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Men who have sex with men (MSM) are disproportionately impacted by sexually transmitted infections (STIs), but many engage in condomless sex. One factor contributing to condomless sex may be an assumption of low risk of STIs from physically attractive partners. The present study tested the effect of partner attractiveness on perceived STI risk and condom use intentions and examined two mechanisms believed to underlie this effect: implicit personality theory and motivated reasoning. Participants were 197 MSM who viewed photos of attractive and unattractive men and responded to items assessing perceptions of the men's positive traits and STI risk, as well as motivation to have sex with the men and condom use intentions. Sexual arousal was manipulated. Attractiveness reduced perceived STI risk and condom use intentions by increasing both positive perceptions of and motivation to have sex with the person. Findings were not influenced by arousal.

Men who have sex with men (MSM) are severely affected by human immunodeficiency virus (HIV) and other sexually transmitted infections (STIs) (Centers for Disease Control and Prevention [CDC], 2015). Although people are aware that condoms are a method to prevent STIs, many still engage in condomless sex (Smith, Herbst, Zhang, & Rose, 2015). For this reason, much research has been dedicated to identifying predictors of condom use. Meta-analyses have shown that perception of vulnerability to STIs motivates preventive behavior (Sheeran, Harris, & Epton, 2014). Reisen and Poppen (1999) suggested that the perceived risk of becoming infected from a sexual partner can depend on characteristics of that partner, which in turn can cause variation in a person's condom use across partners. The present study focused on one factor that could potentially influence the perception of the likelihood of contracting an STI from a given partner: physical attractiveness.

The use of physical attractiveness as an indicator of the risk associated with a potential sexual partner is particularly relevant in today's sexual landscape, where MSM make judgments regarding sexual partners based in part on their photos when using geosocial networking applications (GSN apps), such as Grindr. A content analysis of 1,400 Grindr profiles of MSM found that profile pictures with objectifying content (i.e., more focus on the man's body than the face or in which the man was not clothed) were associated with using Grindr to find sex partners (as opposed to friends or relationship partners). The same study also found that MSM who used Grindr were more likely than non-Grindr users to objectify other men, and that greater objectification of men on Grindr was correlated with finding sex partners under the influence of drugs and reduced frequency of discussing HIV status with partners prior to sexual activities (Anderson, Holland, Koc, & Haslam, 2018). Zou and Fan's (2016) meta-analysis of characteristics of MSM who use GSN apps found that 46.4% had condomless anal sex (CAS) within the past three months. App-using MSM were also found to be more likely than other MSM to have gonorrhea and chlamydia infection (Zou & Fan, 2016). These findings, in part, could be attributed to use of physical attractiveness to determine that a potential partner is "safe" and condoms are not needed. This possibility was investigated in the present study in a sample of app-using MSM.

Theory on the Role of Attractiveness and Perceived Risk

Scholars have theorized mechanisms that explain the impact of superficial characteristics on judgments about the STI risk of a partner, even knowing that they are inaccurate indicators of STI status (Misovich, Fisher, &

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Fisher, 1997; Williams et al., 1992). The present study focused on two such mechanisms: implicit personality theory and motivated reasoning. Implicit personality theories are assumptions people hold about how a psychological trait is expressed through behavior and how traits relate to one another (Eagly, Ashmore, Makhijani, & Longo, 1991). One well-known implicit theory is based on the halo effect: the notion that a person possessing one positive trait must generally be positive (Dion, Berscheid, & Walster, 1972). Misovich et al. (1997) suggested that physically attractive sexual partners may elicit a halo effect involving the belief that such partners do not have STIs.

Another proposed mechanism is motivated reasoning: the notion that people are drawn to beliefs that are consistent with personal goals—even if those beliefs are not based on rational decision-making strategies (Kunda, 1990). Interacting with an attractive person could increase the perceiver's motivation to have sex with that person. This motivation, in turn, could lead the perceiver to develop beliefs that support the goal of sexual contact (e.g., "This person probably does not have an STI").

Research on the Role of Attractiveness and Perceived Risk

Research on the relationship between physical attractiveness and perceptions of risk has yielded mixed findings, and few of these studies have focused specifically on MSM. Some studies have found that attractiveness of partners is associated with lower estimates of risk for STIs (Agocha & Cooper, 1999; Blanton & Gerrard, 1997; Gold & Skinner, 1992) or greater intentions to engage in condomless sex (Eleftheriou, Bullock, Graham, Stone, Ingham, 2016; Kruse & Fromme, 2005; Lennon & Kenny, 2013; Wongsomboon & Robles, 2017).

It is not clear, however, what mechanisms may have been underlying these associations. For example, in a study of heterosexual men, Blanton and Gerrard (1997) found that motivation to have sex was only negatively associated with perceived risk when participants were given personality information about the targets. The authors suggested that motivation to have sex led to lower estimates of risk only when personality information was used to justify beliefs regarding the safety of a partner (e.g., that she is well educated, which does not seem typical for high-risk individuals), which appears consistent with motivated reasoning. However, these results are consistent with an implicit personality theory perspective: Participants may have used the personality information as evidence that the target had other desirable characteristics, which were overgeneralized to conclude that she posed less risk.

Other studies conducted with heterosexual and lesbian, gay, and bisexual (LGB) men and women have found that physical attractiveness is associated with increased perceptions of risk for STIs (Dijkstra, Buunk, & Blanton, 2000; Gold & Skinner, 1996; Lennon & Kenny, 2013). Two additional studies, one conducted with a sample of heterosexual men and women (Renner, Schmalzle, & Schupp, 2012) and another conducted with heterosexual and LGB men and women (Epstein, Klinkenberg, Scandell, Faulkner, & Claus, 2007), found no relationship between attractiveness and perceived risk for STIs. Taken together, previous studies do not provide a consistent picture of the relation of physical attractiveness to perceptions of risk among both heterosexual and LGB people.

Present Study

Research to date on the relation between physical attractiveness and perceived risk has been limited in its relevance to MSM who use GSN apps, who may be at the most risk for appearance-based bias when they judge potential sexual partners based on their profile photos. The present study was designed to address several factors that have contributed to the limited relevance for this population. First, the few studies featuring MSM participants did not assess whether participants were GSN app users. Second, these studies have used methods that do not resemble the experience of using GSN apps. For example, studies have used written descriptions of attractiveness rather than pictures (i.e., Gold & Skinner, 1996) or have not influenced participants to think about the possibility of having sex with targets (e.g., Epstein et al., 2007). Also, previous research has not addressed the likely possibility that MSM are most motivated to find sex partners with GSN apps when they feel sexually aroused. Thus, the sexual motivation theorized to underlie motivated reasoning may be not only a product of seeing a photo of an attractive partner but also an antecedent to the search for partners.

To address these concerns, the present study was conducted with MSM who were not currently in a monogamous relationship and who had used GSN apps to find sex partners. Participants viewed photos of attractive and unattractive men under the guise that they had been taken from a popular GSN app and featured available men located in their area. Also, the present study manipulated attractiveness and sexual arousal separately, increasing ecological validity.

An additional limitation of previous research is that few studies have examined implicit personality theory and motivated reasoning perspectives as mechanisms underlying the relation between attractiveness and perceived risk; more broadly, few studies have investigated any mediating mechanisms. The present study directly examined these mechanisms by measuring indicators of motivated reasoning (i.e., sexual motivation) and implicit personality theory (i.e., positive traits of the partner).

Hypotheses

The first set of hypothesized relations reflects the implicit personality theory perspective (see Figure 1). Physical attractiveness was hypothesized to be positively related to
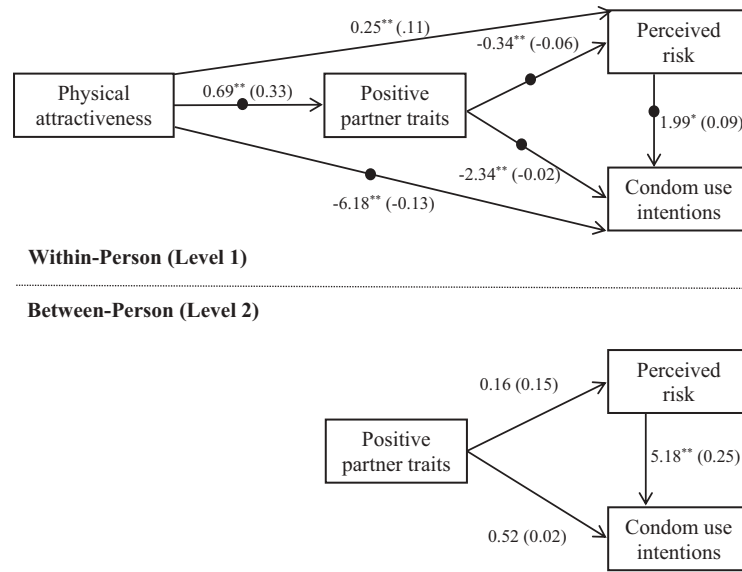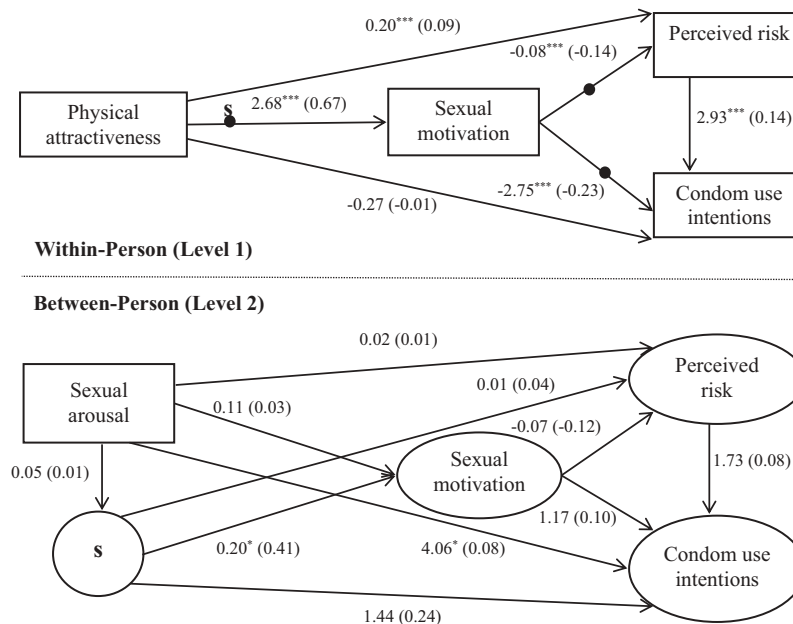
Figure 1. Multilevel path analysis results for the implicit personality model. Path coefficients are unstandardized; standardized coefficients are in parentheses. Black circles indicate within-person slopes that were allowed to vary randomly across participants. *$p < .05$; **$p < .001$.

the perception of positive partner traits, which in turn was hypothesized to be negatively related to both perceived risk and condom use intentions. Thus, the negative associations of physical attractiveness with perceived risk and condom use intentions, respectively, were expected to be mediated by positive partner traits.

The next set of hypothesized relations corresponds to what would be expected from the motivated reasoning perspective (see Figure 2). Physical attractiveness was expected to be positively associated with sexual motivation, which in turn was expected to be negatively associated with perceived risk and condom use intentions. These hypothesized relations indicate an indirect effect of physical attractiveness on perceived risk and condom use intentions through sexual motivation. Also, consistent with the motivated reasoning perspective, it was expected that the effect of physical attractiveness on sexual motivation would be even stronger when feelings of sexual arousal

Figure 2. Multilevel path analysis results for the motivated reasoning model. Path coefficients are unstandardized; standardized coefficients are in parentheses. Black circles indicate within-person slopes that were allowed to vary randomly across participants. s = within-person slope between partner physical attractiveness and intentions to have sex. For clarity of presentation, covariates (i.e., PrEP use and number of instances of anal sex in which condoms were used out of the last 10 instances of anal sex) are not featured in this figure. *$p < .05$; **$p < .01$; ***$p < .001$.

were present (Shuper & Fisher, 2008). Thus, it was hypothesized that sexual arousal would moderate the relation between attractiveness and sexual motivation, and the interaction between attractiveness and arousal would influence both perceived risk and condom use intentions through its effect on sexual motivation.

These hypotheses were the focus of the study. However, the models included additional paths with expected relations. For example, based on research showing that perceptions of risk are positively associated with condom use intentions (Agocha & Cooper, 1999; Reisen & Poppen, 1999), it was hypothesized that perceived risk would be positively associated with condom use intentions. Also, it seemed likely that sexual arousal would increase sexual motivation and thus have an indirect negative effect on risk perception and condom use intentions, reflecting a process consistent with the motivated reasoning perspective.

To summarize, the two hypothesized models were based on what would be expected in the presence of implicit personality theories and motivated reasoning, respectively. In the implicit personality theory model, physical attractiveness is hypothesized to decrease perceived risk and condom use intentions via positive partner traits. In the motivated reasoning model, physical attractiveness is hypothesized to decrease perceived risk and condom use intentions via sexual motivation. Sexual arousal was hypothesized to moderate the relation between attractiveness and sexual motivation.

Method

Participants

Participants were 197 men who, as required by the eligibility criteria, identified as cisgender, had cisgender male sexual partners, were HIV negative or unsure of their HIV status, had used a GSN app to find sexual partners, were not in a sexually exclusive relationship, and lived in the United States (see Table 1 for additional demographic information). Participants were recruited using advertisements on GSN apps used by MSM to find sexual partners and announcements on community organization electronic mailing lists and online message boards directed toward MSM or LGBT individuals. Data were collected between February and April 2017.

Stimulus Materials

Video Clips. Participants in the control condition viewed one of two randomly assigned six-minute nonsexual and nonviolent video clips from popular talk shows. Participants in the arousal condition viewed one of two randomly assigned six-minute video clips depicting sexual behavior between two men. Film clips were borrowed, with permission, from the authors of a previous study that validated erotic film clips to be used for the experimental manipulation of sexual arousal among MSM (Woolf-King, Maisto, Carey, & Vanable, 2010).

Table 1. *Participant Demographics for Experimental and Control Groups*

Demographics	Experimental Group ($N = 97$)	Control Group ($N = 100$)
Age (years)	28.97 (8.09)	28.46 (8.56)
Race/ethnicity		
White/European American	54 (55.7%)	60 (60.0%)
Black/African American/Caribbean American	7 (7.2%)	8 (8.0%)
East Asian/South Asian/Southeast Asian/Asian American/Pacific Islander	9 (9.3%)	12 (12.0%)
Latino/Hispanic	10 (10.3%)	9 (9.0%)
Middle Eastern	1 (1.0%)	0 (0.0%)
Other	1 (1.0%)	0 (0.0%)
Multiracial	15 (15.5%)	11 (11.0%)
Sexual orientation		
Gay	81 (83.5%)	84 (84.0%)
Bisexual	16 (16.5%)	15 (15.0%)
Heterosexual	0 (0.0%)	1 (1.0%)
PrEP use	20 (20.6%)	15 (15.0%)
Instances of anal sex using condoms out of last 10	6.86 (3.71)	6.77 (3.86)

Note. Statistics are means (standard deviations) or frequencies (%). PrEP = pre-exposure prophylaxis.

Photos. Participants viewed five photos of men in the high-attractiveness condition and five photos of men in the low-attractiveness condition. Photos were chosen from a pool of 114 photos of racially diverse young adult men selected from an online photo-sharing site. Photos were selected based on the following criteria (which reflect photos typically found on GSN applications; Renner et al., 2012): (1) a colored photo of (2) a single man located in the foreground (3) with face clearly visible (i.e., chest and up).

To determine a set of photos for each condition, pilot testing was conducted with a sample of 22 MSM meeting the same eligibility criteria as the present study. Participants were asked to rate each photo in terms of physical attractiveness on a scale of 1 (*Extremely unattractive*) to 7 (*Extremely attractive*). Photos from the upper and lower 20% of mean attractiveness ratings were examined; from those, five were selected for the high-attractiveness group (attractiveness $M = 5.63$, $SD = 0.48$) and five were selected for the low-attractiveness group (attractiveness $M = 2.26$, $SD = 0.20$), with the goal of having the two groups of photos be racially diverse and racially matched.

Measures

Sexual Motivation. Sexual motivation was assessed using two groups of items originally used by Agocha and Cooper (1999) to assess perceived desirability and intention to have sex, respectively, with a target person. The perceived desirability measure includes nine items assessing the degree of the participant's interest in dating or having sexual intercourse with the target person (e.g., "Overall, how

sexually desirable is the person in the photo?"). Participants responded on a scale from 1 (*Not at all desirable/interested*) to 7 (*Extremely desirable/interested*). The intention to have sex measure includes seven items assessing the intention to have sex with the target person under various conditions (e.g., "How likely is it that you would have a one-night stand with this person?"). Participants responded on a scale from 0% (*Not at all likely*) to 100% (*Absolutely likely*).

These measures were developed for a heterosexual sample assumed to be meeting potential partners via in-person methods. Certain items, such as "How interested would you be in exchanging phone numbers with this person?," may not be relevant for MSM looking for partners through sex-oriented apps. To address these concerns, the 22 MSM who participated in pilot testing were presented with these 16 items and asked to indicate how relevant each question seemed in the context of looking at profiles of potential dating/sexual partners when using an app like Grindr or Scruff. Relevance of each item was rated on a sale from 1 (*Not at all relevant*) to 3 (*Very relevant*). Items whose mean relevance scores were above the median relevance score across all items (2.24) were retained, which included five items from Agocha and Cooper's (1999) intention to have sex measure and three items from the perceived desirability measure. Items were standardized using a simple linear transformation applied to scores for items rated from 0% to 100% so that the range of possible ratings on the transformed item scores was 1 to 7 (to match the items rated on a 1 to 7 scale). Items were composited into a single score for sexual motivation, with higher scores indicating greater motivation to have sex with the target person. Scores on the eight-item measure of sexual motivation used in the present study showed good reliability ($\alpha = .98$).

Positive Partner Traits. Participants were asked to rate their impressions of the man in each photo on eight traits (e.g., trustworthy, responsible, healthy). The traits used in this measure were selected based on previous research showing that they have been associated with STI risk perception (Blanton & Gerrard, 1997; Gold & Skinner, 1996; Renner et al., 2012). All traits were rated on scales ranging from 1 (e.g., *Very unlikeable*) to 7 (e.g., *Very likeable*), with higher scores indicating a more positive view of the target on the trait. Cronbach's alpha in the present sample was .89.

Perceived Risk. Perceived risk was measured using six items assessing the perceived likelihood of getting HIV or another STI from the target person (e.g., "How likely do you think it is that you would get HIV—the virus that causes AIDS—from this person?"). Participants responded on a 0% (*Not at all likely*) to 100% (*Absolutely likely*) scale for six items, and on a scale from 1 (*Not at all risky*) to 7 (*Extremely risky*) for one item that asked about overall risk for HIV of the person in the photo (Agocha & Cooper, 1999). A simple linear transformation was applied to scores for the items that were rated from 0% to 100% so that the range of possible ratings was 1 to 7. Items were averaged into a single score for perceived risk, with higher scores indicating that the person is perceived as posing greater risk for STIs. Scores on the perceived risk measure showed good reliability in the present study sample ($\alpha = .93$).

Condom Use Intentions. Condom use intentions were measured using five items that assess the likelihood of using condoms if intercourse were to occur (e.g., "How likely is it that you would ask him to use a condom during sex?"; Agocha & Cooper, 1999). Participants responded on the same 0% to 100% scale as that for the measure of perceived risk. Items were composited into a single score, with higher scores indicating a greater likelihood that condoms would be used if sex with the target person were to occur. The measure of condom use intentions showed good reliability in the present study sample ($\alpha = .90$).

Procedure

By clicking on the survey link, participants were redirected to an Internet page that welcomed them to the online survey. Those who were eligible to participate were directed to a page with the informed consent information. To indicate consent, participants responded to an item that read "If you agree to participate, please click 'I consent and wish to participate' below." Participants were asked to complete the survey in a location in which their responses could be entered privately and confidentially. Those who consented to participate were randomly assigned to the control condition or experimental (i.e., sexual arousal) condition. Those assigned to the control condition were randomly assigned to view one of two control video clips, and those assigned to the experimental condition were randomly assigned to view one of two video clips to induce sexual arousal. After viewing their assigned video, participants answered a sexual arousal manipulation check question by rating their level of sexual arousal from 1 (*Not at all aroused*) to 9 (*Extremely aroused*). Participants were told that they would be shown photos of men located in their area that were taken from a phone dating application. As they viewed each photo, participants rated the man's physical attractiveness (manipulation check; same rating scale as used in pilot study, described previously), followed by measures assessing sexual motivation, positive partner traits, perceived risk, and condom use intentions. All procedures were approved by the University of Maryland Institutional Review Board (IRB). Participants were compensated $10 for completing the online survey.

The online survey link was clicked a total of 856 times, via both clicks on advertisements on GSN apps and links distributed through electronic mailing lists and online message boards. Of those, 416 people were eligible and consented to participate. A total of 227 participants completed

the full survey. Of these, data from 30 participants were removed due to concerns regarding the integrity of the data (i.e., data validity questions were answered incorrectly, the survey was taken multiple times from the same Internet protocol [IP] address, or the survey was taken from an IP address outside of the United States, despite responding to the eligibility question indicating that they were located within the United States). This yielded a final sample size of 197 participants.

Data Analysis Strategy

The multilevel structure of the data (wherein ratings of photos were nested within participants) made it challenging to conduct a statistical power analysis, particularly given the relatively sparse research in this area of study. Attractiveness was a within-person factor with two levels (low, high), whereas arousal was a between-groups factor with two levels (low, high). Thus, the effects of attractiveness, both direct and indirect, occurred at the within-person level of analysis (Level 1); the effects of arousal, direct and indirect, occurred at the between-person level (Level 2). The Level 1 sample size (197 participants with 10 observations each; $N = 1{,}970$) has been shown to be adequate to detect 2–1–1 mediation effects in multilevel models (Preacher, Zhang, & Zyphur, 2011), indicating that it would be adequate to detect the 1–1–1 mediation effects in the present study. In addition, if all variables had been within-person centered and used for a single-level mediation analysis, it is clear that the study would have been well powered to detect even small indirect effects (Fritz & MacKinnon, 2007).

The direct and indirect effects hypothesized in the implicit personality and motivated reasoning models were tested with multilevel path analysis using Mplus software (Version 7.1; Muthén & Muthén, 1998–2012). Specifically, a multilevel latent covariate model was used, which has been shown to offer higher power to detect a variety of effects relative to more traditional multilevel regression models (Lüdtke et al., 2008; Zhang, Zyphur, & Preacher, 2009). This model partitions predictors measured at Level 1 into latent within-cluster and between-cluster components. Because the model can accommodate complex structural relations among variables, it is sometimes referred to as multilevel structural equation modeling (MSEM; Preacher, Zyphur, & Zhang, 2010). It is this feature of the model that makes MSEM particularly attractive for mediation analysis. Interpretation of path coefficients is virtually identical to that of fixed effects in traditional multilevel models. Mplus does not provide standardized path coefficients in multilevel models with random slopes. To generate standardized coefficients, all of the main analyses were conducted twice: first with the raw data (which generated unstandardized coefficients) and then with variables that had been standardized prior to analysis (which generated standardized coefficients).

All variables were grand-mean centered in the main analyses, except for condom use intentions (i.e., the ultimate outcome variable in each model). Exogenous variables were allowed to covary. Within-person slopes were initially permitted to vary randomly across participants but were dropped from the model if deviance tests indicated that doing so did not significantly impact model fit ($p > .05$). The hypothesized indirect effects were estimated with 95% confidence intervals (CIs) using the Monte Carlo method, which has been found to perform comparably with other methods (e.g., nonparametric bootstrap, distribution of product) and is easily executed with multilevel data (Preacher & Selig, 2012). These CIs were computed using the online utility developed by Selig and Preacher (2008). Support for a hypothesized indirect effect was inferred from a CI that does not contain zero.

Results

Preliminary Results

Participant demographics by randomized group are reported in Table 1. Examination of the ratings of sexual arousal and physical attractiveness indicated that both manipulations were effective and strong. Arousal scores were lower in the control group ($M = 1.90$, $SD = 1.69$) than the experimental group ($M = 4.85$, $SD = 2.26$); $t(195) = 10.40$, $p < .001$, $d = 1.48$. Similarly, scores for physical attractiveness were higher in the high-attractiveness group ($M = 5.50$, $SD = 0.72$) than in the low-attractiveness group ($M = 2.55$, $SD = 0.87$); $t(196) = 45.75$, $p < .001$, $d = 3.69$.

Descriptive statistics for all participants, as well as for the experimental (i.e., arousal) and control groups, are shown in Table 2. The intraclass correlation coefficient (ICC) was estimated for the main continuous variables. The ICC can be interpreted as the proportion of variance due to differences between people (or, alternatively, to consistency within persons). Conversely, (1 – ICC) can be interpreted as the proportion of variance due to differences within a person across stimuli (plus error). The ICCs for sexual motivation and positive partner traits, .03 and .17, respectively, indicated that a larger proportion of the variance was due to differences within a person than between persons. The ICCs for the outcome variables, perceived risk and condom use intentions, were .56 and .70, respectively, indicating that more than half the variance was due to differences between persons.

The total effects of attractiveness on the two outcome variables were tested through simple random intercept and slope models with one within-person predictor (attractiveness) and one outcome. Attractiveness was negatively related to condom use intentions ($B = -8.29$, $p < .001$) and unrelated to perceived risk ($B = -0.03$, $p = .571$).

Table 2. *Univariate and Bivariate Descriptive Statistics for Mediator and Outcome Variables*

Variable	*M*	*SD*	Min.	Max.	1	2	3	4
			Full sample					
1. Sexual motivation	3.40	0.72	1	7	.03	.59	−.13	−.49
2. Positive partner traits	4.22	0.53	1	7	.60	.17	−.41	−.38
3. Perceived risk	3.10	0.89	1	7	−.12	−.11	.56	.26
4. Condom use intentions	81.55	20.73	0	100	.09	−.02	.28	.70
			Experimental group					
1. Sexual motivation	3.45	0.71	1	7	.03	.56	−.14	−.50
2. Positive partner traits	4.28	0.52	1	7	.76	.17	−.46	−.35
3. Perceived risk	3.08	0.83	1	7	−.27	−.08	.57	.25
4. Condom use intentions	83.10	18.58	0	100	−.07	−.10	.29	.65
			Control group					
1. Sexual motivation	3.34	0.73	1	7	.03	.62	−.12	−.48
2. Positive partner traits	4.16	0.54	1	7	.43	.16	−.38	−.40
3. Perceived risk	3.13	0.95	1	7	.01	−.12	.55	.26
4. Condom use intentions	80.05	22.61	0	100	.19	.03	.28	.74

Note. Means and standard deviations reflect Level 1 variables aggregated to the person level prior to grand-mean centering. Within-person correlations are above the diagonal; between-person correlations are below the diagonal. Intraclass correlations are on the diagonal.

Testing the Implicit Personality Theory Model

Deviance tests indicated that within-person slopes varied significantly across participants, with the exception of the slope for the association between physical attractiveness and perceived risk, χ^2 (9, N = 197) = 6.17, p = .723. In other words, most of the associations between variables in the within-person model differed across participants. For example, participants differed in the extent to which physical attractiveness impacted perceived positive partner traits. To reflect such variability in the model and obtain more accurate estimates of the parameters of interest, the within-person slopes were allowed to vary randomly across participants (with the one exception noted; Snijders, Bosker, & Bosker, 2012). These slopes were allowed to covary with one another and with other components of the between-person model.

Hypotheses for the implicit personality model were limited to the within-person portion of the model, given the focus on direct and indirect effects of attractiveness. As indicated in Figure 1, the hypothesized within-person relations were found among all model variables. Physical attractiveness was positively associated with perceived positive partner traits, which, in turn, was negatively associated with both perceived risk and condom use intentions. Also, as expected, perceived risk was positively related to condom use intentions. The direct effects of attractiveness on both perceived risk and condom use were statistically significant. Attractiveness was positively associated with perceived risk and negatively associated with condom use intentions. Only one statistically significant association was found at the between-person level: Perceived risk was positively related to condom use intentions.

Indirect effects were investigated to test the hypothesis that physical attractiveness indirectly influences perceived risk and condom use intentions through its impact on perceptions of positive partner traits. Two indirect effects were estimated at the within-person level, based on one predictor (physical attractiveness), one mediator (positive partner traits), and two outcomes (perceived risk and condom use intentions). In support of the hypothesis, the 95% CIs indicated that both indirect effects were nonzero (see Table 3).

Testing the Motivated Reasoning Model

Deviance tests indicated that all but two of the within-person slopes varied randomly across participants. The variance component for the association between physical attractiveness and condom use intentions was not statistically significant and thus was removed from the model, χ^2 (7, N = 197) = 0.91, p = .996. Similarly, the variance component for the association between physical attractiveness and perceived risk was removed, χ^2 (7, N = 197) = .995, p = .891. Thus, the magnitude of all other within-person associations between variables significantly differed across participants, and slopes were allowed to vary randomly across participants and covary with one another.

The within-person model testing the motivated reasoning perspective was similar to that for the implicit personality perspective, except the mediator was sexual motivation rather than positive partner traits (see Figure 2). The between-person structural model, however, differed from that for the implicit personality perspective because it included two additional main variables (sexual arousal and the within-person slope between attractiveness and sexual motivation) and two covariates (use of pre-exposure prophylaxis [PrEP] and recent condom use during anal sex). Sexual arousal was modeled as a predictor of all other main variables, including the within-person slope between physical attractiveness and sexual motivation (which corresponded to the hypothesis that physical attractiveness would most strongly increase sexual motivation when the person was sexually aroused). The within-person

Table 3. *Within-Person Indirect Effects of Attractiveness on Perceived Risk and Condom Use*

Predictor	Mediator	Outcome	95% CI for indirect effect
Attractiveness	Positive partner traits	Perceived risk	[−0.30, −0.18][a]
Attractiveness	Positive partner traits	Condom use intentions	[−2.33, −0.99][a]
Attractiveness	Sexual motivation	Perceived risk	[−0.30, −0.13][a]
Attractiveness	Sexual motivation	Condom use intentions	[−9.01, −5.80][a]

Note. CI = Confidence interval.
[a]CI does not include zero, indicating a significant indirect effect.

slope between attractiveness and sexual motivation, in turn, was included as a predictor of the remaining person-level variables. The two covariates were included as predictors of all variables except sexual arousal.

As indicated in Figure 2, hypothesized relations at the within-person level were found among all model variables. Physical attractiveness was positively associated with sexual motivation, which was negatively associated with both perceived risk and condom use intentions. Also, as expected, perceived risk was positively associated with condom use intentions. Direct relations between attractiveness and both outcome variables were also examined. Results indicated that attractiveness increased perceived risk but did not directly impact condom use intentions. Thus, the effect of attractiveness on condom use intentions was fully mediated in the motivated reasoning model but not the implicit personality theory model.

The hypothesis that sexual arousal would be positively associated with sexual motivation was not supported, nor was support found for the hypothesis that arousal would increase the strength of the association between attractiveness and sexual motivation (see Figure 2). The strength of the within-person association between attractiveness and sexual motivation, however, was positively associated with person-level sexual motivation. Thus, sexual motivation was generally higher among participants whose motivation was most strongly impacted by perceived attractiveness. Direct relations between arousal and both outcome variables were also examined. The relation between arousal and perceived risk was not significant; however, arousal was found to positively predict condom use intentions.

Indirect effects were investigated to test the hypothesis that attractiveness indirectly influences within-person variation in perceived risk and condom use intentions through its impact on sexual motivation. Two indirect effects were estimated at the within-person level, based on one predictor (physical attractiveness), one mediator (sexual motivation), and two outcomes (perceived risk and condom use intentions). The 95% CI estimates indicated that both indirect effects were nonzero (see Table 3).

Two covariates were included in this model: use of PrEP and number of reported instances of anal sex in which condoms were used out of the last 10 instances of anal sex. Although these did not influence the hypothesized results, intention to use condoms was negatively associated with using PrEP ($B = -11.76$, $p = .001$; $\beta = -0.19$) and positively associated with instances of anal sex using condoms out of the last 10 times ($B = 2.42$, $p < .001$; $\beta = 0.38$). No other associations were found between the covariates and the main variables.

Discussion

Perceptions of attractiveness often play a role in the process of seeking romantic and sexual partners, but GSN apps actively encourage users to consider physical appearance by presenting images of a large number of potential partners in one's geographic area. The present study investigated the role of such relative judgments about partner attractiveness in sexual risk perception and condom use intentions among MSM users of GSN apps, a population which is disproportionately affected by STIs (CDC, 2015; Zou & Fan, 2016). As expected, attractiveness indirectly reduced perceived risk and condom use intentions by increasing the extent to which the person viewed a potential partner in generally positive terms (implicit personality model) and was motivated to have sex with the potential partner (motivated reasoning model).

These results could potentially explain higher rates of CAS among GSN app-using MSM (Zou & Fan, 2016). For example, viewing a photo of an attractive man on a GSN app could lead the perceiver to believe that the man has other positive traits (e.g., trustworthiness, responsibility) and assume that the man poses a low risk for STIs, decreasing the likelihood of condom use. Alternatively, viewing a photo of an attractive man could increase the perceiver's motivation to have sex with the man, which could lead to biased reasoning regarding the low risk for STIs associated with this man, because this would facilitate the goal of sexual contact; this, in turn, could also decrease the likelihood of condom use.

One interesting result found in both models was that attractiveness had a positive direct effect on perceived risk after accounting for the indirect effect of positive partner traits or sexual motivation. This result appears consistent with Dijkstra et al.'s (2000) finding that attractiveness was related to increased perceived STI risk, mediated by perceived promiscuity. Attractiveness may influence risk perceptions through multiple pathways: halo effect, motivated reasoning, and perceptions of number of sexual partners. In fact, the nonsignificant total effect of attractiveness on risk perception in the present study indicates that these opposing mechanisms may effectively cancel each other out—a case of inconsistent mediation. This finding highlights the importance of measuring mediators of this effect because, otherwise, one might conclude that attractiveness has no influence on perception of risk. In contrast to the opposing effects found on risk perception, the effects of appearance on condom use intentions were largely consistent: Overall, attractiveness decreased intentions to use condoms with a partner.

The role of sexual arousal in sexual risk has been little studied in research on perceived attractiveness. In the present study, it was reasoned that that arousal could amplify the effect of attractiveness on sexual motivation; however, this hypothesis was not supported. Moreover, sexual arousal did not even have a main effect on sexual motivation, counter to the expectation that those who are feeling sexually aroused would be more motivated to have sex with any potential partner regardless of their attractiveness. In short, based on these results, motivated reasoning is more likely

influenced by partner attractiveness rather than arousal of the perceiver.

The null results for arousal could also have been related to the manipulation and assessment of sexual arousal relatively early in the completion of the online survey. Although the manipulation check indicated a strong effect of the experimental videos on sexual arousal, this effect may have decreased as participants continued taking the survey. It is also possible that the influence of arousal would have been stronger had participants had an option to pursue sex with the men in the photos at the time (e.g., by contacting them). Future research could address this possibility by incorporating an option to contact potential partners into an experimental design or conducting observational research on partners contacted through GSN apps.

This explanation, however, does not help to make sense of the unexpected direct positive relation between arousal and condom use intentions. This finding is inconsistent with the motivated reasoning perspective, as well as with findings from studies where increased sexual arousal predicted CAS or intentions to engage in CAS (Shuper & Fisher, 2008; Strong, Bancroft, Carnes, Davis, & Kennedy, 2005). Some scholars have proposed that rational decision-making processes become impaired when individuals are sexually aroused (Bancroft, 2000) or that aroused individuals engage in cognitive processes that involve reliance on heuristics that are not always accurate (Gold, 2000). However, these authors have not directly measured indicators of these cognitive processes, making direct comparison with the present study's results difficult.

It is possible that those in the sexual arousal condition reported higher condom use intentions because they were more able to realistically imagine themselves having sex with the men in the photos. It appears that condom use was generally salient for this sample, based on the number of times participants reported that they had used condoms out of the last 10 instances of anal sex ($M = 6.86$). Thus, the experience of sexual arousal may have primed participants to think about their typical behavior when having sex, which, among these participants, involved condom use.

Finally, although they did not influence hypothesized relations, some notable results were found for the two covariates tested in the motivated reasoning model. Participants who used PrEP reported decreased intention to use condoms, and those who had used condoms during anal sex more often in the past reported an increased intention to use condoms. Although intentions to use condoms are not necessarily indicative of actual condom use behavior, the negative association between PrEP use and condom use intentions may be consistent with previous research showing less consistent condom use and higher rates of STI diagnosis among MSM after initiating PrEP (Montaño et al., 2018). PrEP was not significantly associated with sexual motivation, which, although not unexpected, may

help to dispel stereotypes of PrEP users as promiscuous; such stereotypes are stigmatizing and can have important implications for PrEP uptake among MSM (Grimm & Schwartz, 2018).

Results of this study should be interpreted in light of some limitations. Although it was designed to increase ecological validity to GSN app-using MSM, it did not perfectly replicate the experience of using these apps in the real world. For example, although participants were told that they would view photos of local men taken from a GSN app, not all participants may have believed this to be the case. This could mean that such participants did not respond to photos as they might in the context of app use. In addition, GSN apps contain information in each profile other than a photo that could influence the viewer's perception of risk (e.g., disclosure of PrEP use; photos of bodies instead of or in addition to faces). Finally, although condom use intentions were used as a proxy for actual condom use behavior, it is unclear how this would translate into behavior in the real world, which may include additional barriers to condom use not examined in this study (e.g., negotiation with partners). For example, a meta-analysis on whether constructs in the theory of planned behavior explain condom use among MSM found that intentions to use condoms accounted for only 12.4% of the variance in condom use behavior, leaving a large amount of variance in behavior unexplained (Andrew et al., 2016).

Additional observational research is needed to further support the results found in the present study. Future research could also be used to investigate which mechanisms (e.g., halo effect, motivated reasoning, perceptions of previous partners) have the strongest impact on the relation between attractiveness and perceived risk—and under what conditions (e.g., while under the influence of alcohol, with different types of relationships). Future research could also build on these results by incorporating additional variables that have been shown to influence condom use, such as those included in the information-motivation-behavioral skills model (Green et al., 2018). It would also be useful to explore whether assumptions about perceived STI risk based on attractiveness are actually more likely among GSN app-using MSM compared to MSM who meet sexual partners in other ways. Observational research of GSN app users could incorporate methodology such as ecological momentary assessment, which has the potential to provide a unique view of how sexual behavior occurs in the real world and can impart more detailed information about aspects of decision making, antecedents, and consequences (Wray, Kahler, & Monti, 2016).

Because the results of this study are most generalizable to GSN app-using MSM, an important avenue for future research is to replicate these results with diverse samples in regard to gender and sexual orientation. Sawyer, Smith, and Benotsch (2018) found that nearly 40% of their sample of heterosexual cisgender college students used cell phone–based dating applications to find sexual partners,

and that those who did use dating apps had higher rates of sexual risk behaviors in the past three months. In addition, research has shown that attractiveness is related to perceptions of STI risk among heterosexual men and women (Agocha & Cooper, 1999; Blanton & Gerrard, 1997; Dijsktra et al., 2000; Renner et al., 2012). Thus, assumptions about the HIV/STI risk posed by potential sexual partners based on attractiveness should be investigated in other populations as well.

Results of this study also have potential to inform interventions geared toward decreasing CAS among MSM who use GSN apps. Zou and Fan (2016) pointed out that GSN apps could be an effective way to disseminate information to increase the sexual health of their customers. For example, Scruff has a health section that includes information on physical and mental health services; HIV/AIDS prevention, care, and advocacy; and hepatitis A and B vaccinations. Czarny and Broaddus (2017) conducted a survey to assess acceptability of types, methods, and frequency of delivery of HIV prevention information through GSN apps, which could inform an intervention delivered through GSN apps, including psychoeducation, related to assumptions about potential partners and how this could be influencing behavior.

This study's findings shed light on two potential processes whereby users of GSN apps may be making assumptions regarding the relative safety of physically attractive partners, which can have important implications for sexual health among MSM. It is hoped that additional research will provide support to these results, further elucidate underlying mechanisms, and lead to interventions to reduce the burden of HIV and other STIs in this population.

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References

Agocha, V. B., & Cooper, M. L. (1999). Risk perceptions and safer-sex intentions: Does a partner's physical attractiveness undermine the use of risk-relevant information? *Personality and Social Psychology Bulletin*, *25*, 746–759. doi:10.1177/0146167299025006009.

Anderson, J. R., Holland, E., Koc, Y., & Haslam, N. (2018). Iobjectify: Self- and other-objectification on Grindr, a geosocial networking application designed for men who have sex with men. *European Journal of Social Psychology*. doi:10.1002/ejsp.2350.

Andrew, B. J., Mullan, B. A., de Wit, J. B. F., Monds, L. A., Todd, J., & Kothe, E. J. (2016). Does the theory of planned behaviour explain condom use behaviour among men who have sex with men? A meta-analytic review of the literature. *AIDS and Behavior*, *20*, 2834–2844. doi:10.1007/s10461-016-1314-0.

Bancroft, J. (2000). Individual differences in sexual risk taking. In J. Bancroft (Ed.), *The role of theory in sex research* (pp. 177–212). Bloomington, IN, US: Indiana University Press.

Blanton, H., & Gerrard, M. (1997). Effect of sexual motivation on men's risk perception for sexually transmitted disease: There must be 50 ways to justify a lover. *Health Psychology*, *16*, 374–379. doi:10.1037/0278-6133.16.4.374.

Centers for Disease Control and Prevention (CDC). (2015). HIV among gay and bisexual men. Retrieved from http://www.cdc.gov/hiv/group/msm/index.html.

Czarny, H. N., & Broaddus, M. R. (2017). Acceptability of HIV prevention information delivered through established geosocial networking mobile applications to men who have sex with men. *AIDS and Behavior*, *21*, 3122–3128. doi:10.1007/s10461-017-1743-4.

Dijkstra, P., Buunk, B., & Blanton, H. (2000). The effect of target's physical attractiveness and dominance on STD-risk perceptions. *Journal of Applied Social Psychology*, *30*, 1738–1755. doi:10.1111/j.1559-1816.2000.tb02465.x.

Dion, K., Berscheid, E., & Walster, E. (1972). What is beautiful is good. *Journal of Personality and Social Psychology*, *24*, 285–290. doi:10.1037/h0033731.

Eagly, A. H., Ashmore, R. D., Makhijani, M. G., & Longo, L. C. (1991). What is beautiful is good, but…: A meta-analytic review of research on the physical attractiveness stereotype. *Psychological Bulletin*, *110*, 109–128. doi:10.1037/0033-2909.110.1.109.

Eleftheriou, A., Bullock, S., Graham, C. A., Stone, N., & Ingham, R. (2016). Does attractiveness influence condom use intentions in heterosexual men? An experimental study. *BMJ Open*, *6*, 1–10. doi:10.1136/bmjopen-2015-010883.

Epstein, J., Klinkenberg, W. D., Scandell, D. J., Faulkner, K., & Claus, R. E. (2007). Perceived physical attractiveness, sexual history, and sexual intentions: An internet study. *Sex Roles*, *56*, 23–31. doi:10.1007/s11199-006-9169-x.

Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science*, *18*, 233–239. doi:10.1111/j.1467-9280.2007.01882.x

Gold, R. S. (2000). AIDS education for gay men: Towards a more cognitive approach. *AIDS Care*, *12*, 267–272. doi:10.1080/09540120050042972.

Gold, R. S., & Skinner, M. J. (1992). Situational factors and thought processes associated with unprotected intercourse in young gay men. *Aids*, *6*, 1021–1030. doi:10.1097/00002030-199209000-00017.

Gold, R. S., & Skinner, M. J. (1996). Judging a book by its cover: Gay men's use of perceptible characteristics to infer antibody status. *International Journal of STD & AIDS*, *7*, 39–43. doi:10.1258/0956462961917032.

Green, S. M., Turner, D., Baldwin, J. A., Walsh-Buhi, E. R., Vamos, C. A., Dagne, G., & Marhefka, S. L. (2018). Towards an information motivation and behavioral skills model for new sex partners: Results of a study of condom use as an HIV prevention method for emerging adults who met partners on dating and sex-seeking platforms or offline. *AIDS and Behavior*. doi:10.1007/s10461-018-2349-1.

Grimm, J., & Schwartz, J. (2018). 'It's like birth control for HIV': Communication and stigma for gay men on PrEP. *Journal of Homosexuality*. doi:10.1080/00918369.2018.1495978.

Kruse, M. I., & Fromme, K. (2005). Influence of physical attractiveness and alcohol on men's perceptions of potential sexual partners and sexual behavior intentions. *Experimental and Clinical Psychopharmacology*, *13*, 146–156. doi:10.1037/1064-1297.13.2.146.

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, *108*, 480–498. doi:10.1037/0033-2909.108.3.480.

Lennon, C. A., & Kenny, D. A. (2013). The role of men's physical attractiveness in women's perceptions of sexual risk: Danger or allure? *Journal of Health Psychology*, *18*, 1166–1176. doi:10.1177/1359105312462438.

Lüdtke, O., Marsh, H. W., Robitzsch, A., Trautwein, U., Asparouhov, T., & Muthén, B. (2008). The multilevel latent covariate model: A new, more reliable approach to group-level effects in contextual studies. *Psychological Methods*, *13*, 203–229. doi:10.1037/a0012869.

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.

Montaño, M. A., Dombrowski, J. C., Dasgupta, S., Golden, M. R., Duerr, A., Manhart, L. E., … Khosropour, C. M. (2018). Changes in

sexual behavior and STI diagnoses among MSM initiating PrEP in a clinic setting. *AIDS and Behavior*. doi:10.1007/s10461-018-2252-9.

Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide* (Seventh ed). Los Angeles, CA: Muthén & Muthén.

Preacher, K. J., & Selig, J. P. (2012). Advantages of Monte Carlo confidence intervals for indirect effects. *Communication Methods and Measures*, 6, 77–98. doi:10.1080/19312458.2012.679848.

Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2011). Alternative methods for assessing mediation in multilevel data: The advantages of multilevel SEM. *Structural Equation Modeling*, 18, 161–182. doi:10.1080/10705511.2011.557329.

Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods*, 15, 209–233. doi:10.1037/a0020141.

Reisen, C. A., & Poppen, P. J. (1999). Partner-specific risk perception: A new conceptualization of perceived vulnerability to STDs. *Journal of Applied Social Psychology*, 29, 667–684. doi:10.1111/j.1559-1816.1999.tb02018.x.

Renner, B., Schmälzle, R., & Schupp, H. T. (2012). First impressions of HIV risk: It takes only milliseconds to scan a stranger. *PloS one*, 7, 1–8. doi:10.1371/journal.pone.0030460.

Sawyer, A. N., Smith, E. R., & Benotsch, E. G. (2018). Dating application use and sexual risk behavior among young adults. *Sexuality Research & Social Policy: A Journal of the NSRC*, 15, 183–191. doi:10.1007/s13178-017-0297-6.

Selig, J. P., & Preacher, K. J. (2008, June). Monte Carlo method for assessing mediation: An interactive tool for creating confidence intervals for indirect effects [Computer software]. Retrieved from http://quantpsy.org/.

Sheeran, P., Harris, P. R., & Epton, T. (2014). Does heightening risk appraisals change people's intentions and behavior? A meta-analysis of experimental studies. *Psychological Bulletin*, 140, 511–543. doi:10.1037/a0033065.

Shuper, P. A., & Fisher, W. A. (2008). The role of sexual arousal and sexual partner characteristics in HIV+ MSM's intentions to engage in unprotected sexual intercourse. *Health Psychology*, 27, 445–454. doi:10.1037/0278-6133.27.4.445.

Smith, D. K., Herbst, J. H., Zhang, X., & Rose, C. E. (2015). Condom effectiveness for HIV prevention by consistency of use among men who have sex with men in the United States. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 68, 337–344. doi:10.1097/QAI.0000000000000461.

Snijders, B., & Bosker, R. J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). Los Angeles, CA: Sage.

Strong, D. A., Bancroft, J., Carnes, L. A., Davis, L. A., & Kennedy, J. (2005). The impact of sexual arousal on sexual risk-taking: A qualitative study. *Journal of Sex Research*, 42, 185–191. doi:10.1080/00224490509552273.

Williams, S. S., Kimble, D. L., Covell, N. H., Weiss, L. H., Newton, K. J., Fisher, J. D., & Fisher, W. A. (1992). College students use implicit personality theory instead of safer sex. *Journal of Applied Social Psychology*, 22, 921–933. doi:10.1111/j.1559-1816.1992.tb00934.x.

Wongsomboon, V., & Robles, E. (2017). Devaluation of safe sex by delay or uncertainty: A within-subjects study of mechanisms underlying sexual risk behavior. *Archives of Sexual Behavior*, 46, 2131–2144. doi:10.1007/s10508-016-0788-1.

Woolf-King, S. E., Maisto, S., Carey, M., & Vanable, P. (2010). Selection of film clips and development of a video for the investigation of sexual decision making among men who have sex with men. *Journal of Sex Research*, 47, 589–597. doi:10.1080/00224490903216748.

Wray, T. B., Kahler, C. W., & Monti, P. M. (2016). Using ecological momentary assessment (EMA) to study sex events among very high-risk men who have sex with men (MSM). *AIDS and Behavior*, 20, 2231–2242. doi:10.1007/s10461-015-1272-y.

Zhang, Z., Zyphur, M. J., & Preacher, K. J. (2009). Testing multilevel mediation using hierarchical linear models: Problems and solutions. *Organizational Research Methods*, 12, 695–719. doi:10.1177/1094428108327450.

Zou, H., & Fan, S. (2016). Characteristics of men who have sex with men who use smartphone geosocial networking applications and implications for HIV interventions: A systematic review and meta-analysis. *Archives of Sexual Behavior*. doi:10.1007/s10508-016-0709-3.