interesting, and entertaining on the surface might not always be those seen as most relevant to our reproductive prospects, and so they may not be those we remember best. The case of moderate or ambiguously threatening gossip is a case in point—while high threat was generally judged to be juiciest across experimental conditions, recognition memory was higher for moderate versus high threat gossip, presumably due to the potentially high danger of the ambiguous threat depicted in moderate threat gossip. Further, these results suggest that individual difference variables uniquely moderate IA behavior and cognitions, in both

expected and unexpected ways. Narcissists appear to be concerned with low threat gossip, recalling it better than high threat gossip, whereas psychopathic individuals are more concerned with high and moderate threat gossip, perceiving it to be particularly juicy. This helps alert us to the idea that dark triad subscales each operate differently, and additional research is needed to tease out the nature of the effects found here. Possible explanations for unexpected and seemingly counter-intuitive results were provided above, but these explanations need to be put to the test.

Limitations and Directions for Future Research

This experiment helps illuminate many promising avenues of future research, some of which are opportunities made possible due to limitations that emerged in the study. For example, one shortcoming of the present study involved the romantic prime manipulation. It came as a surprise that the romantic prime did not elicit romantic feelings or mating motives, as this same prime has successfully elicited mating motives and enhanced intrasexual mate competition in several other studies (Maner et al., 2007; Maner et al., 2012). In the present study, a few students noted in their open-ended written responses that the prime, asking them to recount a time they felt romantically aroused, made them feel slightly uncomfortable, and so the somewhat scandalous and/or surprising nature of the romantic prime may have dampened the prime's effectiveness in eliciting romantic feelings. To address this, future work should make use of different romantic primes—ideally those centered more clearly on mate competition (e.g., “imagine that you discover that you and a peer at school are both interested in dating the same guy”) rather than romantic arousal more generally in order to successfully activate mate competition motives. Future research might also make use of different writing-based mating primes successfully used in past research, such as those

asking participants to write about their perfect first date with a desired romantic partner (Griskevicius et al., 2007), and those in which subjects write about a time they competed with a rival for a romantic partner (Hill & Durante, 2011). Perhaps use of these less “juicy” romantic primes would amplify juiciness perceptions for moderate and high threat gossip among those in the romantic prime condition. Relatedly, it would be fruitful to content analyze the text written by low, moderate, and high SOI participants in response to the romantic prime, and perhaps ask subjects to rate their written prime responses for juiciness to assess whether the juiciness of scenarios recalled in the prime can indeed dampen juiciness perceptions of gossip read later in the study.

Further, the three recognition memory questions developed for this study were too few to allow for a broad range of scores, which may have affected findings with respect to recognition memory. Future studies should make use of longer comprehension tests to circumvent this possible issue. To make the recognition memory task more difficult and to stimulate more variation in scores, it would be beneficial to use a longitudinal experimental design with a handful of memory tests presented over a period of several days. If recognition memory for threatening gossip is an evolved cognitive ability enhancing one’s success in mate competition, then gossip content should be remembered over relatively long time periods.

In the present study, recall was assessed by tabulating the number of correct idea units present in each participants’ free recall response, but some of these idea units did not reflect central points from the gossip conversation, such as simple affirmatives (e.g., “yeah,” “me too”) or questions like “are you sure?” (see Appendix for idea units in each gossip message). It may be the case that what is most relevant in mate competition is the *gist* of the

message—who did what to whom, and with what effect—rather than recalling specific conversational turns. Thus, to measure recall for gossip, future studies might assess the degree to which participants remembered the “gist” versus specific concrete details from the message, including the words and phrases appearing therein.

Future research is also needed to test explanations for dark triad results proposed earlier: namely, that highly narcissistic individuals see pro-social gossip in which the target is praised as kind, popular, or friendly as particularly threatening for their social and romantic prospects. Relatedly, research should also examine whether highly psychopathic individuals see ambiguously threatening gossip as most threatening in intrasexual competition, most entertaining and interesting due to its ambiguity, or both. For instance, when presented with romantic gossip about a person described in favorable terms versus ambiguous or negative terms, those high in narcissism should report that they see the former as the most threatening (i.e., dangerous) romantic rival, and should consider moderate threat gossip to be the most socially damaging.

If remembering threatening romantic gossip and perceiving it to be juicy ultimately leads to success in intrasexual mate competition, then women who better remember threatening romantic gossip and judge it to be juicier should obtain higher quality mates in their lifetimes, and should have more and higher quality offspring than women who do not remember threatening romantic gossip as well or perceive it to be as juicy. Future research should test this evolutionary prediction, making use of longitudinal designs to assess the ultimate mating and reproductive benefits of these cognitive gossip outcomes. Evolutionary scholars should also address how memory for romantic gossip and perceptions of its juiciness are shaped by females’ fertility status and age. Research indicates that fertile females engage

in more intense intrasexual mate competition (e.g., Fisher, 2004), and that mate competition is most fierce (and IA perpetration most common) during peak reproductive years in young adulthood (Hess & Hagen, 2006).

While females were the focus of the present study, the role of SOI and dark triad attributes on memory for gossip and perceived juiciness of gossip should also be tested with a male sample, using gossip messages relevant to male intrasexual mate competition. The content of gossip seen as threatening on the mating market would differ for males, likely including information about characteristics that female mates value, such as a rival males' athleticism and work ethic, for example (Buss & Dedden, 1990). In line with Hess and Hagen's (2002) reasoning that gossip is a successful strategy when attacking reputational domains that are private and hence difficult to verify, we would also expect the content of effective (i.e., reputation-damaging) male gossip to include difficult-to-verify domains including claims about a male's sexual abilities, rather than merely visible domains such as one's physical appearance. Using the retaliation cost logic forwarded in Study 1, relative to high formidability males, low formidable males likely see more threatening gossip as juicier and better remember it.

While this study made an important step forward in aggregating results across variations of three different gossip messages, related work should make use of different romantic gossip messages to assess whether the same pattern of results emerges across messages containing different content seen as threatening on the mating market (e.g., describing a beautiful, young, and popular rival). The present study manipulated threat by describing low, moderate, and high threat behaviors perpetrated by a potential romantic rival (e.g., hooking up versus flirting versus dancing with someone's boyfriend) and by

manipulating explanations for her behavior (e.g., she’s “a bitch,” she just wants attention from a guy, or she is just being friendly). Future studies could make use of different types of romantic scenarios presented in writing and via audio recording, and might manipulate threat levels in other ways, including via the anger depicted in the conversation (using exclamation points and capital letters in writing, variations in volume and tone in audio recordings, etc.). Developing variations of gossip storylines as experimental stimuli is no easy task—scholars have noted that the study of gossip faces methodological difficulties due to challenges associated with obtaining samples of real-life (or ‘lifelike’) gossip (Wilson, Wilczynski, Wells, & Weiser, 2000). Despite this difficulty, future research should take pains to develop different romance-related gossip messages with more diverse storylines, ideally gleaned from observation or from participants themselves to ensure ecological validity, the latter of which was done in this study. Indeed, researchers might ask subjects to recall romantic gossip messages that they had received in ‘real life’ over several time points, using a longitudinal design. In the present study, gossip messages all varied in length such that higher threat messages contained more idea units. To circumvent this limitation, the number of idea units was included as a control in analyses. However, future work should take pains to ensure that all gossip messages are of equal length.

Beyond manipulating features of the gossip message itself, future experimental work should also manipulate features of the message sender, including their facial expression, physical attractiveness, and physical formidability (for males). It may be the case that a highly negative or positive versus a neutral facial expression amplifies recipients’ perceptions of gossip threat, hence increasing their perceptions of gossip juiciness and their memory for the message. Given that males lower their perceptions of a female gossip target’s

attractiveness only when the gossip is herself an attractive female (Fisher & Cox, 2009), perhaps female gossip about attractive rival females will be judged as more threatening (and hence better remembered) when shared by a physically attractive female, and male gossip about rival males' athleticism will be judged as more truthful and juicy when shared by a highly formidable male. Finally, future research should explore additional adaptive cognitions for successful gossip perpetration in mate competition, including a tendency to ruminate more about high threat gossip. Together, the aforementioned suggestions reflect just a sliver of the myriad research opportunities available to scholars in this area, as the study of gossip in evolutionary perspective is still in its infancy.

All in all, this study teaches us that among females, gossip threat level indeed shapes cognitive outcomes, and that dark triad attributes and socio-sexualities each uniquely moderate these relationships. This means that individual differences differentially shape perceptions of *identical* gossip content—for instance, while females higher in narcissism better recall low threat gossip, the opposite is true for females high in psychopathy. While results deviated from predictions at times, if it is true that romantic gossip is used for success in mate competition, then the observed cognitive outcomes in response to gossip receipt should help individuals accomplish the ultimate goal of successful reproduction. For example, disregarding low threat gossip and seeing it as uninteresting likely helps psychopathic individuals reserve their limited cognitive resources for more fitness-relevant information about high threat (e.g., potential mate poaching) rivals, whereas remembering *favorable* information about others presumably helps narcissistic individuals track and better compete with those who are particularly well-liked and are hence seen as rivals on the mating market. Ultimately, this study furthers our understanding the complexities of females'

cognitive processing of romantic gossip in an intrasexual mate competition context. This work represents an important step forward in the study of gossip as an IA tactic, opening doors to promising new avenues for research in this area.

Chapter VII. General Discussion

Data from this dissertation teaches us a great deal about the cognitions and behaviors enabling the successful use of gossip in mate competition, and the individual differences moderating these effects. Here, core insights gleaned from this work are parsimoniously addressed. Generally speaking, the present studies identified a host of individual and sex differences that shape gossip behavior and cognitions in a mate competition context. Predictors of gossip behavior (i.e., frequency of self-reported gossip sharing) identified here were physical formidability, sex, socio-sexuality, narcissism, and Machiavellianism. Predictors of gossip cognitions (i.e., recall, recognition memory, and perceived gossip juiciness) consisted of socio-sexuality, psychopathy, and narcissism. Further, gossip cognitions were influenced by gossip threat level (reflecting the threat level of a potential romantic rival) and exposure to a control (i.e., happiness) versus romantic prime. Each predictor differentially shaped gossip outcomes, and several of these predictors interacted with one another to predict gossip outcomes.

Evolutionary logic dictates that calculations in favor of IA behavior (i.e., self-reported gossip sharing) and cognitions (i.e., memory for gossip and perceptions of its juiciness) emerge because the perceived rival threat level and intrasexual competition level are heightened for these individuals, costs of IA are reduced, and/or benefits heightened. So for example, for low formidability males, the benefits of IA presumably outweigh the costs of IA, and what's more, the possible costs of using IA are much lower than the potential costs of using direct aggression in mate competition due to the anonymity of IA. Further, these findings suggest that sexually unrestricted females may face more mate competition than restricted females due to their seeking out access to a variety of mates, perceiving potential

romantic rivals are more threatening and ultimately contributing to more frequent use of gossip as an IA tactic to defeat them.

Study 1 identified a host of individual differences giving rise to more frequent gossip sharing, a proposed behavioral output enabling heightened success in mate competition. Results from Study 1 revealed that narcissists and Machiavellian individuals of both sexes, along with sexually unrestricted females and males low in physical formidability, reported especially frequent gossip sharing. Further, self-reported gossip sharing was more frequent among narcissistic females who were also more sexually unrestricted.

Study 2 examined gossip-related cognitions—psychological armaments facilitating the successful use of gossip in mate competition. These cognitions included enhanced memory for threatening gossip and heightened perceptions of its juiciness. Study 2 results indicated that on average, moderate threat gossip yielded higher recognition memory scores, whereas high threat gossip yielded higher juiciness perceptions than moderate and low threat gossip. Narcissism and psychopathy—together with gossip threat level—affected gossip-related cognitions such that those higher in psychopathy perceived moderately threatening gossip to be juicier and those low in psychopathy better recalled low compared with moderate and high threat gossip. In contrast, there was a positive main effect of narcissism on juiciness, and those high in narcissism better recalled low versus high threat gossip.

Given this, it is clear that the relevant inputs differed somewhat when considering cognitive rather than behavioral armaments for gossip perpetration. The dark triad attributes most relevant to gossip memory and perceived gossip juiciness were narcissism and psychopathy, whereas narcissism and Machiavellianism were most relevant to self-reported gossip sharing. Psychopathy may have been related to perceived gossip juiciness but not

gossip sharing due to the interpersonal coldness and lack of social connectedness that characterizes psychopathic individuals. Indeed, it may be that while psychopathic individuals find threatening gossip interesting, they prefer to use direct aggression rather than IA. Alternatively, it may be that psychopathic individuals do not tend to share a lot of gossip because they do not receive gossip on account of their social disconnectedness. Similarly, Machiavellianism may be linked to gossip sharing but not gossip cognitions perhaps because Machiavellian individuals are not particularly interested in remembering or thinking about others' gossip messages. Instead, they might elect to create and spread their own malicious gossip messages—fictional or rooted in truth—to inflict the most reputational harm upon their romantic rivals. Future research is needed to assess these possibilities.

Considering findings from both studies together, narcissism was the dark triad attribute most consistently related to gossip-related cognitions and behaviors, further supporting the hypothesis that it is sexually selected. This suggests that of the dark triad subscales, narcissism is most strongly related to intensified mate competition, giving rise to adaptations for successful gossip perpetration, both behavioral and cognitive. Narcissists reported that they engaged in more frequent gossip sharing, which may be seen as a way to highlight their popularity and centrality in social networks—real or imagined. If narcissists' response to the gossip sharing measure is self-enhancing rather than reflecting objective reality, this act itself is likely a sexually selected response meant to impress potential mates. Females who were more narcissistic saw gossip as juicier (i.e., more interesting and entertaining) on average, presumably to facilitate their close attention to romantic gossip messages. It is likely important for narcissists to take an interest in romantic gossip about those in their social circles because it is particularly relevant to their comparative social

standing, mating prospects, and hence their self-esteem. Narcissists presumably attend closely to gossip they see as juicy—this would be evolutionarily advantageous in that paying close attention to the activities and romantic reputations of others allows narcissists to better see where they stand within the social hierarchy, confirming their superiority and/or identifying rivals who may damage their mating prospects and egos. Further, narcissists better recalled low (versus high) threat gossip that portrayed potential rivals in a positive light, describing them as “nice,” “friendly,” and hence incapable of mate poaching, for example. Presumably this result emerged because narcissistic individuals see well liked others as most threatening of all. Perhaps narcissists think that well-liked individuals could outshine them and steal their friends and romantic partners. Given the importance of narcissism in shaping gossip outcomes, future research should assess how narcissism relates to evolved affective outcomes that would aid in successful IA perpetration in mate competition, including strong positive feelings when sharing threatening gossip and strong negative feelings when victimized and upon receipt of gossip about (well-liked) rivals.

It is clear that romantic gossip considered “threatening” varies by personality, and so too do the resulting mental calculations and outputs associated with IA perpetration. For example, among highly psychopathic individuals the intrasexual threat level of moderately threatening rivals may be amplified, and the perceived threat of low threat rivals diminished, giving rise to heightened interest in moderate threat gossip. The opposite appears to be true for narcissistic individuals, for whom the perceived threat level of friendly same-sex others (i.e., low threat rivals) is increased, leading to superior recall for low relative to high threat gossip. These nuanced results indicate that adaptive cognitive responses differ based on the nature of the inputs. Gossip recall and juiciness perceptions appear to be more important

tools in intrasexual mate competition for psychopathic and narcissistic than Machiavellian individuals as discussed above. Further, gossip sharing appears to be a particularly important mate competition tactic for narcissistic and Machiavellian but not psychopathic individuals.

This discussion leads to the conclusion that gossip behaviors and cognitions are highly context-sensitive, uniquely shaped by specific individual differences relevant to mate competition. Unexpectedly, narcissism did not associate with the same outcomes as Machiavellianism and psychopathy, and male unrestricted socio-sexualities did not result in the same outcomes as female restricted socio-sexualities as was predicted. Further, not all of these predictors led to identical behavioral and cognitive outcomes as was hypothesized. This suggests that IA is enacted in various ways, which diverge based on an individual's physical and psychological characteristics.

These results indicate that the hypothesized cognitive and behavioral outcomes are not always required for successful IA perpetration. For instance, given that memory effects for high threat gossip did not always emerge as expected, it may be that some individuals devise fictional gossip in mate competition rather than relying on memory for gossip they previously received. Further, the diverging results for memory and perceived juiciness indicate that juiciness perceptions do not always facilitate memory for gossip, although they may temporarily heighten attentional resources allocated to the gossip or help the recipient identify potential threats. Clearly the study of gossip behaviors and cognitions—and predictors giving rise to these outcomes—warrants much more empirical attention. This work presents a small but important glimpse of how gossip functions in a mate competition context.

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Appendix

HIGH THREAT #1 (92 WORDS) – version 1 (10 idea units)

Sarah: [OMG dude I cannot believe Jessica keeps messaging Jake on Snapchat all the time.] [I saw one of the messages the other day] [and it was super flirty, too.]

Karen: [What?! Seriously why would she do something like that?!] [The bitch!]

Sarah: [He’s my ex boyfriend] – [it is totally NOT okay for my best friend to be talking to him like that.] [I am pissed.]

Karen: [Yeah, there is definitely something very wrong with that.]

Sarah: [She is so out of line. Does she not know that that’s not okay?!]

MODERATE THREAT #1 (69 WORDS) – version 2 (7 idea units)

Sarah: [OMG dude I cannot believe Jessica started messaging Jake on Snapchat.]

Karen: [I think she might just want attention from a guy.]

Sarah: [He’s my ex boyfriend] – [it is not okay for my best friend to be talking to him.] [This whole situation annoys me.]

Karen: [Yeah, I get it]

Sarah: [Like, regardless of what her motives are, she should know it isn’t okay to do that.]

LOW THREAT #1 (61 WORDS) – version 3 (7 idea units)

Sarah: [Dude I cannot believe Jessica started messaging my ex boyfriend on Snapchat.]

Karen: [I think she’s just doing it as a friend.] [You know she’s really nice and likes keeping in touch with people.]

Sarah: [Okay, that makes me feel better about it.]

Karen: [Yeah, probably nothing to worry about there.]

Sarah: [Cool. Yeah, we’re best friends] – [I trust her.]

HIGH THREAT #2 (112 WORDS) – version 4 (14 idea units)

Alana: [Kara, I saw Sean making out with some girl in the park yesterday].

Kara: [Are you lying to me?? BECAUSE DON’T.]

Alana: [No, I swear I’m not lying.] [It was him and that fucking barista girl, Sophia.]

Kara: [OMG. I totally knew she was up to something.] [That slut!]

Alana: [Well screw him.] [That shady dirtbag isn’t worth your time.]

Kara: [I'm gonna get back at him for this.]

Alana: [What are you gonna do?]

Kara: [I'm going to destroy him.] [When we started dating I told him that if he ever hurts me he's going to pay.]

Alana: [Alright.]

Kara: [He needs to know that he hurt me big time.]

MODERATE THREAT #2 (98 WORDS) – version 5 (12 idea units)

Alana: [Kara, I saw Sean flirting with that girl Sophia in the park yesterday.]

Kara: [Are you sure??]

Alana: [Yes. It was him and that barista girl.]

Kara: [I've noticed she's pretty flirty] [(plus have you seen that mesh top she likes to wear?!),] [but I'm not sure she'd do that.]

Alana: [Yeah].

Kara: [I think I might go talk with him about it though, just to be sure.]

Alana: [Sounds good.]

Kara: [When we started dating I told him never to hurt me, and I meant it].

Alana: [Yeah, I hope it was nothing.]

Kara: [Me too.]

LOW THREAT #2 (88 WORDS) – version 6 (11 idea units)

Alana: [Kara, I saw Sean hanging out with that girl Sophia in the park yesterday.]

Kara: [Are you sure?]

Alana: [Yes. It was him and that barista girl.]

Kara: [I bet they were just catching up.] [Sophia's a really nice, friendly person.]

Alana: [Yeah, you're probably right that she wouldn't do something like that.]

Kara: [Probably no need to bring it up to him.]

Alana: [Yeah I agree.]

Kara: [I don't think my boyfriend would ever hurt me.]

Alana: [Yeah, I'm sure it was nothing.]

Kara: [Me too.]

HIGH THREAT #3 (84 WORDS) – version 7 (10 idea units)

Monica: [I seriously can't believe that Stephanie would hook up with Andre.]

Ashley: [Did she REALLY?] [The bitch!]

Monica: [Yeah. Some friends who were at the party told me about it]. [The worst part is that she knows that we are dating]. [And she was my friend—why would she do this to me?!]

Ashley: [Ugh, that's super shitty of her.]

Monica: [She's so mean and selfish] [and I'm totally sick of it.] [That's it – I'm done with her. We ARE NOT friends anymore.]

MODERATE THREAT #3 (69 WORDS) – version 8 (9 idea units)

Monica: [I can't believe that Stephanie would hold hands with Andre]

Ashley: [Did she really?]

Monica: [Yeah. Some friends who were at the party told me about it.] [She knows that we are dating.] [And she's my friend—why would she do this to me?!]

Ashley: [Maybe you got bad info]—[this doesn't sound like something Stephanie would do.]

Monica: [Maybe you're right]. [I'll talk with her about it.]

LOW THREAT #3 (69 WORDS) – version 9 (9 idea units)

Monica: [I can't believe that Stephanie would dance with Andre].

Ashley: [Did she really?]

Monica: [Yeah. Some friends who were at the party told me about it.] [She knows that we are dating]. [And she's my friend -- why would she do this to me?!]

Ashely: [Maybe you got bad info]—[this really doesn't sound like something Stephanie would do]. [She's so incredibly sweet!]

Monica: [Yeah, you're probably right.]