

The Causal Effects of Relational Security and Insecurity
on Condom Use Attitudes and Acquisition Behavior

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ABSTRACT

Research on attachment and condom use has been limited to correlational studies of self-report measures, yielding inconsistent results. Here, we examined the causal effects of attachment priming on self-reported condom use attitudes and an observational measure of condom acquisition behavior. In three experiments, participants were exposed to one of three attachment primes (*security*, *anxiety*, or *avoidance*) or a *control* prime. For Study 1, participants in the *security* and *anxiety* conditions preferred condom non-use to a greater extent, compared to participants in the *avoidance* condition. This effect was replicated in Study 2, and was mediated by perceptions of sexual health threat. In Study 3, the effect of security priming on condom acquisition behavior was eliminated through the use of a framing manipulation, though, the effect of primed attachment on condom use attitudes was not significant. A Meta-Analysis, however, revealed that the predicted effects of attachment priming were consistent across the three studies, supporting the role of attachment in evaluations of condom use. Priming attachment security or anxiety lead participants to perceive their sexual partners as less of a sexual health threat, resulting in a devaluation of condom use. Primed security also reduced condom acquisition behavior, though this negative effect eliminated by framing condoms as protecting a partner's sexual health. Overall, these studies suggest that relational factors, such as attachment, require greater consideration when studying sexual health and designing interventions.

KEY WORDS: attachment, attitudes, condoms, priming, sexual health

INTRODUCTION

Despite the many advantages of condom use, and the obvious risks of unsafe sex, many adults still have sex without condoms (Reece et al., 2010). Meta-analyses of condom behavior studies revealed a central determining role for attitudes; if people hold a negative attitude about condoms they are unlikely to use them (Albaracín et al., 2005; Albaracín, Johnson, Fishbein, & Muellerleile, 2001; Sheeran, Abraham, & Orbell, 1999). A major limitation of the literature on condom-related attitudes, however, is its disregard of relational processes that influence condom use (Ciesla, Roberts, & Hewitt, 2004; Feeney & Raphael, 1992; WHO, 2012). Focusing on relational processes can help explain the motivational and emotion-based aspects of sexuality and condom use (Feeney & Raphael, 1992). For example, reasoned action and health belief approaches to understanding condom use (e.g., Ajzen, 1991; Rosenstock, 1974) do not explicitly detail the roles that relational feelings of trust and intimacy, or the motivation to get close to sexual partners, play in determining condom use behavior (e.g., Bauman & Berman, 2005).

Attachment theory (Bowlby, 1982) has been successfully applied to study sexual behavior in general (e.g., Gillath & Schachner, 2006), and to a limited extent of condom (see Dewitte, 2012; Mikuliner & Shaver, 2007a for reviews); however, the research has been exclusively correlational and self-report based, and has yielded conflicting results. To overcome these issues we ran three studies; first we examined the effects of priming a sense of attachment security, anxiety, or avoidance, on attitudes toward condom use (Study 1). We then tested the potential mediating mechanisms through which attachment may affect these attitudes (Study 2). Finally, we investigated the effects of priming attachment on a behavioral measure related to condom use (condom acquisition; Study 3).

ATTACHMENT THEORY AND RESEARCH

Attachment Theory

Proposed by Bowlby (1982), attachment theory posits that infants are born helpless, and therefore are completely dependent on older and wiser caregivers—attachment figures—to protect and comfort them during times of need. Early experiences with attachment figures are subsequently internalized into mental representations of self and others, called internal working models (Bowlby, 1982). Hazan and Shaver (1987) applied attachment theory to the study of adult romantic relationships. They argued that adults' romantic relationships could be conceptualized as an amalgam of the attachment, caregiving, and sexual behavioral systems. Following this pioneering work, the extension of attachment theory to adult romantic and sexual relationships has received broad empirical support (e.g., Fraley & Davis, 1997; Fraley, Heffernan, Vicary, & Brumbaugh, 2011; Mikulincer & Shaver, 2007a)

When attachment figures, like romantic partners, are sensitive and responsive, individuals tend to develop a *secure* attachment style. Individuals with a secure attachment style are comfortable being emotionally close with others, and relying on their attachment figures in times of need (Mikulincer & Shaver, 2007a). Conversely, when attachment figures fail to provide adequate support, are cold and rejecting, or intrusive and unreliable, individuals tend to develop negative internal working models of self and others, and an *insecure* attachment style.

Attachment insecurity is further parsed into anxiety and avoidance (Bartholomew & Horowitz, 1991). Individuals with an *anxious* attachment style are concerned with rejection, abandonment, and general lack of availability of their attachment figures. Conversely, individuals with an *avoidant* attachment style evade emotional closeness in relationships, distrust others, downplay their own emotions, and suppress relationship-related thoughts.

Attachment styles are theorized to entail different combinations of working models of self and other. A secure attachment style, for example, entails a positive working model of self, whereby individuals see themselves as good and worthy of others love, and a positive working model of other, which is to say that these individuals tend to see others as benevolent, well intentioned, and likely to be there for them in times of need. An anxious attachment style, alternatively, is thought to be based on a negative model of the self and a positive model of the other, whereas an avoidant attachment style is thought to be based on a positive model of the self and negative model of other (Bartholomew & Horowitz, 1991; Mikulincer & Shaver, 2007a). For the current investigation, we were most interested in working models of other.

State Versus Trait Attachment

Although social cognitive processes facilitate stability in attachment, attachment theory suggests that working models are dynamic (Mikulincer & Shaver, 2003) and sensitive to changes in one's environment (Kagan, 1996; Lewis, 1997). Extensive longitudinal studies support conceptualizing attachment styles as prototypes—relatively stable over time—however, the sense of attachment (in)security is susceptible to occasional variations based on experience (Fraleigh, Vicary, Brumbaugh, & Roisman, 2011). These findings and others have prompted researchers to focus on the concept of *state* as opposed to *trait* attachment (e.g., Gillath et al., 2009; Xu & Shrouf, 2013). State attachment is conceptualized as the fluctuations in attachment that occur due to life events and transitions, changes in the environment, and relevant to the current study, priming. Over time such changes may result in a shift in trait attachment style (e.g., Carnelley & Rowe, 2007; see Gillath, Selcuk, & Shaver, 2008, for a review).

The use of experimental methods such as priming to study state attachment has become increasingly popular (see Mikulincer & Shaver, 2007a, Sakaluk, 2014, for reviews). Though

these experimental methods are limited to the study of changes in state attachment—as opposed to trait attachment—they have proven invaluable in terms of affording opportunities to observe the causal effects of attachment. We will use these methods in the current studies, in order to better understand the causal direction of the association between attachment and condom use.

Attachment Styles and Condom Use

Studies examining the association between attachment and self-reported condom use attitudes and behavior have yielded contradictory findings. Most frequently, anxious attachment style is associated with more unsafe sex and negative attitudes towards condom use, whereas an avoidant attachment style is associated with more positive attitudes towards condom use (Feeney, Kelly, Gallois, Peterson, & Terry, 1999; Feeney et al., 2000; Strachman & Impett, 2009). One possible explanation for this association, advanced by Feeney et al., is that anxiously attached people engage in risky sex and hold such attitudes because they fear that non-compliance with their partners' wishes will jeopardize their relationships (see Davis, Shaver, & Vernon, 2004). These findings, however, seem at odds with findings of a positive association between secure attachment style and negative attitudes towards condom use (Bogaert & Sadava, 2002), or between avoidant attachment style and negative attitudes towards condom use (Kershaw et al., 2007). The inconsistencies in this literature could be on account of a number of factors, such as the use of different scales to measure attachment, the use of ad-hoc measures of condom use attitudes, and the study of different populations.

Beyond inconsistent findings, an additional major limitation of existing studies is their heavy reliance on correlational designs, which prevents the examination of causality between attachment and condom use attitudes. Thus, it might be the case, for example, that using a condom makes people feel more avoidant with their partner. Even if one causal direction is more

sensible than the other, potentially a third variable might have affected both people's attachment style and condom use. Experimental studies, which have yet to be conducted, can therefore aid with examining the causal influence of attachment on condom use attitudes and behavior.

THE PRESENT STUDIES

The current studies were set to test the associations between attachment style and condom-use-related attitudes. Extending existing work, we used experimental methods for the first time to manipulate attachment (in)security, thought to affect people's internal working models of the other. Priming attachment has been successfully used to study outcomes such as break up strategies (Collins & Gillath, 2012), sexual fantasies (Birnbaum, Simpson, Weisberg, Barnea, & Assulin-Simhon, 2012), and sexual strategies (Gillath & Schachner, 2006). In Study 1, we examined the effects of such manipulations on self-reported attitudes towards condom use. In Study 2, we examined possible mediators for the effects of attachment on condom use attitudes. Finally, in Study 3, we examined the effects of our attachment manipulations on a behavioral measure related to condom use, and further, examined how the framing of condom use promotion messages interacts with attachment to affect condom use behavior.

STUDY 1

The goal of Study 1 was to test the causal link between attachment (in)security and attitudes towards condom use. Participants, online, were exposed to either an attachment (*secure, anxious, avoidant*) or a *control* prime, via guided imagery, and were then asked to complete questionnaires assessing, among other things, attitudes toward condom use. Correlational research on attachment and condom use attitudes has supported multiple permutations of associations between attachment style and condom use preferences; some investigations have found that anxiety is associated with negative evaluations of condom use (Feeney et al, 1999,

2000; Strachman & Impett, 2009), some have found security is associated with negative evaluations of condom use (Bogaert & Sadava, 2002), and others have found that both anxiety and avoidance are associated with negative evaluations of condom use (Kershaw et al., 2007).

The mixed findings in the attachment and condom use literature, at first glance, might make it difficult to make strong predictions for our investigation. However, most of the findings in this literature are consistent with our theorizing of the role of working models of other in appraisal of condom use. Specifically, four of the five reviewed studies found that attachment anxiety or security were associated with more negative evaluations of condom use. We therefore expected that security and anxiety primes would result in more negative attitudes toward condom use, compared to participants in the control or avoidance priming conditions.

Method

Participants and procedure

Amazon's Mechanical Turk service (MTurk; see Buhrmester, Kwang, & Gosling, 2011, for a review) was used to recruit a final sample of 282 heterosexual participants (M age = 27.41, SD = 5.54, range: 18-39). Participants were randomly assigned to one of four priming conditions (see Bartz & Lydon, 2004; Gillath, Hart, Nofle, & Stockdale, 2009; Sakaluk, 2014, for similar priming procedures). Participants assigned to the *security* condition wrote about a close relationship in which they felt they achieved the goal of getting close to their partner with relative ease, and did not experience difficulty relying on that partner. Participants assigned to the *anxiety* condition wrote about a close relationship in which their partner did not want to get as emotionally close as they wanted, and in which they feared that their partners did not really love them. Participants assigned to the *avoidance* condition wrote about a relationship in which they did not feel comfortable getting close to their partner, and had trouble depending on their

partner. Finally, participants in the *acquaintance [control]* condition wrote about a person they knew, but to whom they were not particularly close (i.e., not an attachment figure).

Participants who incorrectly completed their assigned prime (i.e., failing to write anything, writing that they did not have experience with a relationship that matched their assigned prime, or wrote about a relationship that did not match the attachment style described in their assigned prime) were excluded from our sample for giving a noncompliant response, yielding the final sample size of 282 (see Sakaluk, 2014).¹ After finishing their assigned prime, participants completed the attitudinal measure described below and were then debriefed regarding the purpose of the study, and paid \$1.00 for their participation. Table 1 contains all relevant demographic information for each of the samples from Study 1-3, as well as the percentage of participants randomly assigned to each attachment priming condition, and the percentage of participants excluded for giving noncompliant prime responses.

Measures

Cognitive-based attitudes towards condom use were measured using the Bipolar Attitudes towards Consistent Condom Use Scale (BACCUS) and Bipolar Attitudes towards Condom Non-Use Scale (BACNUS; Sakaluk & Muehlenhard, 2012). For both the BACCUS and BACNUS, participants were asked to think about the next three months, and to indicate how they would think/feel about using a condom every time (BACCUS) they had penile-vaginal intercourse, or never using a condom (BACNUS) every time they had penile-vaginal intercourse. The seven evaluative bipolar-adjective pairs that are used for the BACCUS are the same as those used for the BACNUS², and include *selfish/caring*, *smart/stupid*, *responsible/reckless*, *safe/dangerous*, *protective/risky*, *respectful/insulting*, *right/wrong*. A 7-point scale separates adjective pairs. Responses are then coded from -3 (most negative evaluation) to +3 (most positive evaluation),

and responses are summed to create the subscale scores; higher positive scores indicate a more positive attitude towards condom use (or non-use). Internal consistency for the BACCUS ($\alpha = .93$) and the BACNUS ($\alpha = .95$) were excellent.

Analysis strategy

Scores for participants' attitudes towards condom use relative to condom non-use were created by standardizing the scores from the BACCUS and BACNUS, and taking the difference of these two standardized scores.³ Positive scores indicate a stronger preference for condom use, negative scores indicate a stronger preference for condom non-use, and scores of zero indicate no distinct preference for either condom use or non-use.

We then subjected participants' preference scores to a multiple regression analysis, to examine the effects of attachment priming condition, while controlling for participant age and gender.⁴ Between-group variance for attachment priming conditions was fully accounted for using three orthogonal contrast codes (Cohen, Cohen, West, & Aiken, 2002). The first contrast code ("Control v. Attachment") compared participants in the three attachment priming conditions (coded as $-1/4$) to those in the control condition (coded as $+3/4$). The second contrast code—the contrast of interest ("Security/Anxiety v. Avoidance")—compared participants in the security and anxiety conditions (i.e., those with positive working models of other; coded as $1/3$) to those in the avoidance condition (i.e., those with a negative working model of other; coded as $-2/3$). The final contrast code ("Security v. Anxiety") compared participants in the anxiety condition (coded as $-1/2$) to participants in the security condition (coded as $1/2$).

Results

Regression model parameters are presented in Table 2. Men (dummy coded as 1) preferred condom use to a greater extent than women (dummy coded as 0) and older participants

preferred condom nonuse to a greater extent than younger participants. Attachment priming condition had a significant effect on participants' preferences for condom use (see Figure 1). Specifically, the Control v. Attachment contrast revealed that participants in the control condition preferred condom use to a greater extent compared to those in the three attachment priming conditions. Further, and as predicted, the Security/Anxiety v. Avoidance contrast revealed that participants primed with *security* or *anxiety* preferred condom non-use to a greater extent compared to those primed with *avoidance*. The Security v. Anxiety contrast was not significant. We explored the possibility that the effects of these contrasts were moderated by participant gender, but these interactions were not significant.⁵

Discussion

Overall, the results of Study 1 supported our hypotheses. *Security* and *anxiety* primes (i.e., invoking a positive working model of other) led to a preference for condom non-use. Although these results support the causal influence of attachment on attitudes towards condom use, the mechanism through which attachment primes affected condom use attitudes was still unknown. Examining possible mediators of these effects was therefore the purpose of Study 2.

STUDY 2

Feeney and colleagues (1999) were the only researchers, of which we are aware, to have directly examined mediators of the association between attachment and condom use. Their examination provided evidence to support the mediating role of communication levels in the attachment-condom use dynamic, such that higher anxiety was associated with infrequent communication about sexual health, and thereby, more negative attitudes towards condom use. We agree with Feeney and colleagues that individual differences in attachment styles likely have downstream consequences for communication in relationships that ultimately impact decisions

about condom use. However, we have conceptually ruled out communication patterns as a possible mediator of the priming effects observed in Study 1: there simply was not an opportunity for participants to communicate (or avoid communicating) with sexual partners, so it is impossible for such communication to result in changes in individual attitudes towards condom use. Thus, although communication might mediate the association between measured attachment and condom use preferences, the mediator of the effects of primed attachment on condom use preferences is likely to be a more proximal psychological aspect of the individual.

Having a more positive view of the other could potentially translate to viewing one's partner as a less of a threat to their own health. Health behavior theories such as the health belief model (see Rosenstock, 1974) suggest that perceiving threat is a necessary precursor to taking health-related action. If security and anxiety lead people to perceive their sexual partners as less of a threat or 'safe', they may deem condom use as unnecessary.

An alternative explanation is that secure and anxious attachment priming may have increased the chances that individuals will feel more positively toward their sexual partner(s). As relationship partners' evaluations of their relationship quality increases, they may no longer see a need to use condom. Indeed, the literature on condom use does suggest that relationship partners evaluate condom use more negatively and are less likely to use condoms when their relationship is of higher quality (e.g., Katz, Fortenberry, Zimet, Blythe, & Orr, 2000).

Though relationship quality is a relatively broad concept, it is often assessed in terms of multiple related constructs, such as satisfaction, commitment, intimacy, trust, passion and love (Fletcher, Simpson, & Thomas, 2000). Condom use research exploring many of these factors has yielded consistent results; higher levels of commitment (e.g., Bauman & Berman, 2005), intimacy (e.g., Gebhardt, Kuyper, & Greunsvan, 2003), trust (e.g., Brady, Tschann, Ellen, &

Flores, 2009), and love (Corbett, Dickson-Gómez, Hilario, & Weeks, 2009), are associated with negative attitudes towards condom use and less frequent condom use.

The purpose of Study 2, therefore, was to evaluate the competing potential mediators of the effects of attachment on attitudes towards condom use, while providing further evidence for the claim we tested in Study 1. Specifically, we examined whether the negative effects of security and anxiety primes on condom use attitudes were because of changes in perceptions of sexual health threat, or rather, because of changes in perceptions of relationship quality.

Method

Participants and procedure

MTurk was again used to recruit a final sample of 149 heterosexual participants for Study 2 (M age = 26.56, SD = 5.08, range: 18-39). Participants were randomly assigned to one of four attachment-priming conditions: *security*, *anxiety*, *avoidance*, or a *control* condition. These priming conditions were identical to those used in Study 1; once again, participants giving noncompliant prime responses were excluded from the final sample (see Table 1). After completing the priming procedure, participants completed a brief set of questionnaires, and were then debriefed and paid \$1.00 for their time.

Measures

Participants first completed the Perceived Relationship Quality Component (PRQC) Inventory (Fletcher, Simpson, & Thomas, 2000). The PRQC consists of six subscales with three items each rated on a 7-point scale, assessing the levels of relationship satisfaction (α = .93), commitment (α = .95), intimacy (α = .87), trust (α = .92), passion (α = .81), and love (α = .92). In the present study, participants were asked to rate their “romantic relationships (in general)” on these qualities, based on how they felt at that moment. A similar subscale, assessing the extent to

which participants anticipated negative outcomes from the sexual interactions with their romantic partners—their perceptions of sexual health threat—was also created using three items: “How safe do you feel having sex with your partners?” (reverse-scored), “How suspicious are you of your partners cheating?” and “How confident are you that your partners wouldn’t give you a sexually transmitted infection?” Internal consistency for this subscale was found to be somewhat lower than desired ($\alpha = .62$). Finally, participants completed the same items from the BACCUS and BACNUS (Sakaluk & Muehlenhard, 2012). Internal consistency for the BACCUS ($\alpha = .94$) and BACNUS ($\alpha = .96$) were excellent. As in Study 1, a difference score was calculated using standardized BACCUS and BACNUS scores.

Analysis strategy

Between-group variance of attachment primes was accounted for using the same three orthogonal contrast codes used in Study 1: Control v. Attachment, Security/Anxiety v. Avoidance, and Security v. Anxiety. Mediation analysis was conducted using Hayes’s (2013) PROCESS macro for SPSS, which provides bias-corrected bootstrapped confidence intervals (Bootstrapped $N = 10,000$) for indirect effects. Significant mediation is present when the bootstrapped confidence interval for the indirect effect does not contain 0. All of the PRQC factors and the sexual health threat factor were examined as mediators of changes in preferences for condom use, caused by the Security/Anxiety v. Avoidance contrast. The remaining two contrasts were controlled for during this analysis, as was participant gender and age.

Results

Zero-order correlations between the investigated mediator variables and condom use preferences are presented in Table 3. Coefficients for the total effects model (i.e., the same model run in Study 1) are also presented in Table 2. Replicating the findings from Study 1, the

total effect for the Security/Anxiety v. Avoidance contrast was found to be a significant predictor of attitudes toward condoms use. Participants primed with security or anxiety preferred condom non-use to a greater extent compared to participants in the avoidance condition.

Estimated coefficients for the various regressive paths in the final mediation model are presented in Figure 2. As predicted, compared to participants primed with avoidance, participants primed with security or anxiety perceived their romantic partners as less of a threat to their sexual health, and this effect was associated with a preference for condom non-use (Indirect effect = -0.17, Bootstrapped 95% CI: -.01, -.49). Mediation by the PRQC factors was not supported, and the effects of the other two contrasts were not significant.

Discussion

The results of Study 2 support our predictions, while replicating the results from Study 1. Together the results of Studies 1 and 2 suggest that when people's positive working models of the other become accessible due to security or anxiety priming, they show a significant preference for condom non-use because of decreased concerns of their partners' sexual health. Interestingly, however, attachment priming appears to affect condom use preferences through a more domain-specific person perception (i.e., perceived sexual health threat), as opposed to a more general perceived relationship quality (e.g., commitment).

Although the results from Studies 1 and 2, combined, help to provide a more consistent depiction of the causal role of attachment in the evaluation of condom use, these studies are limited by their reliance on self-report measures of condom use attitudes. Although attitudes and behavior are often theorized as being strongly linked, the possibility of attachment affecting *behaviors* related to condom use needs to be examined empirically. Testing the effects of primed attachment on a behavioral measure related to condom use was therefore the purpose of Study 3.

STUDY 3

Previous research examining attachment and condom use behavior (e.g., Feeney et al., 1999, 2000), is correlational, and heavily relies on self-reports of behavior, as opposed to using observational behavioral measures related to condom use. This raises potential problems both practically (self-reports suffer from various biases, such as social-desirability) and conceptually. According to Baumeister and colleagues (2007) the only way to fully understand human behavior is by venturing beyond self-reports and use observational behavioral measures. Observations of behaviors are, however, relatively rare in psychology, and rarer still in the domain of sexuality. Thus, a main goal of Study 3 was to examine the effects of primed attachment on an observational behavioral measure related to condom use.

A second goal of Study 3 was to reexamine the association between attachment security and condom use. Our findings regarding attachment anxiety are in line with the robust evidence showing that attachment anxiety is associated with higher symptomatology, and worse health (see Mikulincer & Shaver, 2007a, for a review). The correlational (Bogaert & Sadava, 2002) and experimental (Studies 1 and 2) findings regarding attachment security, however, are not in line with the extensive literature on the benefits to health and wellbeing associated with attachment security (Mikulincer & Shaver, 2007b). Put another way, not using a condom following security priming, which can have deleterious effects on one's sexual health, makes sense considering the activation of a positive model of the other (Bartholomew & Horowitz, 1991), but makes less sense in light of the beneficial outcomes of security priming in general and with respect to health-relevant behavior specifically (Gillath et al., 2008; Mikulincer & Shaver, 2007b).

A potential explanation for these seemingly contradicting findings is a difference in framing or context. In other words, security priming may have different outcomes, based on how

condom use is framed. Priming security, for example, may increase pro-social tendencies (see Mikulincer & Shaver, 2007b; Mikulincer, Shaver, Gillath, & Nitzberg, 2005, for examples), such as protecting others from negative outcomes of sex (e.g., unwanted pregnancy or STIs).

The idea of framing is not new to the sexual health literature or condom use research (e.g., Kiene, Barta, Zelenski, & Cothran, 2005). However, previous research on framing has focused almost exclusively on manipulating *gain* versus *loss* due to condom use (see Tversky & Kahneman, 1981). Here we take a different approach—framing condom use as *other-focused* versus *self-focused*—suggesting that this framing likely moderates the association between security priming and condom use. Sexual health promotion messages are typically self-focused (e.g., wear a condom to protect yourself from STIs/unwanted pregnancy), but one could instead frame these messages as other-focused (e.g., wear a condom to protect your partner from STIs/unintended pregnancy). Doing so may tap into the benevolence and altruism evoked by security priming (Mikulincer et al., 2005), and result with more condom use compared to when condom use is self-focused. Indeed, given that security priming lead participants to perceive their partners as less of a threat to their sexual health (Study 2), self-focused framing of condom use could prove to be highly ineffective when coupled with security priming, as under these conditions, participants are unlikely to think their own sexual health is in need of protecting.

We therefore conducted the first examination of the effects of experimentally primed attachment on an observational measure related to condom use (Baumeister et al., 2007): condom acquisition behavior. Based on our previous findings, we predicted that participants primed with attachment security or anxiety would take fewer condoms compared to participants in other conditions. However, we predicted that when condom use was framed as other-focused, security enhancement would lead to participants taking more condoms compared to when

condom use was framed as self-focused. We also attempted to replicate the pattern of attachment priming effects on condom use attitudes found in Studies 1 and 2.

Method

Participants and procedure

The sample consisted of 228 undergraduate psychology students from a large American university (M age = 19.43, SD = 1.60, range: 18-26). Participants were blind to the topic of study when signing up to participate. Participants were escorted to private rooms and told they would be participating in a study on sexuality, after which informed consent was collected. Participants were then randomly assigned to one of the three attachment-priming conditions: *security*, *anxiety*, or *avoidance*, or a *control* condition. The text for these primes was modified in line with Sakaluk (2014), to reduce unacceptably high rates of incorrect attachment prime responses for younger samples with less relationship experience. In essence, the only difference in this priming procedure is that participants in Study 3 were asked to think of a *time in a relationship* (v. an entire *relationship* in Studies 1-2) characterized by security, anxiety, or avoidance. Participants yielding noncompliant prime responses were excluded from the final sample, as were another 13 participants because they indicated an awareness of the purpose of the study (see Table 1). Following the primes, participants completed a series of self-report measures.

Next, a research assistant returned with a bowl of 20 condoms; participants were told they could take as many as they liked—an ostensible gift for their participation. The manipulation of self/other framing was accomplished using custom-branded condoms. Participants were randomly assigned to receive a bowl of condoms that had either the message “Protect YOUR sexual health!” ($n = 111$) or “Protect YOUR PARTNER’S sexual health!” ($n = 117$) printed on the condom foils. The research assistant then told participants they would be

back shortly after filing the participant's completed materials, and closed the door to ensure participants had time and privacy to take as many condoms as they desired. After two minutes, the research assistant returned to debrief the participants regarding the purpose of the study, and to count the numbers of condoms taken after the participants left the lab.⁶ Thus, the study had a 4 (*security, anxiety, avoidance, control*) X 2 (*other-focused, self-focused*) between-subject design.

Measures

Self-report measures collected included the BACCUS ($\alpha = .94$) and BACNUS ($\alpha = .91$; Sakaluk & Muehlenhard, 2012), assessments of positive and negative affect (PANAS; Watson, Clark, & Tellegen, 1988) and erotophilia/erotophobia (Rye, Meaney, & Fisher, 2011). The affect-related measures were collected primarily to rule out the possibility that the effects of attachment priming could be attributed to changes in general mood or sexual arousal. The PANAS contains 20 items assessing participants' levels of affect, with half of the items assessing positive affect, and the other half assessing negative affect. Participants were asked to indicate how they felt at the moment of completing the questionnaire, and responded on a 5-point scale (1 = *very slightly or not at all*; 5 = *extremely*). Scores for positive affect or negative affect were averaged to form composites of positive and negative affect, with higher composite scores indicating a greater level of felt positive or negative affect. Internal consistency for the PANAS subscales of positive and negative affect were acceptable ($\alpha s = .88$).

The erotophilia/erotophobia measure, alternatively, contains five items assessing participants' evaluations of various sexual acts (e.g., "masturbation can be an exciting experience"). Responses to the erotophilia/erotophobia measure were made on a 7-point scale (1 = *strongly agree*; 7 = *strongly disagree*). Scores were averaged to form a composite, with higher

composite scores indicating greater erotophilia. Internal consistency for the erotophilia/erotophobia measures was acceptable ($\alpha = .70$).

Analysis strategy

As in Study 1 and 2, a difference score was calculated using standardized BACCUS and BACNUS scores. Participants' preferences for condom use were predicted using a multiple regression model that included the same three contrasts used in Study 1 and 2, while also controlling for participant gender and age.

Condom taking data were analyzed using a generalized linear modeling approach. As the distribution for the number of condoms taken by participants drastically departed from normality (skewness = 2.13, kurtosis = 8.51), a Poisson distribution was used. Poisson distributions are commonly specified when analyzing nonnegative integer values, like the one generated by the number of condoms taken (see Agresti, 2007).

We hypothesized that the framing manipulation would primarily affect participants primed with attachment security, as opposed to participants in the other attachment priming conditions (Mikulincer et al., 2005). To test this hypothesis, attachment-priming conditions were dummy coded into three variables that compared each of the three attachment primes (*security*, *anxiety*, and *avoidance*, all coded as 1 in their respective dummy variable) to the control condition (coded as 0). Framing conditions were also dummy-coded (*other-focused* = 0, *self-focused* = 1), and three interaction terms were created for the three attachment prime dummy code variables and the framing dummy code variable. Finally, four control variables were included in the initial model, consisting of participant gender and age, as well as two dummy-coded variables to control for possible differences in numbers of condoms taken as a result of the research assistant (one of three) responsible for running the particular data collection session.

Results

Coefficients from our regression analysis predicting condom use attitudes are again presented in Table 2. Unlike Studies 1-2 and contrary to our predictions, the contrast between participants primed with *security* or *anxiety* and those primed with *avoidance* was not significant, though it was in the expected negative direction. Beyond the significant gender difference in condom use attitudes, the only significant attachment priming contrast was the Security v. Anxiety contrast, indicating that participants primed with *security* preferred condom use to a greater extent than those in the *anxiety* condition.

Parameter estimates and confidence intervals from the Poisson regression are presented in Table 4. Older and male participants took significantly more condoms. None of the main effects of the attachment priming conditions were significant. There was a significant interaction between the security dummy-code variable and the condom promotion message. As predicted, participants in the *security* condition took fewer condoms than participants in the *control* condition when exposed to the *self-focused* promotion message ($e^{\beta} = 0.69$, 95% CI: 0.50, 0.95); when exposed to the *other-focused* message, however, there was no difference in number of condoms taken between participants in the security and control conditions ($e^{\beta} = 1.10$, 95% CI: 0.81, 1.49). Critically, these effects were not the product of positive and negative affect, or erotophilia, as including these variables as covariates did not affect the strength of this interaction. All other interactions between attachment condition dummy variables (i.e., for anxiety and avoidance) and framing condition were not significant.

Discussion

Our primary hypothesis that framing condom use as an other-focused benevolent act would moderate security-priming effects was supported, as participants primed with security

took fewer condoms compared to participants in the control condition, when condom use was self-focused. Conversely, when condom use was other-focused, participants primed with security took the same number of condoms as participants in the control condition. Contrary to our predictions, however, primed anxiety, although affecting condom use attitudes (in Studies 1 and 2), did not appear to have an effect on condom acquisition behavior. Although this null effect was surprising, it helps to highlight the need for scholars to consider the use of behavioral measures of the sexuality-related phenomena they study, because in some circumstances—as in the case of the present study—psychological effects on attitudes and self-reports of behavior may not always neatly transfer over to behavioral indicators (Baumeister et al., 2007).

Unlike in Studies 1 and 2, participants primed with security or anxiety in Study 3 did not prefer condom non-use to a significantly greater extent compared to those primed with avoidance. This failure to replicate could have occurred for a number of reasons. We therefore conducted small-scale meta-analyses of our regression model parameters from Studies 1-3.

META-ANALYSIS OF ATTACHMENT PRIMING EFFECTS FROM STUDIES 1-3

Studies 1 and 2 suggested that participants primed with security or anxiety preferred condom non-use to a greater extent compared to those primed with avoidance, but in Study 3, this contrast was non-significant. A simple, though disappointing, explanation for these inconsistent outcomes is that the results of Studies 1 and 2 might have been Type I errors, and that the effect of attachment primes on condom use attitudes is truly null. Alternatively, perhaps some psychological or demographic variable—present in Studies 1 and 2 and absent in Study 3—moderated the effect of attachment on condom use attitudes. This possibility is especially plausible in light of previous research that has found MTurk samples (Studies 1 and 2) to be significantly more diverse than college samples (Study 3; Buhrmester et al., 2011). Finally, it is

possible the null effect of Study 3 was simply a result of sampling error. Indeed, Francis (2012) and Schimmack (2012) have both independently shown that even in cases of well-powered studies, it is probable that a number of true effects will not replicate.

In order to evaluate whether our attachment priming effects across Studies 1-3 were more likely to be null, moderated, or robust effects, we conducted small-scale meta-analyses of the regression parameters used across Studies 1-3 (gender, age, and the three attachment contrasts) to predict condom use attitudes (see Cumming, 2014). A total of five fixed-effect meta-analytic models were fit, using the *metafor* package (Viechtbauer, 2010) in R (R Core Team, 2014), in order to evaluate the predictive power of (1) participant gender, (2) participant age, (3) the Control v. Attachment contrast, (4) the Security/Anxiety v. Avoidance contrast, and (5) the Security v. Anxiety contrast, across the three studies.

Of particular importance is the meta-analyzed unstandardized regression weight for the Security/Anxiety v. Avoidance contrast. A non-significant meta-analyzed effect of this contrast would suggest that our hypothesized effect of primed attachment on condom use attitudes is not supported. A moderated account of our findings would be supported, alternatively, if the meta-analyzed effect of this contrast were significant, along with the Q statistic for effect size heterogeneity (Borenstein, Hedges, Higgins, & Rothstein, 2009). Finally, our hypothesized account of primed attachment and condom use attitudes would be supported if the meta-analyzed effect of this contrast were significant, but the Q statistic for effect size heterogeneity was non-significant (i.e., the effect of the contrast did not significantly vary from study to study).

Results of the meta-analytic models are presented in the final columns of Table 2. Across our three studies, the synthesized effects of participant gender and age were not significant, however, these effects varied significantly across studies ($Qs = 17.07$ and 23.45 , $ps < .001$).

Crucially, and as predicted, the Security/Anxiety v. Avoidance contrast was significant when synthesized across all three studies, such that participants primed with *security* or *anxiety* preferred condom non-use more compared to participants primed with *avoidance*. Further this effect did not significantly vary from study to study ($Q = 1.08, p = .58$). The size and direction of this effect, in other words, was relatively consistent across our three studies. The meta-analyzed effects for the remaining two attachment-related contrasts were also consistent across the three studies ($Qs = 0.69, 3.79$ $ps = .71, .15$).

GENERAL DISCUSSION

Results from our studies provide the first experimental evidence supporting the effects of attachment (in)security on condom use attitudes and behavior. Participants primed with attachment security or anxiety—thereby invoking more positive working models of other—consistently preferred condom non-use to a greater extent compared to participants primed with attachment avoidance. As shown in Study 2, this was due to security and anxiety priming causing participants to perceive sexual partners as less of a threat to their sexual health. Although the experimental designs of these studies makes them an important contribution to the attachment and sexuality literature, the meta-analytic consistency of the findings for the effects of attachment on condom use attitudes, across the three studies, makes them particularly valuable, given the conflicting findings obtained from previous correlational studies (e.g., Bogaert & Sadava, 2002; Feeney et al., 2000; Kershaw et al., 2007).

As in Studies 1-2, priming attachment security had a negative impact on condom acquisition when participants were encouraged to focus on their own sexual health. However, when participants were encouraged to adopt a more pro-social focus on their partner's sexual health, the effect of attachment security on condom acquisition was eliminated. Additionally,

contrary to the findings of the first two studies, our predictions and previous research (e.g., Feeney et al., 1999, 2000), priming attachment anxiety had no effect on condom acquisition.

Although we do not have any data to directly explain this disconnect between anxiously primed participants' condom use attitudes and behavior, like Feeney and her colleagues (1999, 2000) and others (e.g., Davis et al., 2004), we suspect that anxiously primed participants would be reluctant to disrupt whatever norm was present in their sexual encounters by acting on their changed attitudes. As anxiously attached individuals strongly associate sex with love (Davis et al., 2004; Schachner & Shaver, 2004), they likely are more content to leave the decision of condom use to their partners, fearing that voicing their particular preference would jeopardize their access to the sex (and therefore love) they so desperately covet.

Basic and Applied Implications

The results of our studies support a causal model in which attachment styles have downstream consequences for condom use attitudes and behavior. This insight is valuable, as it could have been the case that experiences with condom use shaped attachment styles. Although a reciprocal causal model of attachment and condom use—attachment influencing condom use, and condom use subsequently influencing attachment—cannot be ruled out by our data, it is nonetheless a valuable first step to establish the causal path between attachment and condom use.

Our findings also help to provide some consistency regarding the role of attachment in condom use. Much of the previous research in this area, such as the work of Feeney and colleagues (1999, 2000) and Bogaert and Sadava (2002), produced seemingly inconsistent findings, as some studies found anxiety to predict more negative condom use attitudes, whereas other studies found that security predicted more negative condom use attitudes. Our research suggests that *both* attachment security and anxiety can negatively impact condom use attitudes.

At the level of application, this research demonstrates the importance of attachment in the promotion of sexually healthy and unhealthy attitudes. Researchers (e.g., Feeney & Raphael, 1992) and international health organizations (WHO, 2012) alike have criticized sexual health research for neglecting relational factors like attachment, and indeed, these variables have all but been ignored in sexual health promoting interventions (see Albaracín et al., 2005 for a review of HIV-related prevention interventions). However, as the present research demonstrates, feeling secure in a relationship, or fearing abandonment by one's partner can lead to biased perception of one's partner as sexually healthy (or disregard the risk to their own health risk) thereby encouraging the foregoing of condom use. Interventions designed to improve condom use rates would therefore be well served by addressing possible misperceptions of partner sexual health caused by feelings of attachment security or anxiety.

Results from our third study also highlight the applied value in finding novel ways to frame condom use in promotion messages. Framing condom use as a prosocial other-oriented act (Mikulincer et al., 2005) eliminated the decreases in condom acquisition that resulted from attachment security priming in the control condition and the other studies. As the manipulation of condom use framing was accomplished by printing short messages on the foils of the condoms themselves, we think such framing interventions could potentially be utilized in contexts where condoms are freely distributed to improve rates of condom acquisition.

Strengths and Limitations

The primary strengths of our investigation are the use of experimental priming methods to examine the causal role of attachment (Gillath et al., 2008; Sakaluk, 2014), and the use of an observational measure related to condom use behavior in Study 3 (Baumeister et al., 2007).

These methodological choices facilitated a strong test of our hypothesized account of attachment

and condom use that would not otherwise have been possible had we utilized the more common correlational and self-report methods that have been used to study this phenomenon.

A key limitation, however, of our behavioral measure of condom acquisition in Study 3, is that we have no assurances that the condoms taken by participants were actually used later to facilitate safe sex during intercourse; participants may not have used the condoms at all, used them incorrectly, or could have taken the condoms for someone other than themselves. It is therefore important to acknowledge that we do not believe that our observational measure of condom use was *de facto* superior to traditional self-report measures. Rather, we see observational measures as important to include in research in order to provide a more complete picture of the phenomenon of condom use. Observational measures could be coupled in the future with longitudinal self-report measures, to provide researchers with data on both immediate condom use behavioral decisions, and later, self-reports of the use of the condoms taken.

Additionally, though we were consistent in the variables we controlled for during our analyses (participant gender and age), there are a number of additional relationship-related variables that might be important control variables, or even moderators of attachment priming effects. These include variables such as relationship type (i.e., casual v. exclusive), relationship length, or whether participants were sexually active in their relationships. And though we ruled out the possibility that attachment-induced differences in condom acquisition behavior were a result of changes in erotophilia-erotophobia during Study 3, there may be a number of other sexual motives (see Meston & Buss, 2007) responsible for this behavioral change that we did not control for.

A final limitation worth noting is that our samples were almost entirely homogenous with respect to sexual orientation. Examining the causal role of attachment particularly among men

who have sex with men (MSM), could be advantageous, considering the resurgence of AIDS in North American MSM populations (UNAIDS, 2010). Although we are reluctant to speculate too widely about the generalizability of our findings to other populations like MSM, Diamond's (2003, 2004) work disentangling the concepts of sexual attraction/orientation and romantic attachment gives us reason to believe that the sexual health attitudes and behaviors of members of other sexual orientations might be similarly affected by attachment priming.

Future Research

We think there are a number of promising avenues for future research using experimental attachment priming to better understand the role of attachment in the relational underpinnings of sexuality (Birnbaum et al., 2012; Gillath & Schachner, 2006). One possibility would be to explore the effects of attachment primes on a broader array of sexual health related constructs. Although the use of condoms is critical in the prevention of unintentional pregnancies and sexually transmitted infections, promoting regular condom use is only one aspect of sexual health promotion efforts (see Edwards & Coleman, 2004; WHO, 2012). Given the positive effects of security enhancement in other domains of wellbeing (Mikulincer & Shaver, 2007b), it could prove fruitful to examine the effects of security enhancement on other domains of sexual health, such as sexual functioning, body image, and sex positivity (Edwards & Coleman, 2004).

Yet another possible direction for future research is to extend the present findings to the study of implicit attitudes towards condom use, a relatively unexplored area of research (see Czopp, Monteith, Zimmerman, & Lynam, 2004; Marsh, Johnson, & Scott-Sheldon, 2001, for exceptions). Whereas self-reported 'explicit' attitudes require deliberate introspective efforts to recall, implicit attitudes are automatically activated (Greenwald, Poelman, Uhlmann, & Banaji, 2009). Further, basic research on implicit attitudes in other domains suggests that they are better

predictors of socially sensitive behaviors than explicit attitudes (Greenwald et al., 2009). Implicit attitudes are also superior predictors of behaviors for which motivation or opportunity to engage in deliberate evaluation is low (see Fazio, 1990). For example, implicit attitudes may be important determinants of condom use behavior when an individual is under the influence of alcohol and therefore less able to deliberately consider condom use. Researchers should therefore also consider the impact of attachment on implicit attitudes towards condom use, which may be better predictors of condom use in risky situations (e.g., Cooper, 2002).

Finally, the potential moderating role of trait attachment style should receive dedicated attention in future experimental attachment studies examining condom-related outcomes. In previous attachment priming investigations, priming effects have sometimes been moderated by trait levels of avoidance or anxiety (e.g., Collins & Gillath, 2012, Study 4), whereas other times they have not (e.g., Birnbaum et al., 2012, Studies 2 and 3). Researchers adopting experimental attachment paradigms to the study of condom use in the future should therefore consider including measures of attachment style (e.g., Fraley et al., 2011), in order to explore the possible interactions of trait attachment and manipulated state attachment. In doing so, we encourage researchers to use a narrower range of experimental conditions, in order to avoid dramatically decreasing the degrees of freedoms for their statistical models, thereby decreasing the statistical power they have to detect primed attachment by state attachment interactions.

CONCLUSION

Echoing the recommendations of the WHO (2012), we encourage researchers to focus on the emotional, relational, social, and symbolic factors underlying sexual health, broadly defined (i.e., Edwards & Coleman, 2004). Continued experimental research of this nature is needed to advance the basic understanding of causal determinants of sexual health, thereby highlighting

important factors yet to be addressed in interventions. Here, we made initial steps in understanding the causal effects of attachment. Moving forward, we encourage researchers to continue this line of research and take advantage of experimental methods and behavioral measures to gain a greater understanding of the causal factors underlying sexual health behavior.

References

- Agresti, A. (2007). *An introduction to categorical data analysis* (2nd edition). Hoboken, NJ: John Wiley & Sons. doi: 10.1002/0470114754
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179-211. doi: 10.1016/0749-5978(91)90020-T
- Albaracín, D., Gillette, J. C., Earl, A. N., Glasman, L. R., Durantini, M. R., & Ho, M. (2005). A test of major assumptions about behavior change: A comprehensive look at the effects of passive and active HIV-prevention interventions since the beginning of the epidemic. *Psychological Bulletin*, *131*, 856-897. doi: 10.1037/0033-2909.131.6.856
- Albaracín, D., Johnson, B. T., Fishbein, M., & Muellerleile, P. A. (2001). Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychological Bulletin*, *127*(1), 142-161. doi: 10.1037/0033-2909.127.1.142
- Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology*, *61*(2), 226-244. doi: 10.1037/0022-3514.61.2.226
- Bartz, J. A., & Lydon, J. E. (2004). Close relationships and the working self-concept: Implicit and explicit effects of priming attachment on agency and communion. *Personality and Social Psychology Bulletin*, *30*, 1389-1401. doi: 10.1177/0146167204264245
- Bauman, L. J., & Berman, R. (2005). Adolescent relationships and condom use: Trust, love and commitment. *AIDS and Behavior*, *9*, 211-222. doi: 10.1007/s10461-005-3902-2
- Baumeister, R. F., Vohs, K. D., & Funder, D. C. (2007). Psychology as the science of self-reports and finger movements. *Perspectives on Psychological Science*, *2*, 396-403. doi: 10.1111/j.1745-6916.2007.00051.x

- Birnbaum, G. E., Simpson, J. A., Weisberg, Y. J., Barnea, E., & Assulin-Simhon, Z. (2012). Is it my overactive imagination? The effects of contextually activated attachment insecurity on sexual fantasies. *Journal of Social and Personal Relationships, 29*, 1131-1152. doi: 10.1177/0265407512452978
- Bogaert, A. F., & Sadava, S. (2002). Adult attachment and sexual behavior. *Personal Relationships, 9*, 191-204. doi: 10.1111/1475-6811.00012
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. West Sussex, United Kingdom: John Wiley & Sons, Ltd.
- Bowlby, J. (1982). *Attachment and loss: Vol. 1. Attachment* (2nd ed.). New York: Basic Books.
- Brady, S. S., Tschann, J. M., Ellen, J. M., & Flores, E. (2009). Infidelity, trust, and condom use among Latino youth in dating relationships. *Sexually Transmitted Diseases, 36*, 227-231. doi: 10.1097/QLQ.0b013e3181901cba
- Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (46-76). New York, NY: Guilford Press.
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's mechanical turk: A new source of inexpensive, yet high quality, data? *Perspectives of Psychological Science, 6*, 3-5. doi: 10.1177/1745691610393980
- Carnelley, K. B., & Rowe, A. C. (2007). Repeated priming of attachment security influences later views of self and relationships. *Personal Relationships, 14*, 307-320. doi: 10.1111/j.1475-6811.2007.00156.x

- Ciesla, J. A., Roberts, J. E., & Hewitt, R. G. (2004). Adult attachment and high-risk sexual behavior among HIV-positive patients. *Journal of Applied Social Psychology, 34*, 108-124. doi: 10.1111/j.1559-1816.2004.tb02539.x
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2002). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd edition). New York: Routledge.
- Collins, T. J., & Gillath, O. (2012). Attachment, breakup strategies, and associated outcomes: The effects of security enhancement on the selection of breakup strategies. *Journal of Research in Personality, 46*, 210-222. doi: 10.1016/j.jrp.2012.01.008
- Cooper, M. L. (2002). Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. *Journal of Studies on Alcohol, 14*, 101-117.
- Corbett, A. M., Dickson-Gómez, J., Hilario, H., & Weeks, M. R. (2009). A little thing called love: Condom use in high-risk primary heterosexual relationships. *Perspectives on Sexual and Reproductive Health, 41*, 218-224. doi: 10.1363/4121809
- Cumming, G. (2014). The new statistics: Why and how. *Psychological Science, 25*, 7-29. doi: 10.1177/0956797613504966
- Czopp, A. M., Monteith, M. J., Zimmerman, R. S., & Lynam, D. R. (2004). Implicit attitudes as potential protection from risky sex: Predicting condom use with the IAT. *Basic and Applied Social Psychology, 26*, 227-236. doi: 10.1080/01973533.2004.9646407
- Davis, D., Shaver, P. R., & Vernon, M. L. (2004). Attachment style and subjective motivations for sex. *Personality and Social Psychology Bulletin, 30*, 1076-1090. doi: 10.1177/0146167204264794

- Dewitte, M. (2012). Different perspectives on the sex-attachment link: Towards an emotion-motivational account. *Journal of Sex Research, 49*, 105-124. doi: 10.1080/00224499.2011.576351
- Diamond, L. M. (2003). What does sexual orientation orient? A biobehavioral model distinguishing romantic love and sexual desire. *Psychological Review, 110*, 173-192. doi: 10.1037/0033-295X.110.1.173
- Diamond, L. M. (2004). Emerging perspectives on distinctions between romantic love and sexual desire. *Current Directions in Psychological Science, 13*, 116-119. doi: 10.1111/j.0963-7214.2004.00287.x
- Edwards, W. M., & Coleman, E. (2004). Defining sexual health: A descriptive overview. *Archives of Sexual Behavior, 33*, 189-195. doi: 10.1023/B:ASEB.0000026619.95734.d5
- Fazio, R. H. (1990). Multiple processes by which attitudes guide behavior: The MODE model as an integrative framework. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 23, pp. 75-109). San Diego: Academic Press.
- Feeney, J. A., Kelly, L., Gallois, C., Peterson, C., & Terry, D. J. (1999). Attachment style, assertive communication and safer-sex behavior. *Journal of Applied Social Psychology, 29*(9), 1964-1983. doi: 10.1111/j.1559-1816.1999.tb00159.x
- Feeney, J. A., & Raphael, B. (1992). Adult attachment and sexuality: Implications for understanding risk behaviors for HIV infection. *Australian and New Zealand Journal of Psychiatry, 26*, 399-407. doi: 10.3109/00048679209072062
- Feeney, J. A., Peterson, C., Gallois, C., & Terry, D. J. (2000). Attachment style as a predictor of sexual attitudes and behaviors in late adolescence. *Psychology and Health, 14*, 1105-1122. doi: 10.1080/08870440008407370

- Fletcher, G. J. O., Simpson, J. A., & Thomas, G. (2000). The measurement of perceived relationship quality components: A confirmatory factor-analytic approach. *Personality and Social Psychology Bulletin*, *26*, 340-354. doi: 10.1177/0146167200265007
- Fraley, R. C., & Davis, K. E. (1997). Attachment formation and transfer in young adults' close friendships and romantic relationships. *Personal Relationships*, *4*, 131-144. doi: 10.1111/j.1475-6811.1997.tb00135.x
- Fraley, R. C., Heffernan, M. E., Vicary, A. M., & Brumbaugh, C. C. (2011). The experiences in close relationships-relationship structures questionnaire: A method for assessing attachment orientations across relationships. *Psychological Assessment*, *23*, 615-625. doi: 10.1037/a0022898
- Fraley, R. C., Vicary, A. M., Brumbaugh, C. C., & Roisman, G. I. (2011). Patterns of stability in adult attachment: An empirical test of two models of continuity and change. *Journal of Personality and Social Psychology*, *101*, 974-992. doi: 10.1037/a0024150
- Francis, G. (2012). Too good to be true: Publication bias in two prominent studies from experimental psychology. *Psychonomic Bulletin & Review*, *19*, 151-156. doi: 10.3758/s13423-012-0227-9
- Gebhardt, W. A., Kuyper, L., & Greunsven, G. (2003). Need for intimacy in relationships and motives for sex as determinants of adolescent condom use. *Journal of Adolescent Health*, *33*, 154-164. doi: 10.1016/S1054-139X(03)00137-X
- Gillath, O., Hart, J., Nofle, E. E., & Stockdale, G. D. (2009). Development and validation of a state adult attachment measure (SAAM). *Journal of Research in Personality*, *43*, 362-373. doi: 10.1016/j.jrp.2008.12.009

- Gillath, O., & Schachner, D. A. (2006). How do sexuality and attachment interrelate? Goals, motives, and strategies. In M. Mikulincer & G. S. Goodman (Eds.), *Dynamics of romantic love: Attachment, caregiving, and sex* (pp. 121-147). New York: Guilford Press.
- Gillath, O., Selcuk, E., & Shaver, P. R. (2008). Moving Toward a Secure Attachment Style: Can Repeated Security Priming Help? *Social and Personality Psychology Compass*, 2(4), 1651-1666. doi: 10.1111/j.1751-9004.2008.00120.x
- Greenwald, A. G., Poehlman, T. A., Uhlmann, E. L., & Banaji, M. R. (2009). Understanding and using the implicit association test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology*, 97(1), 17-41. doi: 10.1037/a0015575
- Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. New York, NY: Guilford Press.
- Kagan, J. (1996). Three pleasing ideas. *American Psychologist*, 51, 901-908. doi: 10.1037/0003-066X.51.9.901
- Katz, B. P., Fortenberry, J. D., Zimet, G. D., Blythe, M. J., & Orr, D. P. (2000). Partner-specific relationship characteristics and condom use among young people with sexually transmitted diseases. *Journal of Sex Research*, 37, 69-75. doi: 10.1080/00224490009552022
- Kein, S. M., Barta, W. D., Zelenski, J. M., & Cothran, D. L. (2005). Why are you bringing up condoms now? The effects of message content on framing effects of condom use messages. *Health Psychology*, 24, 321-326. doi: 10.1037/0278-6133.24.3.321
- Kershaw, T. S., Milan, S., Westdahl, C., Lewis, J., Rising, S. S., Fletcher, R., & Ickovics, J. (2007). Avoidance, anxiety, and sex: The influence of romantic attachment on HIV-risk

- among pregnant women. *AIDS and Behavior*, *11*(2), 299-311. doi: 10.1007/s10461-006-9153-z
- Lewis, M. (1997). *Altering fate: Why the past does not predict the future*. New York: Guilford.
- Marsh, K. L., Johnson, B. T., & Scott-Sheldon, L. A. J. (2001). Heart versus reason in condom use: Implicit versus explicit attitudinal predictors of sexual behavior. *Experimental Psychology*, *48*, 161-175. doi: 10.1026//0949-3946.48.2.161
- Meston, C. M., & Buss, D. M. (2007). Why humans have sex. *Archives of Sexual Behavior*, *36*, 477-507. doi: 10.1007/s1058-007-9175-2
- Mikulincer, M., & Shaver, P. R. (2003). The attachment behavioral system in adulthood: Activation, psychodynamics, and interpersonal processes. In M. P. Zanna (Ed.), *Advances in experimental social psychology*, Vol. 35 (pp. 53-152). San Diego, CA: Elsevier Academic Press.
- Mikulincer, M., & Shaver, P. R. (2007a). *Attachment in adulthood: Structure, dynamics, and change*. New York: Guilford Press.
- Mikulincer, M., & Shaver, P. R. (2007b). Boosting attachment security to promote mental health, prosocial values, and inter-group tolerance. *Psychological Inquiry*, *18*, 139-156. doi: 10.1080/10478400701512646
- Mikulincer, M., Shaver, P. R., Gillath, O., & Nitzberg, R. A. (2005). Attachment, caregiving, and altruism: Boosting attachment security increases compassion and helping. *Journal of Personality and Social Psychology*, *89*, 817-839. doi: 10.1037/0022-3514.89.5.817
- Misovich, S. J., Fisher, J. D., & Fisher, W. A. (1997). Close relationships and elevated HIV risk behavior: Evidence and possible underlying psychological processes. *Review of General Psychology*, *1*, 72-107. doi: 10.1037/1089-2680.1.1.72

- R Core Team (2014). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.
- Reece, M., Herbenick, D., Schick, V., Sanders, S. A., Dodge, B., & Fortenberry, J. D. (2010). Condom use rates in a national probability sample of males and females ages 14 to 94 in the united states. *Journal of Sexual Medicine*, 7 (supplement 5), 266-276. doi: 10.1111/j.1743-6109.2010.02017.x
- Rosenstock, I. M. (1974). The health belief model and preventative health behavior. *Health Education Monographs*, 2, 354-386.
- Rye, B. J., Meaney, G. J., & Fisher, W. A. (2011). Sexual opinion survey. In T. D. Fisher, C. M. Davis, W. L. Yarber, & S. L. Davis (Eds.), *Handbook of sexuality-related measures* (3rd edition, pp. 231-236). New York, NY: Routledge.
- Sakaluk, J. K. (2014). Problems with recall-based attachment style priming paradigms: Exclusion criteria, sample bias, and reduced power. *Journal of Social and Personal Relationships*, 31, 888-906. doi: 10.1177/0265407513508728
- Sakaluk, J. K., & Muehlenhard, C. L. (2012). *Development and validation of parallel implicit and explicit measures of attitudes towards condom use and non-use*. Paper presented at the Eastern and Midcontinent Joint Regional Meeting of the Society for the Scientific Study of Sexuality, Bloomington, Indiana.
- Schachner, D. A. & Shaver, P. R. (2004). Attachment dimensions and sexual motives. *Personal Relationships*, 11, 179-195. doi: 10.1111/j.1475-6811.2004.00077.x
- Schimmack, U. (2012). The ironic effect of significant effects on the credibility of multiple-study articles. *Psychological Methods*, 17, 551-566. doi: 10.1037/a0029487

- Sheeran, P., Abraham, C., & Orbell, S. (1999). Psychosocial correlates of heterosexual condom use: A meta-analysis. *Psychological Bulletin*, *125*(1), 90-132. doi: 10.1037/0033-2909.125.1.90
- Strachman, A., & Impett, E. A. (2009). Attachment orientations and daily condom use in dating relationships. *Journal of Sex Research*, *46*, 319-329. doi: 10.1080/00224490802691801
- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211*, 453-458. doi: 10.1126/science.7455683
- UNAIDS: Joint United Nations Programme on HIV/AIDS. (2010). *UNAIDS report on the global AIDS epidemic: 2010*. Retrieved from <http://www.unaids.org/globalreport>
- Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, *36*, 1-48.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063-1070. doi: 10.1037/0022-3514.54.6.1063
- World Health Organization (2012). *Social science methods for research on sexual and reproductive health*. Retrieved from http://whqlibdoc.who.int/publications/2012/9789241503112_eng.pdf.
- Xu, J. H., & Shrout, P. E. (2013). Assessing the reliability of change: A comparison of two measures of adult attachment. *Journal of Research in Personality*, *47*, 202-208. doi: 10.1016/j.jrp.2013.01.005

Footnotes

1. For all three studies, we conducted χ^2 tests to examine whether rates of noncompliant responses differed by attachment priming condition. All tests were non-significant, indicating comparable rates of noncompliant responses in each condition.
2. A confirmatory factor analysis by Sakaluk and Muehlenhard (2012) supported considering consistent condom use and condom non-use as distinct attitudinal objects.
3. Results were similar when attitudes towards consistent condom use and condom non-use were analyzed as levels of repeated measures in a mixed 4 x 2 design. For the sake of simplicity, we have therefore presented the results of analyzing the difference scores.
4. We also explored controlling for participants relationship status. Though relationship status was a significant predictor of condom use attitudes in Studies 1-2, it was not a significant predictor of number of condoms taken in Study 3, and more importantly, it did not substantively impact the pattern of effects we observed throughout Studies 1-3.
5. We also explored whether attachment-priming effects were moderated by measures of trait attachment style in portions of Study 1 and Study 2 samples, but these interactions were not significant. However, as our focus was on primed and not measured attachment, our four-condition design was not optimally suited for testing these interactions; we return to this point in the discussion section on future research.
6. Participants were told during debriefing that the number of condoms they took would be counted as a source of data. No participants indicated discomfort with this minor deception. Nevertheless, research assistants delayed the actual counting until participants left.

Table 1

Demographic and Procedural Characteristics of Samples from Studies 1-3

	Study 1 (<i>n</i> = 282)	Study 2 (<i>n</i> = 149)	Study 3 (<i>n</i> = 228)
Gender			
Male	51.77%	55.03%	46.05%
Female	48.22%	44.97%	53.07%
Racial Identification			
European American	73.40%	66.90%	76.30%
African American	7.80%	8.30%	4.40%
Asian American	7.80%	12.10%	6.60%
Hispanic American	6.40%	8.30%	5.30%
Native American	2.10%	1.30%	3.5%
Other	6.40%	6.40%	--
Relationships Status			
Single	18.80%	21.70%	51.90%
In a relationship*	81.20%	78.30%	48.10%
Attachment Prime			
Security	28.37%	24.83%	28.51%
Anxiety	26.60%	23.49%	24.12%
Avoidance	21.63%	24.83%	24.56%
Control	23.40%	26.85%	28.51%
Noncompliant Response**	9.61%	6.88%	8.71%

* Aggregate created by collapsing across numerous types of relationships (e.g., dating one person, dating multiple people, engaged, married, etc.).

** Percentages reflect amount of original sample yielding noncompliant response, not the final sample (reported in the header of the table).

Table 2

*Unstandardized Regression Estimates for Study 1-3 and Meta-Analyzed Variables**Predicting Condom Use Attitudes*

	Study 1		Study 2		Study 3		Meta- Analyzed	
	B	SE	B	SE	B	SE	B	SE
Gender	.40*	.187	.063	.257	-.763***	.214	-.065	.124
Age	-.054	.017	-.094*	.025	-.001	.001	-.001	.001
Control v.	.486*	.221	.249	.284	.248	.237	.344*	.141
Attachment								
Security/Anxiety v.	-.477*	.236	-.661*	.311	-.239	.269	-.444**	.154
Avoidance								
Security v. Anxiety	.052	.25	-.101	.366	.699*	.299	.228	.170

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

Table 3

Zero-order Correlations between Mediating and Outcome Variables

	1.	2.	3.	4.	5.	6.	7.	8.
1. Sexual Health Threat	--	-.49***	-.51***	-.51***	-.57***	-.19*	-.50***	.19*
2. Relationship Satisfaction		--	.71***	.80***	.78***	.55***	.74***	-.15
3. Commitment			--	.78***	.66***	.48***	.86***	-.24**
4. Intimacy				--	.71***	.68***	.77***	-.15
5. Trust					--	.41***	.69***	-.17*
6. Passion						--	.50***	-.10
7. Love							--	-.17*
8. Attitudes								--

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

Table 4

Log Odds-ratios, Odd Ratios, and 95% Confidence Intervals for Odd-ratios from Poisson

Regression Predicting Number of Condoms Taken

Predictor	β	e^{β}	95% CI: e^{β}
Security	.09	1.10	0.81, 1.49
Anxiety	-.16	0.86	0.61, 1.20
Avoidance	-.05	0.95	0.69, 1.30
Framing	.13	1.14	0.85, 1.54
Security X Framing	-.47	0.62	0.40, 0.97
Anxiety X Framing	-.04	0.96	0.60, 1.54
Avoidance X Framing	-.09	0.91	0.57, 1.45
Age	.01	1.01	1.001, 1.01
Gender	.36	1.43	1.21, 1.70
RA1	.01	1.01	0.84, 1.22
RA2	.04	1.04	0.82, 1.32

Note. Poisson regression utilizes a log-link. β s are therefore log odd-ratios. e^{β} are interpreted as the multiplicative amount of condoms taken for every increase of 1 in a given predictor variable (i.e., the odds-ratios), or, as in the case of dummy codes, the multiplicative amount of condoms taken for the group coded as 1 relative to the group coded as 0 (e.g., men took 1.43 times as many condoms as women did). Predictor is significant if 95% confidence interval for e^{β} does not include 1 (i.e., equal odds).

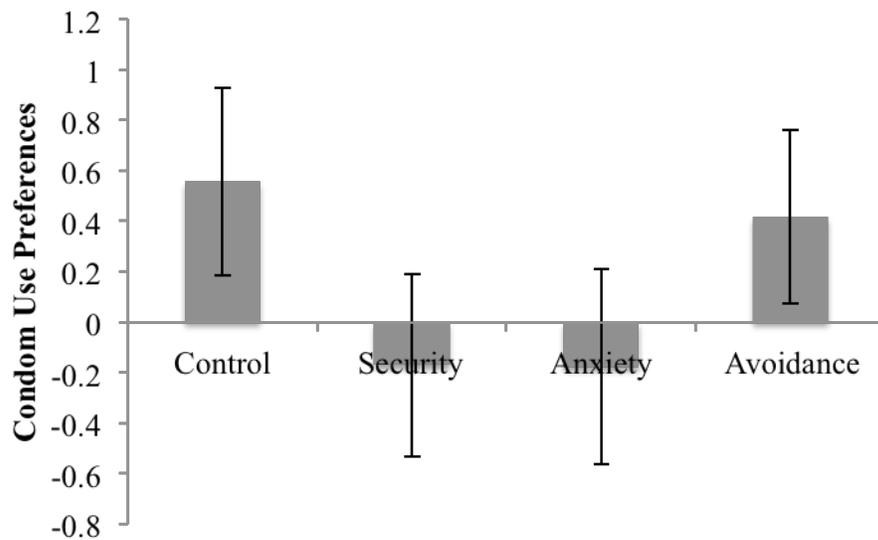


Figure 1. Condom use preference scores by attachment condition. Larger positive scores indicate a preference for condom use; larger negative scores indicate a preference for condom non-use; scores of 0 indicate indifference or ambivalence. Error bars represent 95% confidence interval for estimates of condition means.

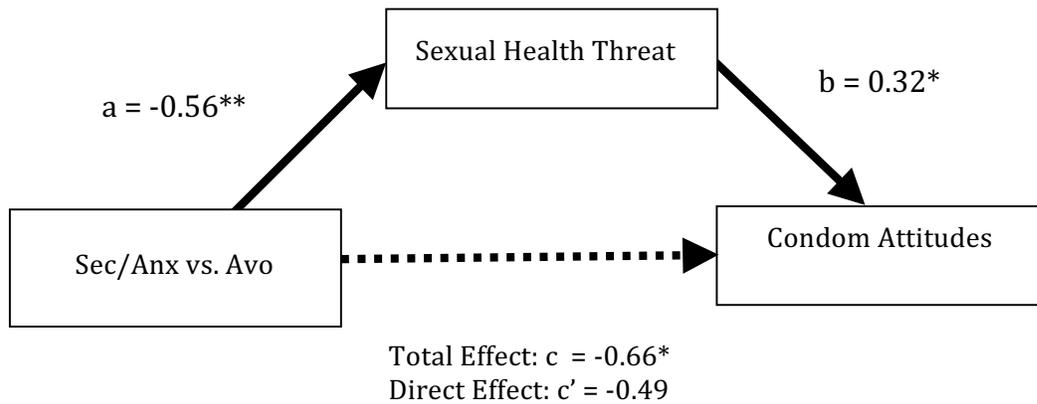


Figure 2. The direct effect coefficient represents the effect of the *Security and Anxiety v. Avoidance* contrast after controlling for the effect of the mediator (sexual health threat), and model covariates (gender, age, and the two remaining contrast codes). Control variables for the model are not shown for the sake of parsimonious presentation. Total adjusted R^2 for the model = .16, $F(6, 142) = 4.65, p < .001$.

* Significant at $p < .05$ ** Significant at $p < .01$.