SOCIAL EXCLUSION AND WOMEN'S SHORT-TERM SEXUAL MOTIVATION: THE

ROLE OF PERCEIVED VULNERABILITY

by

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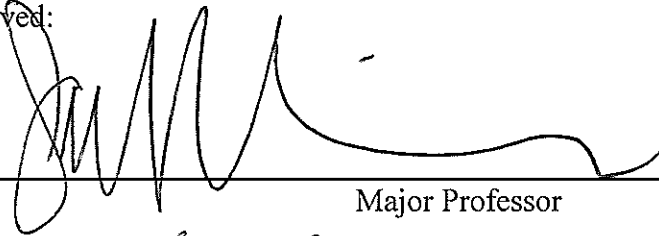for the degree of

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Vulnerability

Social exclusion, the phenomena of being actively or passively rejected by another

individual or group, is as common and unpleasant a human experience as stubbing your toe

on the end of the kitchen table. Whether it be the popular kids in high school, your new

coworkers, an attractive person at the bar, or even your own family, everyone can recall a

time they were denied a desirable social connection. These experiences can range from

mildly annoying to emotionally devastating, however, in most cases, such singular

experiences rarely present a risk to our physical wellbeing. However, for our evolutionary

ancestors, the difference between being included in the group and being excluded by the

group was also often the difference between surviving and reproducing, or meeting an early

grave without any offspring to carry on your genes. An early hunter-gatherer without any

social connections would likely be unable to fend off a hungry tiger, and even less likely to

reproduce considering our sexually reproducing nature. In fact, exclusion was so heavily

feared by our early ancestors that exile and death were considered equivalent punishments by

early civilizations, such as the ancient Greeks (DeWall et al., 2011). Given that the

consequences of exclusion presented such severe threats to survival and reproductive goals,

our evolutionary ancestors were highly motivated to avoid these experiences whenever

possible, and to take strong actions following such experiences when they did occur.

Within the modern context, daily experiences of exclusion rarely have such intense

implications as they did for our ancestors, but nonetheless, the cognitive and behavioral

processes that evolved during the time of our ancestors to navigate exclusion experiences

persist. Incorporating theory and research on cognitive and behavioral responses to exclusion

(Eisenberger et al., 2011; Sacco et al., 2012; Williams, 2009), fundamental needs for belonging and safety (Dean et al., 2019; DeWall et al., 2009), and women's mating strategies (Bleske-Recheck & Buss, 2001; Buss & Schmitt, 1993; Ellis, 1992; Thornhill & Thornhill, 1983, 1987; Studd & Gattiker, 1991; Trivers, 1972) may provide a useful perspective for understanding how and when women may employ particular strategies for coping with social exclusion. Given women's role in the mating market as the figurative purveyors of sexual access (Trivers, 1972), and the threatening nature of exclusion for various fundamental needs (Williams, 2009), women may be uniquely equipped to utilize more sexually unrestricted strategies (i.e., greater willingness to engage in short-term, uncommitted, sexual relationships) as an effective coping response to social exclusion. However, considering the risky nature of sexual intercourse for women's wellbeing (Creanga et al., 2011, Gazmararian et al., 1996; Nasir & Hyder, 2003), it may be that elevated short-term mating (STM) motives may only be utilized when the cost of exclusion is particularly high, such as when a woman's physical wellbeing is threatened. The present research experimentally examines the effect of social exclusion on an individual's STM motives, whether this relationship exists exclusively for women, and whether women's elevated STM motives following social exclusion are due to increased perceptions of vulnerability to physical threats spurred by the exclusion experience.

Social Living and the Evolutionary Brain

Over the course of our evolutionary history, humans have relied on the formation of social groups to facilitate both survival and reproductive success. Through group formation and careful cooperation, early humans were able to overwhelm larger food sources, as well as fend off predatory animals and other hostile humans (Korstjens et al., 2006; Javarone &

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Marinazzo, 2017). Further, ingroup cooperation permitted specialization among group members towards vital tasks (hunting, farming, etc.), which decreased the workload of any one group member and enabled the development of more complex and stable social structures that maximized resources (Cooper & West, 2018). Beyond simple survival, social connectedness afforded early human mothers with a variety of sources, including friends and family, from which to receive help in raising young children, thereby increasing infant survival rates and improving developmental outcomes (Kramer, 2010). With the immense advantages afforded by social connectedness, humans evolved a fundamental need to pursue and foster intimately meaningful social relationships (Baumeister & Leary, 1995). When this fundamental need is denied or thwarted, however, the cognitive and behavioral consequences are widespread.

Social exclusion, the thwarting of our fundamental need to belong, is a ubiquitous part of social living for both human and non-human species. While seemingly counterproductive to successful survival and reproduction, the functional nature of social exclusion among social species can be inferred from its presence among non-human species. For example, chimpanzee species have consistently been observed utilizing exclusion through forcible expulsion as a punishment for individuals that violate social norms (Nishida et al., 1995). Further, among a variety of non-human species, including lions, baboons, and chimpanzees, we can observe established status hierarchies, wherein high-status group members actively exclude low-status group members from accessing preferred locations, resources, and high-quality reproductive mates (Kurzban & Leary, 2001). Additionally, social exclusion is used within three-spined stickleback fish species as a means of pathogen avoidance, with individuals that display cues to disease or parasites being isolated or

excluded from the rest of the group (Dugatkin et al., 1994). Through this evidence of social exclusion practices among social, non-human animals, we can infer a similarly functional purpose of social exclusion use for our human ancestors, which in turn provides a basis through which we can then assess the cognitive and behavioral responses of those unfortunate individuals that are excluded.

While the cost of social exclusion for contemporary humans is far less severe than that of historical humans or non-human species, our perceptions of and responses to threats and experiences of social exclusion likely evolved alongside our functional use of social exclusion very early in our evolutionary history. Given the evolutionarily ingrained threat posed by social exclusion, over time, humans developed several processes designed to quickly identify potential sources of social exclusion, such as perceptual mechanisms that closely monitor vocal tone, facial expressions, and body language (Kerr & Levine, 2008; Pickett & Gardner, 2005; Wesselmann et al., 2012). Further, when we do experience social exclusion, we often experience heightened attention towards, and accurate identification of, potential cues of social reaffiliation, such as smiling faces (Bernstein et al., 2010; DeWall et al., 2009).

Shifts in perceptual processing in response to potential threats and actual experiences of social exclusion suggest that humans have evolved such that we are well equipped to both proactively avoid and reactively recover from social exclusion. However, exclusion is often unavoidable, and social reaffiliation is often not immediately feasible. In such cases, our immediate psychological responses to exclusion are typically intense and seemingly maladaptive towards recovery. Indeed, the experience of social exclusion elicits a host of negative psychological outcomes with stark implications for subsequent behavioral

responses. Such psychological outcomes include increased hostility and jealousy (Coie et al., 1992; Dodge & Somberg, 1987; Salovey & Rodin, 1986), dejection and emotional withdrawal (Coyne, 1976; Lefkowitz & Tesiny, 1984), impaired self-regulation (Baumeister et al., 2005), and reduced self-esteem (Leary et al., 1995). Importantly, while the immediate psychological response to social exclusion is almost uniformly negative, the behavioral and cognitive responses that follow exclusion are highly dependent upon various contextual factors, including the fundamental needs threatened by an individual experience of social exclusion.

Social Pain and the Need for Self-Protection

In line with the temporal need-threat model of ostracism, threats and experiences of being socially excluded are detected by our perceptual systems quickly and crudely, and these perceptions signal feelings of pain (Williams, 2009). Evolution is often a process of convenience and, as social exclusion was once equitable to death for our early ancestors, our systems for processing the stress and pain that derive from social exclusion likely developed such that they mapped onto pre-existing systems for processing feelings of physical pain (e.g., stubbing your toe; Eisenberger et al., 2003; MacDonald & Leary, 2005). Indeed, several studies have found that being socially excluded activates the same neural pathways and areas of the brain associated with physical pain processing, such as the anterior cingulate cortex (e.g., Eisenberger et al., 2003). Additionally, analgesic medications that target these neural pathways in order to attenuate feelings of physical pain, acetaminophen for example, also reduce feelings of pain in response to social exclusion (Brown et al., 2003; DeWall et al., 2010; Eisenberger et al., 2011), further supporting the notion that our neurological, and

by extension cognitive and behavioral, systems for responding to social and physical pain are closely tied.

Given the close neurological ties between social and physical pain in response to social exclusion, it is likely that this relationship also extends to other aspects of our psychological experiences of stressful events. That is, just as social exclusion leads us to feel pain similar to stubbing your toe, so too may social exclusion influence our perceptions of our social and physical safety similarly. Indeed, recent research examining the relationship between social interactions and perceptions of physical safety has found that being socially excluded leads individuals to perceive themselves as more vulnerable and more likely to encounter physical threats (Dean et al., 2019). This recent research mirrors earlier work that established a relationship between social exclusion and increased perceptions of vulnerability to social threats (DeWall et al., 2009), suggesting that our social and physical wellbeing, and threats to these domains, are processed similarly at both the neurological and cognitive levels. Nonetheless, how these processes influence downstream behavioral responses to social exclusion remains a critical question within the social exclusion literature.

Responding to Social Exclusion

As mentioned above, social inclusion conferred significant survival and reproductive advantages for our evolutionary ancestors, which led to our psychological systems for processing both social belonging and physical welfare being closely tied. These benefits, as well as the pain of losing them through social exclusion, should provide powerful motivation towards seeking social support and connectedness from others when presented with stressful or threatening events, even within the modern context where our daily lives are comparatively far safer and more predictable (Schachter, 1959). The pain spurred by social

exclusion strongly motivates corrective responses, but the specific nature of these responses is highly dependent upon situational and individual factors. When the possibility of regaining affiliation is made salient (e.g., by introducing a friendly confederate), socially excluded individuals readily display intuitive behavioral responses for regaining social affiliation, such as increased behavioral mimicry (Lakin et al., 2008) and helping behaviors (Maner et al., 2007). However, when opportunities for regaining affiliation are uncertain or absent, socially excluded individuals will typically exhibit avoidant or even antisocial behaviors that are counter-productive towards achieving social affiliation, such as withdrawal from or avoidance of those that excluded them (Molden et al., 2009), or even physical aggression and hostility (Ayduk et al., 2008). Therefore, while socially excluded individuals are highly motivated to pursue social connections that can alleviate their perceptions of social and potentially physical vulnerability, we see that these individuals will only act prosocially when contextual information dictates that following such a strategy would be likely to succeed.

The complex interplay between our cognitive perceptions and behavioral responses to social exclusion, and the environmental factors that influence this relationship, are likely due in part to the fundamental needs that exclusion threatens, which, according to Williams (2009), includes the needs for belonging, self-esteem, control over one's environment / safety, and a meaningful existence. Social exclusion damages each of these conceptually distinct needs in different ways and to different degrees depending on the contextual factors under which the exclusion occurs. Though, it is reasonable to conclude that, based on the tight knit social and physical threats posed by exclusion, there is some overlap in these needs and our responses to them. That is, while a particular instance of exclusion may most directly

impact and arouse either self-esteem or safety needs initially, it is likely that this experience impacts each of the four needs at some level, and depending on environmental cues, the most pressing and consequently addressed need may shift fluidly. Therefore, in order to understand how or why individuals respond to experiences of social exclusion the way that they do, we must understand both the environmental and individual factors that shape these experiences.

Sex Differences in Exclusion

Situational, contextual factors, such as whether an individual is excluded by a close friend or an acquaintance at work, whether they are excluded by an individual or a group, and whether there are opportunities for social reaffiliation following an exclusion experience, play a key role in how an individual responds to social exclusion. However, individual factors of those involved in the exclusion experience themselves also play a critical role, with individual differences, including rejection sensitivity (Downey & Feldman, 1996) and depression (DeWall et al., 2011), modulating the severity of and behavioral responses to these experiences. That is, how any two individuals respond to the same experience of exclusion, within the same situational context, can vary wildly based on their individual differences. In line with this, the cognitive experience of social exclusion and the behavioral coping processes utilized may often differ between men and women.

Much of the research investigating sex differences in social exclusion processing has indicated that exclusion is more stressful for women than men at the biological level. Specifically, while social exclusion leads both men and women to express decreases in positive mood, women exhibit greater cortisol responses to social exclusion (Stroud et al., 2002). Consistent with the proposal that social exclusion is costlier and more stressful for

women, compared to men, women are quicker to identify cues to social exclusion and are more physiologically aroused (i.e., increased heart rate) by being socially excluded (Benenson et al., 2013). Behaviorally, we can also see some evidence of differences in how men and women respond to social exclusion, with women expressing greater preferences for conspicuous products, while men instead express greater preference for resource acquisition (Wang & Tu, 2015). That women are more sensitive to exclusion and exhibit different responses to exclusion than men is well-studied in the social psychological literature, though our understanding of why these behavioral responses differ between the sexes and the breadth of these differences remains somewhat limited.

Utilizing Short-Term Mating Motives Strategically

Social exclusion thwarts our fundamental needs for social belonging and self-protection (Baumeister & Leary, 1995; Williams, 2009) and this experience is particularly salient for women. Resource Redistribution Theory (RRT; Shilling & Brown, 2016) proposes that when one's need to belong and maintain self-protection are harmed, this process leads the afflicted individual to redistribute their available resources and energy toward addressing these needs.

For women, sexual access is one such resource that could be used as a means of addressing affiliation and protection concerns following exclusion. Past research has identified several reasons women engage in sexual behavior aside from reproduction, including obtaining relief from stress, feeling valued by a romantic partner, enhancing feelings of personal power, and experiencing pleasure (Hill & Preston, 1996; Meston & Buss, 2007). Further, intimate physical contact is often used by both human and non-human females as a social reconciliation tactic (de Waal & van Roosmalen, 1979). Many of these

motivations hold the affiliative purpose of enhancing a woman's relationship with a romantic partner. Further, as sexual access to women is a limited resource, with comparatively fewer women of reproductive age in the environment at any given time, women may be able to leverage their control over sexual access in exchange for resources or protection, which are particularly salient needs following social exclusion (Baumeister & Vohs, 2004; Neumann, 2009; Williams, 2009). Accordingly, this sexual cost asymmetry leads to a mating environment in which women maintain control over sexual access, and men compete amongst themselves for the opportunity to be chosen as a mate (Baumeister & Vohs, 2004). The affiliative component of sexual behavior and women's role as sexual arbiters suggest that elevated STM motives could be a useful tool for women looking to reestablish social affiliation following exclusion.

Unrestricted sexual behavior certainly can be a useful tool, though it also comes with the potential for high costs to both women's social and physical wellbeing. According to Parental Investment Theory, sexual intercourse has an elevated minimum level of investment required of women compared to men due to the potential possibility of getting pregnant, which entails far greater investment of time and resources, as well as vulnerability to physical harm from others (Creanga et al., 2011, Gazmararian et al., 1996; Nasir & Hyder, 2003). Therefore, there is an elevated incentive for women to be more selective than men when engaging in sexual behavior (Trivers, 1972), and consequently should only employ sexual intercourse as a reaffiliation strategy when the cost of a social exclusion experience necessitate it. Following this logic, past research suggests that social exclusion often decreases motivations for pursuing mating in favor of securing social connections through other prosocial means (Maner et al., 2007; Sacco et al., 2011). However, there is some

existing research that has found that social exclusion does indeed increase women's STM interests and decrease long-term mating interests (Sacco et al., 2012). This discrepancy in mating outcomes following social exclusion raises several questions about our understanding of the relationship between social exclusion and mating psychology.

To reiterate, increasing sexual unrestrictedness may be a useful strategy for women to use following social exclusion, but this strategy should only be utilized when doing so would directly address a sufficiently and appropriately salient need. Thinking back to the temporal need-threat model from Williams (2009), social exclusion can impact an individual's need for belonging (i.e., affiliation) and their need for control (i.e., self-protection), typically via increased perceptions of physical vulnerability. Historically, unpartnered women (i.e., those not in a committed, romantic relationship) have often confronted ever-present threats to their physical and sexual safety by exhibiting a preference for physically strong and protective men (Bleske-Recheck & Buss, 2001; Buss & Schmitt, 1993; Ellis, 1992; Thornhill & Thornhill, 1983, 1987; Studd & Gattiker, 1991). As such, attracting such a protective mate could be an effective solution to women's dilemma of perceived vulnerability following social exclusion, thereby opening the possibility to upregulation of STM motives being a strategy for protection-related recovery, albeit with a few key caveats.

Drawing from the temporal need-threat model, as well as RRT, when social exclusion threatens a person's need for self-protection, they should utilize their available resources and strategies to address this perceived vulnerability. For women, increasing their STM motives following social exclusion, while perhaps too risky for addressing affiliation concerns, could address self-protective concerns, as this sexual access can be effectively leveraged in exchange for resources and protection from a potential mate (Baumeister & Vohs, 2004).

Conversely, due to a lack of control over sexual access and typically high trait levels of sexual unrestrictedness, as well as human female partners typically being less physically dominant or adept at offering physical protection (Buss & Schmitt, 1993), such a strategy would not be effective for men, and should not be expressed following exclusion. Ultimately, the theoretical and empirical background detailed here suggests that social exclusion may lead both men and women to exhibit decreased feelings of belonging and increased perceptions of vulnerability to physical harm, but that only women would exhibit elevated STM motives following this exclusion as a means of effectively addressing self-protection, but not affiliation, concerns. However, there still remains significant empirical work to be done in order to evaluate this proposed sex-differentiated, self-protection motivated increase in STM cognitions following social exclusion.

Notably, the existing research that finds a relationship between social exclusion and sexual unrestrictedness (Sacco et al., 2012), did so utilizing a sample of exclusively female participants. While sex-differentiation of this relationship, such that men would not show an increase in sexual unrestrictedness following social exclusion, can be theoretically inferred due to the asymmetrical cost of sexual activity between men and women, and the historical role of men as protectors within dyadic relationships, such conclusion should not be assumed, but instead empirically tested. Further, while past research has examined the relationships between social exclusion and sexual unrestrictedness (Sacco et al., 2012) and perceptions of physical vulnerability (Dean et al., 2019) independently, no research to the author's knowledge has yet to examine whether increases in perceived physical vulnerability mediate the relationship between social exclusion and increases in STM motives.

The Current Research

Here, I combine insights from both social and evolutionary psychology to examine the links between social exclusion, perceived vulnerability, and STM motives. Specifically, I hypothesize that, to address increased vulnerability to one's wellbeing spurred by the threat of social exclusion, unpartnered women will exhibit increased STM motives as a means of procuring a mate that, ideally, can offer physical protection and resources. I proposed to test the following two predictions derived from this hypothesis. First, I predicted that feelings of social exclusion, compared to feelings of social inclusion or neutral feelings, would lead unpartnered women, but not men, to report greater levels of STM motives. Second, I predicted that these increases in STM motives following feelings of social exclusion among unpartnered women would be facilitated specifically by increases in self-protective motivations. More specifically, I predicted that following social exclusion, unpartnered women would feel more vulnerable to physical threats, which would in turn motivate women to express greater STM motives.

I proposed to test the predictions derived from my hypothesis in a series of three studies. In Study 1, I tested the hypothesis that unpartnered women, but not unpartnered men, that experienced social exclusion would express greater sexual unrestrictedness compared to individuals that experienced social inclusion or a neutral control. I examined this by first manipulating unpartnered men and women's feelings of social exclusion with a memory recall task and then measuring several dimensions of their STM motives. I predicted that unpartnered women, but not men, who recalled an experience of social exclusion, compared to those who recalled an experience of social inclusion or a neutral event, would express greater STM motives.

In Study 2a and 2b, I aimed to conceptually replicate the pattern predicted of Study 1 using a separate social exclusion manipulation (2a and 2b) and a different sample population (2b). More specifically, I manipulated feelings of social exclusion in men and women not currently in a romantic relationship by providing them with false feedback about their future social relation prospects, and then measuring several aspects of their STM motives. I predicted that, as in Study 1, a future prediction of experiencing social exclusion would increase STM motives among unpartnered women, but not unpartnered men.

Finally, in Study 3, I sought to expand on the results predicted in Study 1, Study 2a, and 2b by investigating whether the predicted increases in STM motives following social exclusion in unpartnered women occur in response to feelings of increased physical vulnerability in this context. To examine this question, I again manipulated feelings of social exclusion in unpartnered women and then measured their perceptions of personal vulnerability to physical threats, affiliation motives, and STM motives. I predicted that feelings of social exclusion would lead unpartnered women to exhibit elevated perceptions of vulnerability to physical threats, which would, in turn, lead to increased STM motives.

Study 1

Study 1 aimed to examine whether exclusion influences unpartnered women's (but not men's) STM motives. To this end, participants were randomly assigned recall and then write about a time in which they were socially excluded, socially included, or a neutral control. After completing this exclusion manipulation, participants then responded to measures assessing their positive and negative mood, sexual unrestrictedness, desired investment from a mate, and sexual openness. Lastly, participants reported relevant demographic information that could influence their STM motives, including childhood

upbringing and parental relationships. In line with prior research (Sacco et al., 2012), I predicted that social exclusion would be related to higher STM motives compared to social inclusion or the neutral control, but that this relationship would be sex differentiated. Specifically, I predicted that following the social exclusion manipulation unpartnered women, but not men, that recalled social exclusion would report higher STM motives compared to other women that recalled social inclusion or a neutral control. Such a finding would be consistent with the temporal need-threat model, Parental Investment Theory and RRT (Shilling & Brown, 2016; Trivers, 1972; Williams, 2009), which together posit that social exclusion threatens our fundamental needs of belonging and self-protection, and motivates goal-oriented use of available resources and strategies that facilitate recovery of these needs, which, given women's role as the more selective sex with control over sexual access, includes the upregulation of STM motives.

Method

Participants

A total of 216 undergraduate students (146 female, 70 male) from Texas Christian University participated in exchange for nominal course credit. A total of 34 participants were excluded from analyses due to reporting being in a committed relationship, leaving a final sample of 182 undergraduate students (126 women, 56 men, M_{age} = 19.18 years, SD = 1.36 years). Demographic characteristics for the Study 1 sample can be found in Table 1.

Table 1

Study 1 Participant Demographic Information, Reported by Condition (N = 182)

	Social Exclusion	Social Inclusion	Control	Full Sample
	n (%)	*n* (%)	*n* (%)	*n* (%)
Gender				
Male	24 (38.1)	19 (32.2)	13 (21.7)	56 (30.8)
Female	39 (61.9)	40 (67.8)	47 (78.3)	126 (69.2)
Race/ethnicity:				
White	46 (73.0)	46 (78.0)	45 (75.0)	137. (75.3)
Black/African American	4 (6.3)	2 (3.4)	1 (1.7)	7 (3.8)
Hispanic	2 (3.2)	8 (13.6)	4 (6.7)	14 (7.7)
Asian/Pacific Islander	1 (1.6)	0 (0)	2 (3.3)	3 (1.6)
Multiracial/Other	10 (15.9)	2 (3.4)	8 (13.3)	20 (11)

Procedure

Participants entered the lab in groups of up to 10, where they were seated at individual computer terminals by a trained research assistant. After providing informed consent, participants provided initial demographic information, including their age, biological sex, and sexual orientation. Participants were then randomly assigned to the exclusion (*n* = 50), inclusion (*n* = 58), or control condition (*n* = 62) and instructed to complete a memory and writing task. Participants in the social exclusion condition were asked to first recall, and then spend at least 5 min writing about *"a time in your life when you were socially excluded or rejected by others."* Participants in the social inclusion condition recalled and wrote about *"a time in your life when you were socially included or accepted by others."* Lastly, participants in the control condition were instructed to recall and write about their daily routine. In all three conditions, the instructions emphasized recalling and describing the event with as much detail as possible.

Immediately after completing the recall and writing task, participants responded to a battery of questionnaires assessing participants' present mood and STM motives. Participants then completed a second set of demographic questionnaires, including current and childhood socioeconomic status (SES), environmental unpredictability, and honesty check questions. Upon completing the questionnaires, participants were debriefed about the nature of the study, thanked for their participation, and dismissed.

Measures

Mood

Participant's present mood was measured using the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988). The BMIS consists of 16 items presenting participants with adjectives used to describe positive and negative moods (e.g., *"happy, grouchy"*). Participants responded to each item indicating how well each adjective described their present mood on a 4-point scale, with scale points of (0) *definitely do not feel*, (1) *do not feel*, (2) *slightly feel*, and (3) *definitely feel*. Individual scores for positive and negative mood are computed from sum scores of the eight positive mood items and the eight negative mood items, respectively.

Short-Term Mating Motives

Sociosexual Orientation. Participants' sociosexual orientation, or their short-term mating tendency, was measured using a modified version of the revised Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf., 2008). The SOI-R consists of nine items probing a participant's short-term mating attitudes (e.g., *"Sex without love is OK."*), future behaviors (e.g., *"With how many different partners would you like to have sex with in the next 12 months?"*), and desires (e.g., *"How often do you have fantasies about having sex*

with someone with whom you do not have a committed romantic relationship"). The "behavior" subscale of the SOI-R was modified to reflect participant's future sexual behavior, rather than past sexual behavior. Participants responded to each item on a 9-point Likert-type scale, appropriate items were reversed scored, and, using the scoring algorithm outlined in Penke & Asendorpf (2008), scores for each of the three SOI-R subscales were first summed. Then, an overall score for sexual unrestrictedness was computed by averaging the sum scores of the three subscales, with higher scores indicating greater sexual unrestrictedness.

Desired Mating Investment. Participants' required investment from a potential mate before consenting to sexual intercourse was measured using a five-item scale (e.g., *"How much investment of love and affection would you require from someone before consenting to sex?"*). Each item was responded to on a 7-point Likert-type scale with endpoints of (1) *very little investment* and (7) *a great deal of investment*. All five items were reverse-scored and a mean composite score was computed, with higher scores indicating less investment required before consenting to sex.

Openness to Sexual Intercourse. Participants' willingness to engage in sexual intercourse with a potential mate after different periods of time knowing the mate was measured using a ten-item measure (Buss & Schmitt, 1993). Each item asks participants *"If the conditions were right, what is the probability that you would consider having sexual intercourse with someone you viewed as desirable if you had known that person for* (time interval)*?"* The time intervals ranged from as long as 5 years to as short as 1 hour, and each item is responded to on a scale of (0) *definitely not* to (7) *definitely yes*. Items were

standardized to z-scores and a mean z-score was computed, with higher scores indicating greater overall willingness to engage in sexual intercourse.

Measures Included as Potential Covariates

In addition to positive and negative mood, participants also reported their age, childhood and adult socioeconomic status (SES), their childhood and adult environmental unpredictability, childhood neighborhood quality, and their childhood relationship with their parents as potential covariates.

Childhood and Adult SES. Childhood and adult SES were measured using two separate 3-item scales that asked participants to rate their agreement with statements pertaining to their early childhood (i.e., ages 0 - 12; e.g., *"My family usually had enough money for things when I was growing up."*) or current situation (e.g., *"I feel relatively wealthy these days."*). Participants responded to these statements on a 7-point Likert-type scale with endpoints of (1) *strongly disagree* to (7) *strongly agree*. Mean composites for each measure were computed, with higher scores indicating a higher level of childhood and/or adult SES.

Childhood and Adult Unpredictability. Similar to SES, Participants' experiences of environmental unpredictability during their childhood and adulthood were measured using two separate 3-item scales that asked participants to rate their agreement with statements pertaining to their early childhood (e.g., *"Things were often chaotic in my house."*) or current situation (e.g., *"Things are often chaotic in my house."*). Participants responded to these statements on a 7-point Likert-type scale with endpoints of (1) *strongly disagree* to (7) *strongly agree*, and a mean composites for each measure was computed, with higher scores indicating a higher level of childhood and/or adult unpredictability.

Childhood Neighborhood Quality. The safety and resource scarcity of participants' childhood neighborhoods was measured using a 5-item scale (e.g., *"We didn't have many businesses operating around my neighborhood."*), with responses ranging from (1) *strongly disagree* to (7) *strongly agree*. Appropriate items were reverse-scored and a mean score was computed, with higher scores indicating that participants lived in a poorer quality neighborhood during their childhood.

Relationship With Parents. Participants' relationship quality with their parents was measured using a 10-item scale probing their parents' involvement in their lives (e.g., *"When I was upset, my parents were there to calm me down."*). Participant responses ranged from (1) *strongly disagree* to (7) *strongly agree*, and appropriate items were reverse-scored. A mean composite for parental relationship was computed, with higher scores indicating a more positive relationship with one's parents.

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Data Analytic Plan

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Initial between-subjects analysis of variances (ANOVA) were conducted using IBM SPSS (Version 26) statistical software to confirm that the socially excluded participants expressed less positive mood and more negative mood than the socially included or control participants. Following this, all models were estimated using MPlus statistical software (MPlus 7.4; Muthén & Muthén, 2017). In each study, a latent factor for STM motives was assessed using a confirmatory factor analysis to ensure their fit. For all studies, the confirmatory factor analysis revealed that scores for the SOI-R, desired investment from a mate, and openness to sexual intercourse all loaded well on the latent factor of STM motives. This latent variable of STM motives was then used as a dependent variable in the subsequent models.

All structural equation models were built iteratively. First, the latent factor of STM motives was regressed on potential covariates, including age, positive and negative mood, childhood and adult SES, childhood and adult environmental unpredictability, childhood neighborhood quality, parental relationship quality, and experience with mating (Studies 2b and 3 only). Non-significant covariates ($p > .100$) were then dropped from subsequent models to improve model fit, preserve power, and prevent over-fitting (Bursac et al., 2008; Hawkins, 2004; van der Schaaf et al., 2012; West et al., 2012). Next, the latent factor of STM motives was regressed on condition (Condition: social exclusion vs. social inclusion vs. control [Studies 1 – 2b]; dummy coded, social exclusion = 0) to assess whether social exclusion led to an increase, relative to social inclusion or a neutral control, in participants' short-term mating orientation.

For Study 1 and Study 2b, I also tested for a moderating impact of sex on the relationship between condition and short-term mating orientation, to explore potential sex differences in this relationship. For Study 3, I assessed whether the relationship between condition (IV; condition: social exclusion vs. social inclusion) and STM motives (DV) was mediated by the effect of both/either perceptions of physical vulnerability (M1) and/or social affiliation motives (M2). Per convention, non-significant interactions ($p > .100$) were excluded from individual models when doing so improved model fit, thereby preserving power and preventing over-fitting of the model.

For each of these models, model fit was assessed using four fit indices: χ^2 test of model fit, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Adequate model fit was indicated by a non-significant χ^2 value ($p > .05$), a CFI value $> .95$, an RMSEA value $< .05$,

and an SRMR statistic < . 05. As the χ^2 value is often inflated with relatively large samples,

models with a significant χ^2 value were still evaluated as having good fit so long as all other

fit indices were within the specified ranges. A summary of the model fit indices and

standardized local fit statistics and main effects for all iterative models for each study can be

found in the supplementary materials.

Results

Mood

See Table 2 for descriptive statistics. To assess whether the writing manipulation was

effective, I first conducted two individual 2 (participant sex: male vs. female) x 3 (condition:

exclusion vs. inclusion vs. neutral control) ANOVAs on positive and negative mood scores.

For positive mood, the results revealed no main effects of either sex, $F(1, 176) = 1.26$, $p =$

.263, $\eta_{partial}^2 = .01$, or condition, $F(2, 176) = 1.41$, $p = .248$, $\eta_{partial}^2 = .02$. However, there was

a significant interaction between sex and condition on positive mood scores, $F(2, 176) =$

3.85, $p = .023$, $\eta_{partial}^2 = .04$ (see Figure 1). To probe this interaction, simple main effect tests

were conducted examining the influence of condition within participant sex. There were no

significant differences across conditions for male participants ($ps > .965$). Conversely, female

participants in the social exclusion condition reported less positive mood than those in either

the social inclusion or neutral control conditions, $ps \leq .013$. Women in the social inclusion

and neutral control conditions did not differ in their positive mood scores, $p = 1.000$. Further,

within conditions, while positive mood scores did not differ for men and women in the

inclusion and control conditions, $ps \geq .303$, men reported greater positive mood than women

in the social exclusion condition, $p = .003$.

With regards to negative mood scores, the results revealed a marginally significant effect of participant sex, $F(1, 176) = 3.73$, $p = .055$, $\eta_{partial}^2 = .02$, with female participants reporting greater negative mood compared to male participants, regardless of condition. Neither the main effect of condition, nor the interaction between condition and participant sex were significant ($ps \geq .204$) for negative mood scores. Overall, these results suggest that the social exclusion manipulation was effective in reducing women's positive mood, relative to social inclusion or a neutral control, but not men's positive mood. The results also indicate that, while women reported greater negative mood than men, regardless of condition, there were no differences in reported negative mood for either men or women across the three conditions, thereby suggesting that the social exclusion may not have been effective in influencing feelings of negative mood.
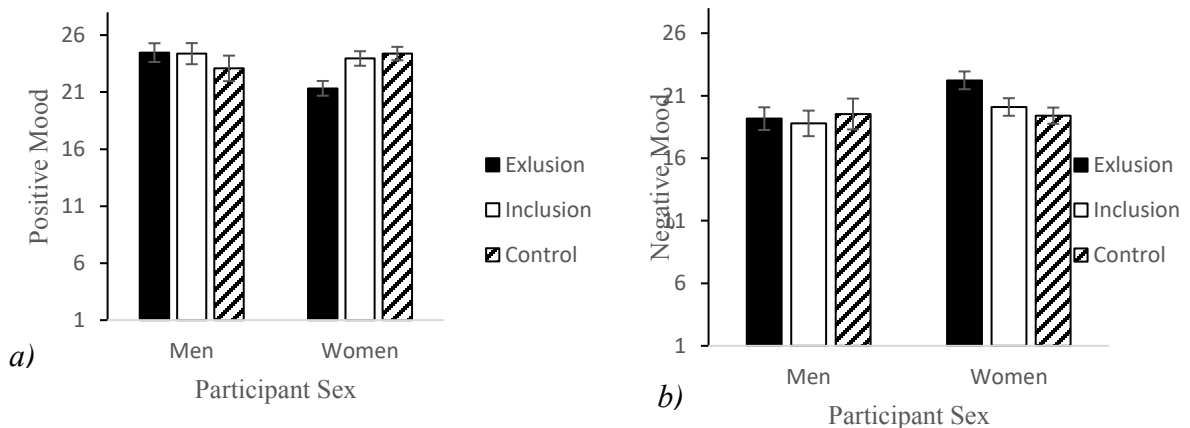
Figure 1. Study 1 (a) Participant Positive and (b) Negative Mood as a Function of the Interaction between Participant Sex and Exclusion Condition.

Path Model Testing

Covariates

See Table 3a for model fit statistics for each final model, and Table 3b for standardized local fit statistics and main effects for all final models for Study 1. Prior to examining the relationship between participant's condition and their STM, potential covariates were regressed onto STM motives. Childhood parenting ($p = .003$) and neighborhood quality ($p = .020$) both predicted participant STM motives. Those who reported experiencing greater environmental unpredictability in their childhood also reported higher STM motives, while those who grew up in higher quality neighborhoods reported lower STM motives; accordingly, childhood parenting and neighborhood were retained as covariates in subsequent models.

Short-Term Mating Orientation

A moderated regression analysis examined the influence of condition (dummy coded; social exclusion = 0) and participant sex (men vs. women; men = 0) on STM scores while controlling for childhood unpredictability and neighborhood quality. The results revealed a significant effect of participant sex on STM scores ($p \le .001$), such that, across conditions, when the participant was a woman, their STM score was 5.59 units less than when the participant was a man. However, the results revealed no effect of condition, with there being no significant differences among the three conditions ($p = .951$), nor an interaction between participants' sex and participants' condition ($p = .467$) on STM scores. When the interactions between participants' sex and participants' condition were omitted from the model, the main effect of participant sex remained significant ($p \le .001$) and there remained no differences among the three groups ($p = .268$). These results suggest that, while men exhibit greater STM

motives than women across all three conditions, neither men nor women that recalled being socially excluded reported different levels of STM motives compared to other men or women that recalled being socially included or an emotionally neutral experience. For exploratory purposes, individual univariate ANOVAs examining the effect of social exclusion condition, participant sex, and the interaction between these factors on each component of the STM motives latent construct (i.e., SOI-R, desired mate investment, and openness to sexual intercourse) can be found in the supplementary materials.

Table 2

Study 1 Descriptive Statistics for Study Outcome Measures

	Male			Female			
	Exclusion	Inclusion	Control	Exclusion	Inclusion	Control	
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	α
BMIS-Negative	19.17 (3.70)	18.79 (4.25)	19.54 (4.59)	22.23 (4.39)	20.10 (4.79)	20.50 (4.71)	0.80
BMIS-Positive	24.46 (3.41)	24.37 (3.25)	23.08 (5.36)	21.33 (4.82)	23.95 (4.17)	24.38 (3.31)	0.82
SOI-Revised	14.54 (5.14)	15.28 (5.41)	15.31 (5.27)	8.74 (4.23)	10.37 (4.54)	10.23 (4.22)	0.90
Mate Investment	4.75 (1.48)	4.63 (1.63)	4.05 (1.71)	2.70 (1.51)	3.10 (1.66)	3.33 (1.68)	0.93
Openness to Sex	0.30 (0.79)	0.71 (0.78)	0.31 (0.85)	-0.27 (0.63)	-0.16 (0.73)	-0.17 (0.75)	0.94
Childhood SES	4.81 (1.21)	4.95 (1.46)	5.05 (0.96)	5.44 (1.16)	5.45 (1.30)	5.50 (1.05)	0.77
Childhood Unpredictability	2.13 (1.38)	2.95 (1.66)	2.59 (1.42)	2.03 (1.15)	2.51 (1.27)	2.04 (1.18)	0.78
Adult SES	4.64 (1.51)	4.47 (1.54)	4.46 (1.87)	5.14 (1.50)	5.45 (1.26)	5.35 (1.13)	0.82
Adult Unpredictability	2.19 (1.67)	2.54 (1.63)	2.69 (1.61)	2.10 (1.41)	2.32 (1.17)	1.97 (1.10)	0.82
Neighborhood Quality	2.19 (0.90)	2.36 (1.13)	2.49 (1.23)	2.13 (0.98)	2.13 (0.95)	1.94 (0.70)	0.71
Parenting Closeness	5.24 (0.80)	4.87 (1.13)	4.75 (1.07)	5.45 (1.07)	5.33 (0.93)	5.45 (0.96)	0.82

Notes. BMIS = Brief Mood Introspection Scale; SOI = Sociosexual Orientation Inventory; SES = socioeconomic status

Table 3a
Study 1 Model Fit Indices For Final Models

Model	χ^2 (*df*)	CFI	RMSEA	SRMR
Covariates – model 3	8.87 (4)	0.99	0.08	.03
STM motives – model 1	18.39 (10)*	0.98	0.07	0.02

Note. STM = short term mating; χ^2 (*df*) = chi-square test of model fit (degrees of freedom); CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual. *$p < .05$.

Table 3b
Study 1 Standardized Local Fit Statistics and Main Effects For Final Models

Model		B(SD)	t	*p*
Covariates – model 3				
STM motives	Parent Relationship	-0.29 (0.08)	-3.79	≤ 0.001
	Childhood Neighborhood	-0.19 (0.08)	-2.54	0.011
STM – model 1				
STM motives	Parent Relationship	-0.22 (0.08)	-2.76	0.006
	Childhood Neighborhood	-0.21 (0.08)	-2.77	0.006
	Participant Sex	-0.53 (0.09)	-5.65	≤ 0.001
	Condition	-0.01 (0.13)	-0.10	0.920
	Sex * Condition	0.12 (0.15)	0.78	0.436

Note. STM = Short Term Mating; Condition = Social Exclusion vs. Social Inclusion vs. Control (Social Exclusion = 0); Participant Sex = Male vs. Female (Male = 0)

Discussion

Study 1 found that, while social exclusion leads unpartnered women, but not unpartnered men, to report lower positive mood, social exclusion did not influence reported STM motives. More specifically, while men exhibited greater STM motives than women in all three conditions, men and women that recalled social exclusion reported similar levels of STM motives as other men and women that recalled social inclusion or their daily routine (i.e., neutral control). Further, even when omitting relevant covariates (i.e., childhood

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parenting and neighborhood quality) from the analysis, STM motives remained similar across all three conditions within groups of men and women. Therefore, the results of Study 1 do not support the hypothesis that social exclusion leads women, but not men, to exhibit increases in STM motives.

This also indicates that Study 1 did not conceptually replicate the relationships between exclusion and sexual unrestrictedness found in past research (Sacco et al., 2012), however one explanation for this incongruence stems from the nature of the prime used in the present study. While social exclusion threatens a variety of needs (Williams, 2009), previous research has revealed distinctions among these threats and motivations that are elicited by different types of exclusion. For example, Molden et al. (2009) found that recalling an experience of being actively and explicitly rejected led individuals to exhibit more "prevention-focused" responses aimed at avoiding further experiences of rejection. Conversely, recalling an experience of being passively and implicitly ignored instead exhibited "promotion-focused" behaviors aimed at actively regaining social belonging. Therefore, the degree to which an experience of exclusion is active or passive could influence the expression of certain cognitive or behavioral responses, such as increases in STM motives (a more promotion-focused response).

In Study 1 of the present work, I employed the same memory recall task used by much social exclusion research, including Molden et al. (2009), in which participants were tasked with recalling and writing about a time in which they were "socially excluded or rejected by others." With this manipulation, participants are free to recall the memory of a wide variety of social exclusion experiences that could be of explicit and direct rejection or more implicit and passive ignoring. Consequently, after examining participants' qualitative

responses to the memory recall task, it appeared that approximately half of the participants in the exclusion condition recalled an active, targeted rejection (e.g., being explicitly told that they were not invited to a party but that their brother was), whereas the other half recalled a time they were more implicitly, passively ignored (e.g., finding out they weren't invited by any of their friends to a party they all went to). So, considering that participants in Study 1 recalled distinct types of exclusion, it may have been the case that the social exclusion participants may have been split in their avoidance or promotion related motivations, thereby explaining why no statistically significant relationship between being in the exclusion condition and reported STM motives was observed, despite there being reductions in reported positive mood. Unfortunately, the collected sample size in Study 1 was not sufficient to adequately examine whether the type of memory recalled led to differences in STM motives, though this is an intriguing area for future research.

Study 2a and 2b

Because Study 1 participants in the social exclusion condition recalled conceptually distinct experiences of being either actively rejected or passively ignored, Study 2a and 2b were designed to more tightly control the type of exclusion participants experienced, and thereby more effectively test the relationship between exclusion and STM motives. To do this, Study 2a and 2b sought to replicate past research that has found a positive relationship between social exclusion and sexual unrestrictedness using the Future Alone Paradigm. To do this, following procedures from Study 1, participants first completed the social exclusion manipulation, in which they completed a short personality questionnaire and received fabricated feedback about their social life, and then responded to questionnaires assessing present mood, several aspects of STM motives (i.e., sexual unrestrictedness, desired mate

investment, and sexual openness), and relevant demographic information. All participants were told that these studies were designed to assess relationships between personality traits and social experiences.

Similar to Study 1, Study 2a assessed this relationship within a sample of male and female undergraduate students, although an insufficient number of male undergraduates were recruited to examine sex differences. Study 2b instead assessed the exclusion and STM relationship within a sample of adult male and female MTurk workers. As in Study 1, it was hypothesized that women, but not men, exposed to social exclusion, compared to other same-sex participants that were exposed to social inclusion or a neutral control, would exhibit higher levels of STM motives. Additionally, given the wider age range of typical MTurk participants compared to undergraduate students, participants' level of experience with mating behaviors was also assessed in Study 2b. In this way, I was able to specify that any observed differences in STM motives among participants would be specifically due to social exclusion and not individual differences in experience level with mating behavior among MTurk participants.

Method

Participants

Study 2a was conducted in-person using a sample of undergraduate students from Texas Christian University, whereas Study 2b was conducted online using a sample of adult men and women from the United States obtained via the CloudResearch toolkit and Amazon Mechanical Turk (MTurk). As in Study 1, exclusion criteria only included being in a committed relationship. A total of 43 respondents from Study 2a and 48 respondents from Study 2b reported being in a committed relationship and were excluded from analyses. In

Study 2a, I obtained full responses from 171 unpartnered, undergraduate students (138

women, 33 men; M_{age} = 19.68 years, SD = 1.32 years), who participated in exchange for

nominal course credit. Study 2b included a sample of full responses from 234 single adults

from the United States (113 women, 121 men; M_{age} = 28.75 years, SD = 5.77 years), who

participated in exchange for $3 USD compensation. Demographic characteristics for Study

2a and 2b can be found in Table 4 and Table 5, respectively.

Table 4
Study 2a Participant Demographic Information, Reported by Condition (N = 171)

	Social Exclusion	Social Inclusion	Control	Full Sample
	n (%)	*n* (%)	*n* (%)	*n* (%)
Gender				
Male	11 (22.0)	11 (19.0)	11 (17.7)	33 (19.3)
Female	39 (78.0)	47 (81.0)	51 (82.3)	138 (80.7)
Race/ethnicity:				
White	33 (66.0)	41 (70.7)	43 (69.4)	118 (69.0)
Black/African American	5 (10.0)	3 (5.2)	5 (8.1)	13 (7.6)
Hispanic	4 (8.0)	8 (13.8)	8 (12.9)	20 (11.7)
Asian/Pacific Islander	2 (4.0)	3 (5.2)	2 (3.2)	7 (4.1)
Multiracial/Other	6 (12.0)	3 (5.2)	4 (6.5)	13 (7.6)

Table 5

Study 2b Participant Demographic Information, Reported by Condition (N = 234)

	Social Exclusion	Social Inclusion	Control	Full Sample
	n (%)	*n* (%)	*n* (%)	*n* (%)
Gender				
Male	37 (50.0)	41 (50.6)	43 (54.4)	121 (51.5)
Female	37 (50.0)	40 (49.4)	36 (45.6)	113 (48.1)
Race/ethnicity:				
White	37 (50.0)	38 (46.3)	48 (60.8)	123 (52.3)
Black/African American	14 (18.9)	22 (26.8)	16 (20.3)	52 (22.1)
Hispanic	7 (9.5)	7 (8.5)	4 (5.1)	18 (7.7)
Asian/Pacific Islander	8 (10.8)	4 (4.9)	7 (8.9)	19 (8.1)
Multiracial/Other	8 (10.5)	11 (13.4)	4 (5.1)	23 (9.8)

Materials and Procedure

After providing informed consent, participants responded to the same initial demographics items from Study 1 and were randomly assigned to one of the exclusion, inclusion, or control conditions. To manipulate social exclusion status in Study 2 we employed the well-validated Future Alone Paradigm, in which participants complete a personality questionnaire that then ostensibly automatically calculates a personality score and explains how this score relates to their future experiences in social situations. To begin, participants were tasked with completing an abbreviated 27-item version of Goldberg's Big 5 personality questionnaire (Goldberg, 1992). Rather than providing feedback based on participant's total response to the personality questionnaire, to support the cover story participants were first provided with accurate feedback about their response to either the single "extraverted" item for participants in the exclusion and acceptance conditions, or the single "conscientious" item for participants in the control condition, based on whether the

response was "high" or "low" (e.g., *"You scored highly in extraversion. Scoring high or fairly high in extraversion is a good thing for meeting people, especially when you are young, but there's been some research that has shown that people who score high on extraversion have trouble keeping their relationships stable later in life."*).

Following the presentation of the accurate feedback, participants were then shown one of three bogus "future life prediction" descriptions. Specifically, participants in the social exclusion condition read, *"You're the type of person who will end up alone later in life. You may have friends and relationships now, but by your mid 20s most of these will have drifted away. You may even marry or have several marriages, but these are likely to be short-lived and not continue into your 30s. Your relationships don't last and when you're past the age where people are constantly forming new relationships, the odds are you'll end up being alone more and more."* In contrast, participants in the social inclusion condition read, *"You're the type of person who has rewarding relationships throughout your life. You're likely to have a long and stable marriage and have friendships that will last you into your later years. The odds are that you'll always have friends and people that care about you."* Lastly, participants in the neutral control condition were provided the following prediction, *"You're the type of person who has really good handwriting skills throughout your life. You're likely to have neat and orderly handwriting that will last into your later years. The odds are that you'll always have impressive handwriting skills."*

After completion of the Future Alone Paradigm, participants were then directed to complete the same positive and negative mood, sociosexual orientation (SOI-R), desired mating investment, and sexual intercourse willingness measures from Study 1. Participants in Study 2b were also asked four questions assessing their level of experience with dating,

flirting, choosing a romantic partner, and sexual intercourse. Participants then provided the same secondary demographics items as Study 1, were thanked for their participation, debriefed, and dismissed. Specifically, participants were informed that the future life prediction that they received during the study was completely false, created by the researcher, and not based on their responses to the personality questionnaire.

Mating Experience

Due to the greater range of ages of MTurk workers compared to undergraduate students, thereby increasing the possibility of experience-related differences in STM motives, participants' experience with mating-related behaviors was also measured in Study 2b as a potential covariate using four individual items (i.e., *"How experienced are you with dating/flirting/choosing romantic partners/sexual intercourse?"*). Participants responded to these items using a 7-point Likert-type scale with endpoints of (1) *very unexperienced* and (7) *very experienced*. Responses to each item were then aggregated to calculate a mean score for mating experience, with higher scores indicating greater experience with mating behaviors.

Study 2a Results

See Table 6 for descriptive statistics for Study 2a. Due to an insufficient sample size of male participants (< 20 men per condition), sex differences could not be assessed and analyses for Study 2a were restricted to only the 138 female participants in order to avoid potential skewing of STM scores by the male participants. Importantly, the pattern of results for Study 2a do not change with the inclusion of male participants.

Mood

For Study 2a, I began by conducting individual one-way between-subjects analysis of variances (ANOVA) on positive and negative mood scores to assess the effectiveness of the Future Alone Paradigm. In Study 2a, the results indicated that there was a significant effect of condition on both positive, $F(2, 134) = 4.463$, $p = .013$, $\eta_{partial}^2 = .06$, and negative mood, $F(2, 134) = 5.886$, $p = .004$, $\eta_{partial}^2 = .08$ (see Figure 2). Women in the social exclusion condition reported significantly less positive mood than women in the inclusion condition ($p = .017$), and significantly more negative mood than women in both the inclusion and control conditions ($ps \leq .017$). Women in the exclusion condition also reported marginally less positive mood than women in the control condition ($p = .055$). Women in the inclusion and control conditions did not differ in their reported positive or negative mood ($ps = 1.00$). These results suggest that the Future Alone manipulation for social exclusion was effective in, relative to social inclusion or a neutral control, reducing positive mood and increasing negative mood among unpartnered women.
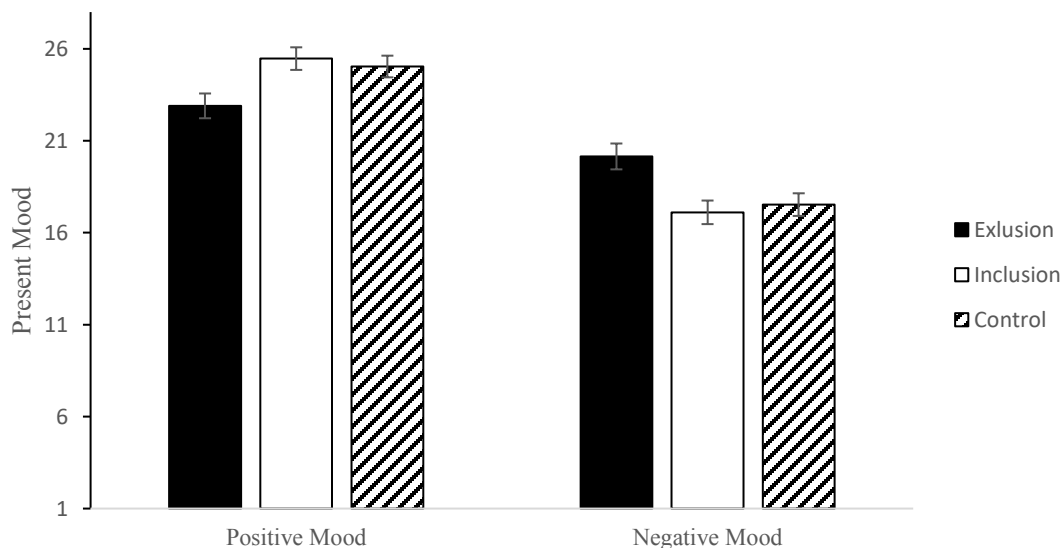
Figure 2. Study 2a Participant Positive and Negative Mood as a Function of Exclusion Condition.

Path Model Testing

Covariates

See Table 7a for model fit statistics for each final model, and Table 7b for standardized local fit statistics and main effects for all final models for Study 2a. I began by regressing potential covariates regressed onto the latent construct of STM motives. The results revealed that childhood SES ($p = .072$) and negative mood ($p = .024$) each positively predicted participant STM motives. That is, those participants with higher childhood SES and more negative mood reported higher levels of STM motives. As such, childhood SES and negative mood were both retained as covariates in their subsequent models.

Short-Term Mating Orientation

For Study 2a, I first conducted a linear regression analysis to assess the influence of female participant's condition (dummy coded; social exclusion = 0) on STM scores while controlling for childhood SES and negative mood. The results revealed no significant effect of condition, with no differences in STM scores among the three conditions ($p = .622$). Therefore, this result suggests that, consistent with the findings of Study 1, social exclusion does not lead unpartnered women to express greater STM motives compared to social inclusion or a neutral control. For exploratory purposes, a multivariate analysis of variance (MANOVA) examining the effect of social exclusion condition on each component of the STM motives latent construct (i.e., SOI-R, desired mate investment, and openness to sexual intercourse) can be found in the supplementary materials.

Table 6
Study 2a descriptive statistics for study outcomes

| | Female | | | |
| | Exclusion | Inclusion | Control | |
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	α
BMIS-Negative	20.15 (4.59)	17.11 (3.67)	17.53 (4.83)	0.79
BMIS-Positive	22.90 (5.12)	25.47 (3.59)	25.04 (3.96)	0.83
SOI-R (total)	10.86 (4.54)	9.31 (4.32)	9.96 (4.18)	0.87
Mate Investment	3.08 (1.42)	3.03 (1.51)	3.33 (1.55)	0.89
Openness to Sex	0.06 (0.72)	-0.18 (0.69)	0.09 (0.89)	0.93
Childhood SES	4.99 (1.54)	5.01 (1.48)	4.86 (1.55)	0.86
Childhood Unpredictability	2.43 (1.22)	2.41 (1.42)	2.12 (1.46)	0.73
Adult SES	4.65 (1.52)	5.03 (1.32)	4.88 (1.40)	0.84
Adult Unpredictability	2.27 (1.21)	2.14 (1.19)	1.99 (1.21)	0.73
Neighborhood Quality	5.61 (1.08)	5.49 (1.31)	5.72 (1.09)	0.80
Parenting Closeness	5.17 (1.03)	5.27 (1.11)	5.40 (1.07)	0.84

Notes. BMIS = Brief Mood Introspection Scale; SOI = Sociosexual Orientation Inventory; SES = socioeconomic status

Table 7a

Study 2a Model Fit Indices For Final Models

Model	χ^2 (*df*)	CFI	RMSEA	SRMR
Covariates – model 2	3.31 (4)	1.00	≤ 0.001	0.02
STM – model 1	7.78 (6)	0.99	0.05	0.03

Note. STM = short term mating; χ^2 (*df*) = chi-square test of model fit (degrees of freedom); CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual. **p* < .05.

Table 7b

Study 2a Standardized Local Fit Statistics and Main Effects For Final Models

Model		B(SD)	t	*p*
Covariates – model 2				
STM	Childhood SES	0.14 (0.08)	1.80	0.072
	Negative Mood	0.19 (0.08)	2.26	0.024
STM – model 1				
	Childhood SES	0.15 (0.08)	1.84	0.066
STM	Negative Mood	0.21 (0.08)	2.43	0.015
	Condition	0.05 (0.10)	0.49	0.622

Note. SES = socioeconomic status; STM = Short Term Mating; Condition = Social Exclusion vs. Social Inclusion vs. Control (Social Exclusion = 0)

Study 2b Results

Mood

See Table 8 for descriptive statistics for Study 2b. As in Study 1, I conducted a 2 (participant sex: male vs. female) x 3 (condition: exclusion vs. inclusion vs. neutral control) between-subjects analysis of variances (ANOVA) on positive and negative mood scores to assess the effectiveness of the Future Alone Paradigm. In Study 2b, there was a significant effect of condition on both positive $F(2, 228) = 6.314$, $p = .002$, $\eta_{partial}^2 = .05$, and negative mood, $F(2, 228) = 4.766$, $p = .009$, $\eta_{partial}^2 = .04$ (see Figure 3). Examining this main effect,

individuals in the social exclusion condition reported less positive mood compared to individuals in both the inclusion and control conditions ($ps \leq .037$), and more negative mood than individuals in the inclusion condition ($p = .009$), but not the control condition ($p = 1.00$). Individuals in the inclusion and control conditions did not differ in their reported positive and negative mood ($ps \geq .116$). There was also a significant effect of participant sex on negative mood, $F(1, 228) = 9.595$, $p = .002$, $\eta_{partial}^2 = .04$, but not on positive mood, $F(1, 228) = 0.007$, $p = .933$, $\eta_{partial}^2 \leq .001$, such that women reported greater levels of negative mood than men, but similar levels of positive mood, across conditions. There was no interaction between condition and participant sex for either positive, $F(2, 228) = 0.796$, $p = .453$, $\eta_{partial}^2 = .01$, or negative mood, $F(2, 228) = 1.750$, $p = .176$, $\eta_{partial}^2 = .02$. Overall, the results of Study 2b suggest that the Future Alone manipulation was mostly effective in reducing positive mood and increasing negative mood among both male and female participants relative to social inclusion or a neutral control.
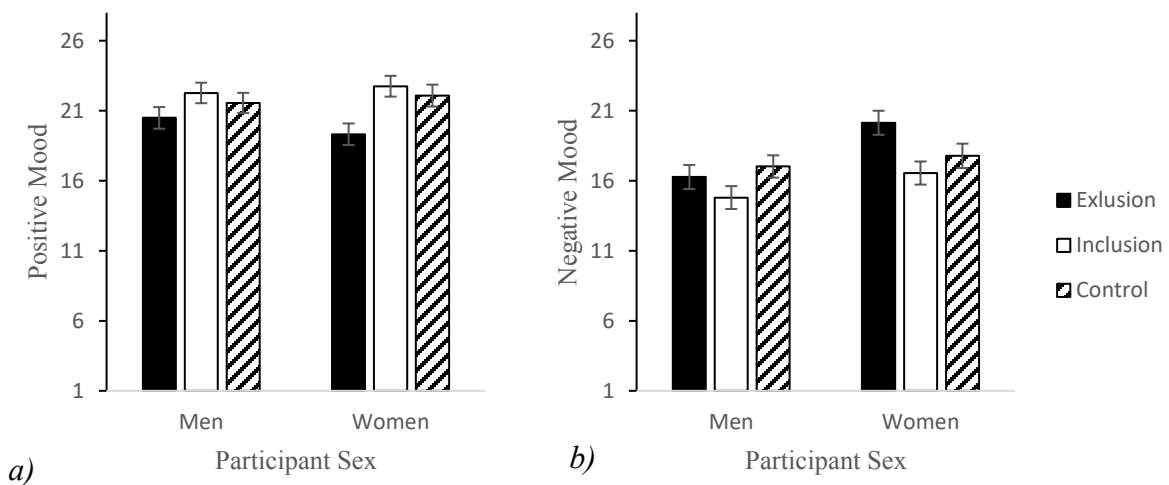

Figure 3. Study 2b Participant Positive (a) and Negative (b) Mood as a Function of the Interaction between Participant Sex and Condition.

Path Model Testing

Covariates

See Table 9a for model fit statistics for each final model, and Table 9b for standardized local fit statistics and main effects for all final models for Study 2b.Covariate model analyses revealed that childhood SES (p = .092), positive mood (p = .001), and mating experience ($p \leq$ .001) each predicted participant STM motives. More specifically, those participants with higher childhood SES and more mating experience reported greater STM motives, while those with more positive mood reported lower STM motives. As such, childhood SES, positive mood, and mating experience were retained as covariates in subsequent models for Study 2b.

Short-Term Mating Orientation

In Study 2b, a moderated regression was conducted to assess the influence of condition (dummy coded; social exclusion = 0) and participant sex (male vs. female; male = 0) on STM scores while controlling for childhood SES, positive mood, and mating experience. The results revealed a significant effect of participant sex on STM scores ($p \leq$ .001), with female participants reporting lower STM motive scores compared to male participants. That is, when the participant is female, they are expected to report a STM motive score that is .470 units lower than if they were male. As in Study 1, the results also revealed no significant effect of condition (p = .377), nor an interaction between participant sex and condition (p = .946). Overall, the results of 2b are consistent with those of Study 1 and Study 2a in that, while men exhibit greater STM motives than women generally, social exclusion, compared to social inclusion or a neutral control, does not lead to an increase in STM motives for either men or women. For exploratory purposes, individual univariate

ANOVAs examining the effect of social exclusion condition, participant sex, and the interaction between these factors on each component of the STM motive latent construct (i.e., SOI-R, desired mate investment, and openness to sexual intercourse) can be found in the supplementary materials

Table 8

Study 2b descriptive statistics for study outcomes

	Male			Female			
	Exclusion	Inclusion	Control	Exclusion	Inclusion	Control	α
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	
BMIS-Negative	16.27 (5.73)	14.80 (5.03)	17.02 (5.62)	20.14 (4.95)	16.55 (5.43)	17.78 (4.42)	0.86
BMIS-Positive	20.49 (4.62)	22.27 (5.24)	21.56 (3.72)	19.32 (5.25)	22.75 (5.13)	22.08 (3.98)	0.85
SOI-Revised	14.56 (5.82)	13.85 (5.41)	16.04 (6.14)	10.49 (4.36)	10.76 (4.84)	10.60 (4.91)	0.91
Mate Investment	4.86 (1.70)	4.88 (1.90)	5.30 (1.75)	3.67 (1.79)	3.58 (1.66)	3.57 (1.93)	0.93
Openness to Sex	0.26 (0.77)	0.28 (0.89)	0.42 (0.76)	-0.37 (0.77)	-0.35 (0.67)	-0.35 (0.71)	0.95
Mating Experience	3.28 (1.74)	3.52 (1.97)	3.99 (1.95)	4.01 (1.75)	3.95 (1.92)	3.78 (1.92)	0.95
Childhood SES	3.83 (1.45)	3.27 (1.45)	3.36 (1.39)	3.28 (1.60)	3.63 (1.40)	3.61 (1.34)	0.80
Childhood Unpredictability	2.44 (1.50)	2.23 (1.48)	2.67 (1.42)	2.98 (1.51)	2.98 (1.85)	2.77 (1.49)	0.80
Adult SES	3.55 (1.59)	3.11 (1.61)	2.81 (1.37)	2.68 (1.48)	3.33 (1.60)	3.33 (1.32)	0.86
Adult Unpredictability	2.27 (1.13)	2.14 (1.47)	2.42 (1.25)	2.07 (1.16)	2.12 (1.35)	2.20 (1.25)	0.80
Neighborhood Quality	4.88 (1.09)	4.69 (1.25)	4.70 (1.30)	4.77 (1.18)	5.04 (1.18)	5.09 (1.18)	0.77
Parenting Closeness	4.99 (1.30)	4.95 (1.03)	4.52 (1.03)	4.04 (1.29)	4.34 (1.60)	4.82 (1.27)	0.88

Note. BMIS = Brief Mood Introspection Scale; SOI = Sociosexual Orientation Inventory; SES = socioeconomic status

Table 9a

Study 2b Model Fit Indices For Final Models

Model	χ^2 *(df)*	CFI	RMSEA	SRMR
Covariates – model 4	16.33 (6)	0.98	0.09	0.02
STM – model 1	22.57 (12)*	0.98	0.06	0.02

Note. STM = short term mating; χ^2 *(df)* = chi-square test of model fit (degrees of freedom); CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual. *$p < .05$.

Table 9b

Study 2b Standardized Local Fit Statistics and Main Effects For Final Models

Model		B(SD)	t	p
Covariates – model 4				
STM	Childhood SES	0.11 (0.07)	1.68	0.092
	Positive Mood	-0.21 (0.07)	-3.20	0.001
	Mating Experience	0.44 (0.06)	7.25	≤ 0.001
STM – model 1				
STM	Childhood SES	0.13 (0.06)	2.23	0.026
	Positive Mood	-0.23 (0.06)	-3.95	≤ 0.001
	Mating Experience	0.48 (0.05)	8.93	≤ 0.001
	Participant Sex	-0.47 (0.09)	-5.24	≤ 0.001
	Condition	0.07 (0.08)	0.88	0.377
	Sex * Condition	-0.01 (0.11)	-0.07	0.946

Note. SES = socioeconomic status; STM = Short Term Mating; Condition = Social Exclusion vs. Social Inclusion vs. Control (Social Exclusion = 0); Participant Sex = Male vs. Female (Male = 0)

Discussion

Study 2a and 2b tested whether social exclusion would lead women, but not men, to exhibit higher levels of STM motives than social inclusion or a neutral control by providing participants with false predictions about their future social lives ostensibly based on their responses to a personality questionnaire. Overall, the results of Study 2a and Study 2b do not support the primary hypothesis. As in Study 1, and contrary to the first hypothesis, there were

no reported differences in STM motives across the social exclusion, inclusion, or control conditions among samples of female undergraduates (2a) or male and female MTurk workers (2b). Further, in Study 2b, there was no interaction between participants' sex or condition, even while controlling for participants' experience with mating related behaviors, indicating that men and women in the exclusion condition reported similar levels of STM motives as other men and women in the inclusion and control conditions. As such, these findings are not consistent with the results of past research, despite utilizing a direct replication method (Sacco et al., 2012), and suggest that social exclusion does not influence men or women's short-term mating psychology.

An explanation for these findings is that social exclusion does not increase perceptions of vulnerability to physical threats for all women, and as such, will not lead to increases in STM motives. More specifically, if increased perceptions of vulnerability are only exhibited by some women that are socially excluded but not others, then it may be that only those women that do experience increased perceptions will see sexual access as an effective tool for securing protection and reducing this perceived vulnerability, and will subsequently exhibit increased STM motives. Conversely, women that do not perceive themselves as more vulnerable following exclusion should not be more motivated to increase their self-protection and, thus, should not exhibit increased STM motives as an exclusion recovery strategy. If this is the case, then such an explanation would be consistent with the second hypothesis that social exclusion leads to increased STM motives in women specifically due to increased perceptions of physical vulnerability, and not other motivations such as affiliation.

Alternatively, the results of these first three studies could be due to a more specific effect of social exclusion on women's STM motives. That is, it may be that social exclusion does not lead women to become more interested in short-term relationships generally. Rather, it may be that social exclusion, through increases in perceived vulnerability, leads women to become more interested in short-term relationships with specific partners that can explicitly offer physical protection. In past research showing that social exclusion leads women to exhibit increased sexual unrestrictedness, it was also shown that social exclusion leads women to express a greater preference for mates with muscular bodies (Sacco et al., 2012). Additionally, as mentioned previously, men with the physical strength to provide protection from potential threats have historically been more attractive to unpartnered women looking for short-term mating partners (Bleske-Racheck & Buss, 2001). So, to the extent that social exclusion leads women to perceive themselves as more at risk to threats, the greater a preference they should exhibit towards mates that signal the ability to protect them from these threats, and the more likely they should be to utilize sexual access as a tool for attracting such mates. However, this specified relationship is not necessarily guaranteed to be reflected by an increase in women's global levels of STM motives, and should therefore be tested separately. Support for this alternate hypothesis would be consistent with the results of the previous research (Sacco et al., 2012), while also providing a more nuanced perspective to the relationship between social exclusion and women's mating psychology.

Study 3

Because the previous three studies suggest that social exclusion does not lead women to exhibit differences in their STM motives relative to social inclusion or a neutral control, Study 3 aimed to examine whether women's STM motives only shifts as a function of the

degree to which social exclusion influences their perceived vulnerability to physical threats. Additionally, as social exclusion may not influence STM motives generally, but may more specifically influence women's preferences for and sexual unrestrictedness towards more muscular-bodied mates that can offer protection and alleviate perceptions of vulnerability, Study 3 was also designed to test this alternative hypothesis. To examine these hypotheses, unpartnered female participants were first randomly assigned to complete the same social exclusion or social inclusion condition used in Study 2a and 2b. Participants then completed measures assessing their preferences for short-term mates based on body type, their perceptions of their vulnerability to physical threats, and their motivations to pursue social affiliation. Lastly, participants then completed the same measures of mood, STM motives, and demographic information (including mating experience) used in the three prior studies. It was predicted that perceptions of vulnerability to physical threats would mediate the relationship between social exclusion and STM motives, such that social exclusion, compared to social inclusion, would lead unpartnered women to report perceiving themselves as more vulnerable, and these perceptions would in turn lead them to also report greater STM motives. Secondarily, it was predicted that socially excluded women would report greater preferences for short-term mates with more muscular bodies than socially included women. If this second prediction was supported, I would then examine whether this relationship was also mediated by perceptions of physical vulnerability.

Method

Participants

Participants included 196 adult women from the United States recruited using CloudResearch Toolkit and MTurk. Participants participated in exchange for $3 USD. A total

of 61 participants were excluded from analyses due reporting being in a committed

relationship ($n = 58$) or incomplete responses ($n = 3$), leaving a final sample of 135 women

with completed responses ($M_{age} = 29.10$ years, $SD = 6.56$ years). Demographic

characteristics for Study 3 can be found in Table 10.

Table 10
Study 3 Participant Demographic Information, Reported by Condition (N = 135)

	Social Exclusion	Social Inclusion	Full Sample
	n (%)	*n (%)*	*n (%)*
Gender			
Female	66 (48.9)	69 (51.1)	135 (100.0)
Race/ethnicity:			
White	40 (60.6)	43 (62.3)	83 (61.5)
Black/African American	13 (19.7)	17 (24.6)	30 (22.2)
Hispanic	4 (6.1)	2 (2.9)	6 (4.4)
Asian/Pacific Islander	6 (9.1)	3 (4.3)	9 (6.7)
Multiracial/Other	3 (4.5)	4 (5.8)	7 (5.2)

Procedure

Upon providing informed consent were randomly assigned to either a social exclusion

($n = 66$) or social inclusion ($n = 69$) condition. Again, as in Studies 2a and 2b, participants

began by completing introductory demographics information and the Future Alone Paradigm.

Upon completing the Future Alone Paradigm, participants completed the BMIS, as well as

measures assessing perceived physical vulnerability to physical threats and affiliation

motivations. Participants then responded to the same STM motives measures used in Studies

1-2b. Finally, participants responded to the same mating experience and secondary

demographic questions as Study 2b, were fully debriefed, and dismissed.

Measures

Perceived Physical Vulnerability

Participants' perceptions about their vulnerability to physical threats was assessed using a 22-item scale originally developed by Dean et al. (2009). The scale begins with the following instructions: *"Compared to other people the same gender and age as you, what do you think are the chances that the following events will occur sometime in the future."* Participants are then presented with 14 events connoting a physical threat (e.g., *"be threatened with a weapon"*) and 8 events denoting a non-physical threat (e.g., *"struggle to pay your bills"*), which participants responded to on a 7-point Likert-type scale with endpoints of (1) *much below average* and (7) *much above average*. A physical threat perception composite score was calculated by averaging the responses to the physical event items, with higher scores indicating greater perceived vulnerability to physical threats relative to one's peers.

Affiliation Motives

To assess motivations to pursue interpersonal affiliation, participants responded to the affiliation (group) subscale of the Fundamental Social Motives Scale (Neel et al., 2016). The affiliation motives subscale consists of six items probing participants' desires to socially affiliate with others (e.g., *"Getting along with the people around me is a high priority"*). Responses to these items were made on a (1) *strongly disagree* to (7) *strongly agree* scale. A composite score for affiliation motivation was calculated by averaging response to each item, with higher scores indicating greater motivation to pursue social affiliation.

Muscular Male Preference

To test the alternative hypothesis that socially excluded women exhibit a targeted, as opposed to general, increase in interest in pursuing mates that can offer physical protection, participants responded to the muscle silhouette scale (MSS) and the fat silhouette scale (FSS; Frederick et al., 2007). These two scales each consist of a single item presenting eight drawings of male bodies that vary on either their body muscle or body fat. Each drawing was assigned a score of 1 to 8, with higher scores indicating a preference for a more muscular or more fat body. Each set of drawings are presented with the following question: "*Which man would make the best short-term sexual partner/brief sexual affair for you?*" To create a preference for muscular males score that measured participants' relative preference for more muscular body types compared to fatter body types, participants' responses to the FSS were subtracted from their responses to the MSS, with higher scores indicating a greater preference for muscular male bodies.

Results

Mood

See Table 11 for descriptive statistics. To assess the effect of condition on participants' positive and negative mood, I conducted individual one-way ANOVAs. The results revealed that, for both positive, $F(1, 133) = 2.570$, $p = .111$, $\eta_{partial}^2 = .02$, and negative mood, $F(1, 133) = .106$, $p = .745$, $\eta_{partial}^2 = .001$, there was no significant effect of condition (see Figure 4). This indicates that women that experienced social exclusion reported similar levels of positive and negative mood to those women that experienced social inclusion, suggesting that the social exclusion manipulation in this study may not have been effective or as salient as in the prior studies.
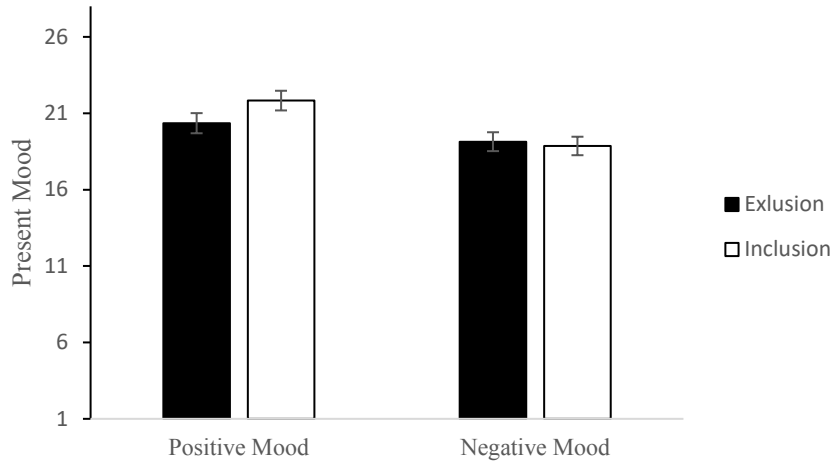
Figure 4. Study 3 Participant Positive and Negative Mood as a Function of Participant Condition.

Path Model Testing

Covariates

See Table 12a for model fit statistics for each final model, and Table 12b for standardized local fit statistics and main effects for all final models for Study 3. As in the previous studies, I began by regressing potential covariates onto STM motives, however, perceived physical vulnerability and affiliation motives were also included in the same model as dependent variables and the potential covariates were regressed onto these factors as well. Participants' STM scores were predicted by participants' childhood unpredictability ($p = .040$), positive mood ($p = .001$), and mating experience ($p \leq .001$). Participants with higher childhood environmental unpredictability and more mating experience reported higher levels of STM motives, whereas those with more positive mood reported lower levels of STM motives. Perceived vulnerability to physical threats was predicted by adult SES ($p \leq .001$) and negative mood ($p = .004$), while affiliation motives were predicted by participants' age ($p = .001$) and mating experience ($p = .028$). These results suggest that participants with

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higher adult SES and lower negative mood perceive themselves as less vulnerable to physical threats, and younger participants with more mating experience have higher levels of affiliation motives. Given these results, childhood unpredictability, positive mood, and mating experience were retained as covariates of STM motives; adult SES and negative mood were retained as covariates of perceived vulnerability; age and mating experience were retained as covariates of affiliation motives.

Main Effects on Primary Outcomes

To begin, I assessed the influence of participants' condition (social exclusion vs. social inclusion) on participants' STM motives, perceived vulnerability to physical threats, and affiliation motives by conducting a linear regression analysis with STM motives, perceived vulnerability, and affiliation motives as individual dependent variables while controlling for their respective covariates. The results revealed that there was a significant effect of condition on women's STM motives ($p = .030$). Contrary to my prediction, these results indicated that socially excluded unpartnered women, when compared to those that were socially included, reported STM scores that were .155 units lower. That is, social exclusion led unpartnered women to exhibit lower, not greater, levels of STM motives. The results also revealed no significant main effect of condition for either perceptions of physical vulnerability ($p = .585$) or affiliation motives ($p = .213$), suggesting that being socially exclusion did not lead women to perceive themselves as more vulnerable to physical threats or desire social affiliation more than women that were socially included. For exploratory purposes, a multivariate analysis of variance (MANOVA) examining the effect of social exclusion condition on each component of the STM motive latent construct (i.e., SOI-R,

desired mate investment, and openness to sexual intercourse), perceived vulnerability, and affiliation motives can be found in the supplementary materials.

Main Effects on Muscularity Preference

To examine the alternative hypothesis that social exclusion leads women to exhibit increased preferences for short-term mates with more masculine bodies, as opposed to a more generalized increase in STM motives, a separate linear regression model was conducted with condition as the independent variable and muscularity preference as the dependent variable. An initial covariate model suggested that none of the potential covariates were significant predictors of women's muscularity preference, and so none were retained in the final model (ps > .173). The final model showed no significant differences in muscularity preference between the social exclusion and social inclusion groups. This suggests that social exclusion did not influence women's specific preferences for short-term mating partners with more muscular bodies. Considering the lack of a direct effect of exclusion on muscularity preferences or perceptions of physical vulnerability, a follow-up mediation model examining whether perceived vulnerability mediated the relationship between exclusion and muscularity preference was not conducted.

Parallel Mediation Model

See Table 13 for standardized total, total indirect, specific indirect, and direct effects for the final parallel mediation model. Given the lack of a significant relationship between social exclusion and the potential mediators, it is unlikely that women's perceived vulnerability to physical threats or affiliation motives would mediate the relationship between social exclusion and women's STM scores. Nonetheless, as proposed, I conducted a parallel mediational model to test the prediction that the relationship between social

exclusion and STM motives would be mediated by perceptions of physical vulnerability, but not by social affiliation motives. All mediations are reported while holding the opposing mediator constant and with the covariates of each mediator and STM motives included on their respective paths.

The analysis revealed that the indirect effect of social exclusion on women's STM scores via perceived vulnerability ($b = -.01$, $SE = .01$, 95% CI [-.03, .02]) and affiliation motives ($b = .01$, $SE = .01$, 95% CI [-.02, .04]) were not significant. The total effect of social exclusion on women's STM motives was marginally significant ($b = -.14$, $SE = .07$, 95% CI [-.01, .28]), and the direct effect of social exclusion on STM motives remained marginally significant when controlling for the potential mediators ($b = .13$, $SE = .07$, 95% CI [-.01, .27]). Therefore, these results provide some evidence to suggest that social exclusion may reduce unpartnered women's short-term mating motives, however, they do not support the hypothesis that this relationship is mediated by either perceptions of physical vulnerability or motivations to pursue social affiliation. The parallel model, along with statistics measuring the significance of each predictive pathway, can be viewed in Figure 5.

While the indirect effect of social exclusion on STM motives through perceptions of physical vulnerability or affiliation motives were not significant, examination of the direct paths revealed marginally significant direct effects of each social exclusion, perceived vulnerability, and affiliation motives on STM motives. That is, when examining the direct of effects of each independent variable on STM motives, the results revealed that social exclusion, in line with the main effect model reported above, marginally predicted decreased STM motives compared to social inclusion, $p = .064$. Conversely, the results revealed that levels of perceived vulnerability, $p = .082$, and affiliation motives, $p = .070$, both marginally

predicted increased STM motives. Therefore, these results suggest that while social exclusion

may not influence STM motives through either perceived vulnerability or affiliation motives,

each of these three factors may independently play a role in elevated levels of STM

motivation among unpartnered women.
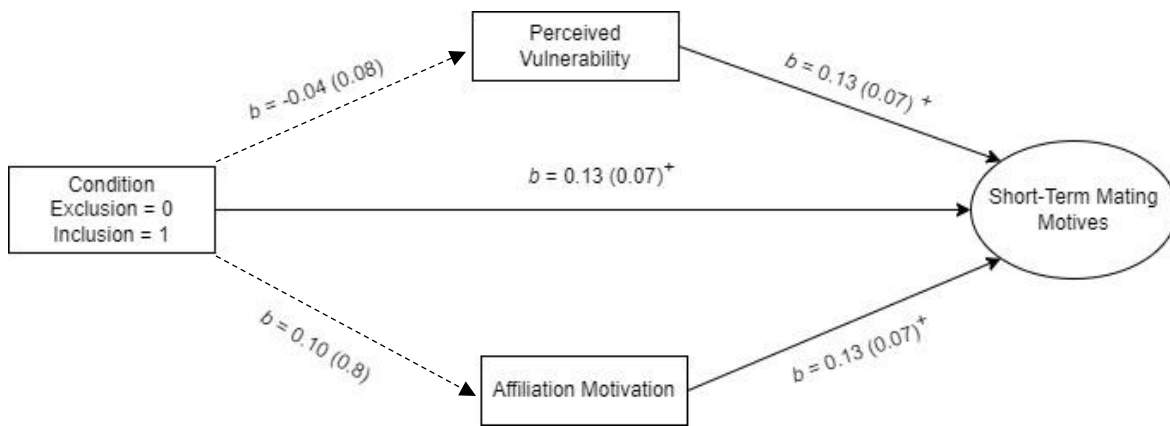
Total Effect: $b = .14$, $SE = .07^+$
Total Indirect Effect: $b = .01$, $SE = .02$
Perceived Vulnerability Indirect Effect: $b = -.01$, 95% CI [-.03, .02]
Affiliation Motive Indirect Effect: $b = .01$, 95% CI [-.02, .04]

Figure 5. Study 3 standardized regression coefficients for the relationship between social
exclusion and short-term mating motives as mediated by perceptions of vulnerability to
physical threats and affiliation motives.
Note. [+] indicates $p < .10$. Non-significant effects denoted by dashed lines. Standard error
provided in parentheses.

Table 11

Study 3 descriptive statistics for study outcomes

Variable	Exclusion M (SD)	Inclusion M (SD)	α
BMIS-Negative	19.14 (5.00)	18.86 (5.04)	0.83
BMIS-Positive	20.35 (5.81)	21.83 (4.88)	0.90
SOI-total	11.05 (4.87)	11.98 (5.03)	0.88
Mate Investment	3.75 (1.67)	3.90 (1.78)	0.92
Openness to Sex	-0.08 (0.76)	0.07 (0.84)	0.94
Mating Experience	3.89 (1.88)	3.74 (1.74)	0.94
Muscularity Preference	0.15 (2.01)	0.40 (1.53)	-
Perceived Physical Vulnerability	3.27 (0.92)	3.31 (0.85)	0.88
Affiliation Motive	4.35 (1.08)	4.58 (0.99)	0.84
Childhood SES	3.80 (1.55)	3.51 (1.43)	0.81
Childhood Unpredictability	2.90 (1.29)	3.00 (1.56)	0.67
Adult SES	3.72 (1.69)	2.83 (1.30)	0.89
Adult Unpredictability	2.26 (0.98)	2.35 (1.18)	0.64
Neighborhood Quality	5.20 (1.12)	4.97 (1.03)	0.75
Parenting Closeness	4.44 (0.98)	4.41 (1.08)	0.78

Notes. BMIS = Brief Mood Introspection Scale; SOI = Sociosexual Orientation Inventory; SES = socioeconomic status

Table 12a
Study 3 Model Fit Indices For Final Models

Model	χ^2 (*df*)	CFI	RMSEA	SRMR
Primary Outcomes Covariates – model 3	28.36 (27)	0.99	0.02	0.04
Primary Outcomes Main Effects – model 1	28.91 (29)	1.00	≤ 0.001	0.03
Muscularity Preference Covariates – model 1	≤ 0.001 (0)*	1.00	≤ 0.001	≤ 0.001
Muscularity Preference Main Effect – model 1	≤ 0.001 (0)*	1.00	≤ 0.001	≤ 0.001
Parallel Mediation - model 1	28.93 (29)	1.00	≤ 0.001	0.03

Note. Primary outcomes = short term mating motives, perceived vulnerability to physical threats, and affiliation motives; Parallel Mediation = the relationship between experimental condition and short-term mating motives as mediated by perceived vulnerability and affiliation motives; χ^2 (*df*) = chi-square test of model fit (degrees of freedom); CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual. *$p < .05$.

Table 12b

Study 3 Standardized Local Fit Statistics and Main Effects For Final Models

Model		B(SD)	t	p
Primary Outcome Covariates – model 3				
STM	Childhood Unpredictability	0.16 (0.08)	2.05	0.040
	Positive Mood	-0.24 (0.07)	-3.29	0.001
	Mating Experience	0.60 (0.06)	9.96	≤ 0.001
Perceived Vulnerability	Adult SES	-0.32 (0.09)	-3.65	≤ 0.001
	Negative Mood	0.25 (0.09)	2.92	0.004
Affiliation Motives	Age	-0.24 (0.08)	-3.18	0.001
	Mating Experience	0.19 (0.09)	2.20	0.028
Primary Outcome Main Effects – model 1				
STM	Childhood Unpredictability	0.16 (0.08)	2.06	0.040
	Positive Mood	-0.26 (0.07)	-3.68	≤ 0.001
	Mating Experience	0.61 (0.06)	10.27	≤ 0.001
	Condition	0.15 (0.07)	2.17	0.030
Perceived Vulnerability	Adult SES	-0.33 (0.08)	-3.93	≤ 0.001
	Negative Mood	0.25 (0.09)	2.84	0.005
	Condition	-0.04 (0.08)	-0.55	0.585
Affiliation Motives	Age	-0.24 (0.08)	-3.05	0.002
	Mating Experience	0.19 (0.09)	2.28	0.023
	Condition	0.10 (0.08)	1.24	0.213
Muscularity Preference Covariates – model 1				
Muscularity Preference	Age	0.01(0.03)	0.20	0.841
	Negative Mood	0.03 (0.05)	0.67	0.506
	Positive Mood	0.01 (0.04)	0.33	0.741
	Childhood SES	0.06 (0.14)	0.43	0.668
	Adult SES	0.14 (0.12)	1.19	0.236
	Childhood Unpredictability	0.24 (0.19	1.24	0.213
	Adult Unpredictability	-0.04 (0.16)	-0.27	0.787
	Childhood Neighborhood	0.31 (0.23)	1.35	0.177
	Parent Relationship	0.03 (0.35)	0.07	0.943
	Mating Experience	-0.12 (0.09)	-1.37	0.172
Muscularity Preference Main Effects – model 1				
Muscularity Preference	Condition	0.07 (0.09)	0.80	0.427

Note. SES = socioeconomic status; STM = short-term mating; Condition = Social Exclusion vs. Social Inclusion (Social Exclusion = 0)

Table 13

Study 3 Standardized Total, Total Indirect, Specific Indirect, and Direct Effects for Parallel Mediation Model

Model		B(SD)	t	p
Parallel Mediation – model 1				
Total Effect				
STM	Condition	0.01 (.02)	0.38	0.703
Perceived Vulnerability	Condition	-0.04 (0.08)	-0.55	0.581
Affiliation Motive	Condition	0.10 (0.08)	1.23	0.219
Total Indirect Effect				
STM	Condition	0.14 (0.07)	1.86	0.063
Perceived Vulnerability	Condition	≤ 0.001 (≤ 0.001)	≤ 0.001	1.000
Affiliation Motive	Condition	≤ 0.001 (≤ 0.001)	≤ 0.001	1.000
Specific Indirect Effects				
STM	Perceived Vulnerability Condition	-0.01 (0.01)	-0.41	0.680
STM	Affiliation Motive Condition	0.01 (0.01)	0.92	0.356
Direct Effects				
STM	Condition	0.13 (0.07)	1.82	0.069
Perceived Vulnerability	Condition	-0.04 (0.08)	-0.55	0.581
Affiliation Motive	Condition	0.10 (0.08)	1.23	0.219

Note. SES = socioeconomic status; STM = Short Term Mating Motives latent construct; Condition = Social Exclusion vs. Social Inclusion (Exclusion = 0); Participant Sex = Male vs. Female (Male = 0)

Discussion

In Study 3, I tested the relationship between social exclusion and women's perceptions of vulnerability to physical threats and whether these perceptions led to subsequent increases in STM motives as a means of addressing these perceptions. I also tested the alternative hypothesis that social exclusion leads women to express an increased preference specifically for mates with more muscular bodies, as opposed to a general increase in STM motives, in response to increased perceived vulnerability. Overall, the results of Study 3 do not support either of these hypotheses. Contrary to the prior studies, there was a significant effect of social exclusion on unpartnered women's STM motives, although this relationship was in the opposite direction from the hypothesis. That is, rather than reporting higher levels of STM motives, women that received a future forecast of being socially excluded instead reported lower levels of STM motives than women who received a future forecast of being socially included. Additionally, socially excluded and socially included women reported similar levels of perceived vulnerability to physical threats and social affiliation motives, and neither of these factors mediated the relationship between social exclusion and STM motives. Lastly, socially excluded women did not report different preferences for more muscular bodies than socially included women, thereby providing no support for the alternative hypothesis that social exclusion may more specifically influence women's mating psychology by leading them to exhibit a greater preference for short-term partners with more muscular bodies.

Of note, while perceived vulnerability and affiliation motives were not significant mediators of the relationship between social exclusion and unpartnered women's STM motives, the parallel mediation model revealed that both of these factors marginally predicted

STM motives independently. Specifically, unpartnered women expressed marginally greater STM motives the more vulnerable to physical threats they perceived themselves to be and the more motivated they were to pursue social affiliation. Therefore, the results of Study 3 suggest that, in contrast to the results of previous research (Dean et al., 2019; Sacco et al., 2012), social exclusion may lead women to be less unrestricted in their sexual cognitions and behaviors, though this shift in mating psychology is not explained by perceptions of vulnerability or affiliation motives, which, while somewhat predictive of STM motives on their own, were not influenced social exclusion in this study.

Importantly, the results of Study 3 should be interpreted with caution in light of the findings relating to participants' positive and negative mood. Unlike in the previous studies, social exclusion did not lead to either lower positive mood or greater negative mood among unpartnered women in Study 3. While the hypothesized and observed effects of social exclusion on women's STM motives, affiliation motives, and perceptions of vulnerability should be expressed regardless of an individual's mood, that there was no effect of exclusion on mood suggests that the social exclusion manipulation may not have been effective. That is, the Future Alone Paradigm may not have been as salient for women in Study 3 as it was for women in Study 2a and 2b, and due to this may not have elicited the hypothesized effect on perceived vulnerability. Further, that perceived vulnerability was a marginally significant direct predictor of STM motives in the parallel mediation model suggests that if exclusion were effective in influencing perceived vulnerability, as seen in prior literature (Dean et al., 2019), then the hypothesized mediation pathway linking social exclusion to STM motives through perceived vulnerability may have been observed. Additionally, if the exclusion prime used in Study 3 was not effective, then it may be that the negative relationship between

exclusion and STM motives, and the lack of a relationship between exclusion and

muscularity preference, may not have been due to social exclusion, but instead due to some

unobserved factor. Future research will be necessary to elucidate these results to more

definitively understand the complex relationship between social exclusion, women's mating

psychology, and perceptions of vulnerability.

General Discussion

Women may utilize sexual behavior for a variety of reasons, ranging from enhancing

feelings of personal power to obtaining relief from stress (Hill & Preston, 1996; Meston &

Buss, 2007), although comparatively little is known about how women may use sexual

access as a coping strategy in response to social exclusion. Based on previous research and

theory on cognitive and behavioral responses to exclusion, fundamental self-protection

needs, and female mating psychology, I conducted four studies examining the sex

differentiated nature of the relationship between exclusion and STM motives, as well as the

potential mediating role of perceived vulnerability to physical threats in this relationship.

Considering women's greater ability to leverage sexual access to facilitate goal acquisition

compared to men (Trivers, 1972), I hypothesized that unpartnered women, but not

unpartnered men, would exhibit greater STM motives following social exclusion, compared

to social inclusion or a neutral control. Secondarily, due to the risky nature of engaging in

permissive sexual behavior, I also hypothesized that exclusion would lead to higher STM

motives in women only when motives to recover from exclusion were particularly high, such

as when exclusion elicited increased perceptions of vulnerability to physical threats. In my

final study, I also explored an alternative hypothesis that social exclusion would lead women

to become more specifically interested in short-term sexual partners that had more muscular bodies, as opposed to a more general increase in STM motives.

Overall, the results of these studies were largely consistent, though none provided support for these hypotheses. That is, rather than an increase in STM motives following social exclusion, excluded women by and large reported similar STM motives to women that were socially included or completed the neutral control (Study 1 - 2b). Even when there were differences following social exclusion, these changes were in the opposite direction of the hypothesis, with social exclusion leading women to report lower levels of STM motives compared to social inclusion (Study 3). Further, in Study 3, social exclusion did not influence women's perceptions of physical vulnerability or affiliation motives, and neither factor mediated the relationship between exclusion and lower STM motives. However, greater perceived vulnerability and affiliation motives both marginally predicted greater STM motives independently. Lastly, the results of Study 3 did not support the alternative hypothesis, with socially excluded women reporting no greater preference for short-term sexual partners with more muscular bodies than socially included women.

Despite attempts at both conceptual and direct replication, the findings of the present studies are consistently inconsistent with those of past research that have found increases in sexual unrestrictedness following social exclusion in women (Sacco et al., 2012). In examining potential explanations for these inconsistencies, two methodological differences between the present work and past research are evident. In the past research showing this effect, women's STM motives was measured using measures of their life history strategies (i.e., the Mini-K scale; Figueredo et al., 2006) and their sexual unrestrictedness (i.e., the original Sociosexual Orientation Inventory [SOI]; Simpson & Gangestad, 1991). While use

of these measures is certainly reasonable for assessing women's STM motives, there remain some concerns regarding the domain specificity and psychometrics of these measures. More specifically, only 3 of the total 20 items included in the Mini-K directly probe sexual relationship attitudes, and, as such, shifts in Mini-K scores following social exclusion may be more reflective in shifts in other life history strategy features, such as generalized risk-taking (e.g., Buelow & Wirth, 2017; Duclos et al., 2013). Similarly, the are several documented psychometric concerns regarding Simpson and Gangestad's (1991) original SOI scale, including the potential for exaggerated responses to open-ended items, multifactorial structure, skewed score distributions, and low internal consistency (Asendorpf & Penke, 2005; Penke & Asendorpf, 2008; Voracek, 2005; Webster & Bryan, 2007).

In the present research, I utilized Penke & Asendorpf's (2008) SOI-R, which addresses many of the psychometric concerns relating to the original SOI. Further, instead of the Mini-K, I utilized measures of women's desired investment from potential mates and their openness to sexual intercourse as secondary measures to comprise the latent construct of STM. This is not to say that the results of the past research using the original SOI and Mini-K (Sacco et al., 2012) should be dismissed in favor of the findings in the present research, but rather that the contrasting findings may be due to these methodological differences. Additionally, this highlights the need for the differences in the findings of the past and present research to be further clarified by future research.

While the results of the present studies did not provide support for the hypotheses, they nonetheless present important implications for research examining the cognitive and behavioral outcomes of social exclusion. Though inconsistent with literature suggesting that exclusion leads women to become more sexually unrestricted, the present research is

consistent with and supports past research finding that social rejection leads men and women to experience decreased mating motivation (Maner et al., 2007; Sacco et al., 2011), and research finding that social inclusion leads to greater perceived importance and interest in sexual affiliation (Brown et al., 2009). The present research also expands upon these previous lines of research by examining two potential mediators of the relationship between exclusion and STM motives, perceptions of vulnerability and affiliation motives. While neither perceptions of vulnerability and affiliation motives were mediators of the exclusion-STM motives relationship, both were marginal predictors of STM motives independently, which indicates that both factors may still be important factors for future research examining women's mating psychology. Future research in this area may benefit from examining other potential mediators that could explain how or when experiences of social exclusion lead women to exhibit increased or decreased STM motives.

Strengths, Limitations, and Future Directions

The results of the present research should be interpreted in light of several key limitations. The most obvious of these limitations concerns the potential ineffectiveness of the Future Alone Paradigm in Study 3. In Study 3, differing from the preceding studies, it was found that social exclusion led women to report lower STM scores compared to social inclusion, however it was also found that exclusion did not influence women's positive or negative mood. As decreased positive mood and increased negative mood are among the most common cognitive outcomes following social exclusion in both the past literature (e.g., Molden et al., 2009; Sacco et al., 2011) and in Studies 1 - 2b, that such effects were not found in Study 3 suggests that the Future Alone Paradigm may not have been effective in priming feelings of social exclusion here. As such, if the social exclusion manipulation was

not effective, the differences in STM motives between the exclusion and inclusion groups may have been due to some unobserved factor. Additionally, considering the marginally significant relationship between perceived vulnerability and STM motives, the mediation pathway linking exclusion to STM motives through perceived vulnerability may not have been observed in Study 3 due to the exclusion prime being ineffective, and more effective priming of exclusion may have elicited the hypothesized relationship. Therefore, future research replicating the results of Study 3 is necessary prior to making any concrete conclusions.

A strength of the present research is finding a consistent lack of a relationship between exclusion and STM motives using two separate exclusion primes, though a limitation of these primes is that both the memory recall task and the Future Alone Paradigm are both administered without any interaction, supposed or real, with other individuals. While use of both the memory recall task and the Future Alone Paradigm is common in the social exclusion literature (e.g., Molden et al., 2009; Twenge et al., 2003), future research utilizing an exclusion prime that includes an actual in-person interaction (e.g., Maner et al., 2007) that more closely simulates real experiences of exclusion may be more effective in eliciting self-protection concerns, and subsequent STM motive increases reflected in past research. Additionally, while the present research utilizes large samples in each study, compared to past research linking exclusion and women's STM motives (Sacco et al., 2012), the majority of participants in our samples were Caucasian, and all participants in Study 1 and 2a consisted of undergraduate college students. Consequently, the findings of the present research are limited in their generalizability, and future work utilizing a more diverse sample

would be a practical next step for research assessing the relationship between exclusion and women's mating psychology.

In the present research, several individual difference factors, including childhood and current SES and environmental unpredictability, age, mood, and mating experience (Study 2b and 3), were controlled for, allowing for more precise examination of the relationship between exclusion and women's STM motives. Nonetheless, these individual factors do not comprise the totality of individual differences that could influence the relationship between social exclusion and women's mating psychology. Future research would benefit from examining other potential moderators of the exclusion-STM motives relationship, such as rejection sensitivity (Downey & Feldman, 1996), father absence (DelPriore et al., 2019; Ellis et al., 2012), and self-perceived mate value (Zhang et al., 2015). Additionally, considering research finding mate value targeted outcomes related to heterosexual rejection (i.e., rejection by an opposite-sex other; Zhang et al., 2015), future research could expand upon the present research by examining whether being excluded by a member of the same-sex or opposite-sex influences the exclusion-STM motives relationship differently. Lastly, while touched on in the discussion of Study 1, future research would also benefit from examining potential STM motive outcome differences of being actively rejected and passively ignored.

Conclusion

Overall, the results of the present research did not provide evidence for the predicted hypotheses, suggesting that feelings of social exclusion, via memory recall or a false future prediction, does not increase women's motivations to pursue short-term, sexual relationships, nor is this relationship influenced by women's perceptions of their vulnerability to physical threats. These results could be due to the limitations regarding the exclusion prime salience

or sample generalizability. However, it could also be that these results are more reflective of socially excluded women, and men, being more concerned with regaining social affiliative status or self-protection through less socially risky strategies than increased STM motives, consistent with some of the past research (Maner et al., 2007; Sacco et al., 2011). Individual differences in one's trait social support or sensitivity to rejection could also provide an explanation as to why exclusion did not increase women's perceptions of vulnerability or their STM motives in the current research. Although future research is needed to elucidate these results, the current research contributes to our growing understanding of the complex relationship between social exclusion and women's mating psychology, and presents avenues for future research to further explore this relationship and bring insight to the sex-specific ways in which men and women respond to threats to their fundamental needs for social connectedness and safety.

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VITA

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ABSTRACT

SOCIAL EXCLUSION AND WOMEN'S SHORT-TERM SEXUAL MOTIVATION: THE

ROLE OF PERCEIVED VULNERABILITY

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For our ancestors, social exclusion was a severe threat to their evolutionary goals, and,

consequently, we have evolved a wide range of coping strategies. Elevated motives to pursue

short-term sexual relationships presents one potential, yet relatively unexamined, strategy for

women following experiences of exclusion. The present research aimed to address this gap

by examining the influence of exclusion on women's short-term mating (STM) motives, and

the role of perceived vulnerability to physical threats on this relationship. I predicted that

exclusion would lead unpartnered women, but not unpartnered men, to exhibit elevated STM

motives, and that heightened perceived vulnerability would mediate this relationship. Results

did not support these hypothesized relationships, but do suggest that exclusion may instead

lead to decreased STM motives among unpartnered women (Study 3). Additionally, while

not influenced by social exclusion, greater perceptions of vulnerability to physical threats

were related to greater STM motives.