

Likelihood of Condom Use when STDs are Suspected: Results from a Clinic Sample

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Short title: STD Suspicion

Counts: text = 2,434 words; Summary = 250 words; 21 references and 2 Tables are included

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Key Words: Condoms, Perceived Susceptibility

Abstract

Objective: To determine the event-level associations between perceived risk of STD acquisition/transmission and condom use during penile-vaginal intercourse (PVI) among STD clinic attendees.

Methods: A convenience sample (N=622) completed daily electronic assessments. Two questions were proxies of perceived risk: suspicion that the partner might currently have an STD and that “you” might currently have an STD. Participants reported whether condoms were used with PVI events in the past 24 hours. Generalized estimating equations determined the association between each of the perceived risk variables and event-level condom use.

Results: For the model pertaining to suspicion of sex partner infection, there were 16,674 events of PVI, with condom use during 10,552 of these events. The effect of current suspicion was significant after adjusting for gender and whether participants identified as African American/Black (Estimated Odds Ratio=2.17, 95% CI=1.57-3.00, $P=.0001$). The model pertaining to suspicion of self-infection included 16,679 events of penile-vaginal sex, with condom use during 10,557 of these events. Again, the effect of current suspicion was significant after adjusting for gender and African American/Black race (Estimated Odds Ratio=2.05, 95% CI=1.43-2.40, $P=.0001$). Tests for interactions with gender and with race were non-significant (all $> .25$ p-values).

Conclusion: Using an event-level, research design, strong associations were found between perceptions of STD risk and condom use in a clinical population. Health care providers and other professionals may indirectly promote condom use by helping clinic patients realistically evaluate their risk of having sex with infected partners or of being a source of STD-transmission to others.

Introduction

Evidence strongly supports that condoms have protective value against sexually transmitted diseases (STDs) (Crosby & Bounse, 2011; Koss, Dunne, & Warner, 2009; Warner et al., 2005). Researchers have demonstrated that a complex web of factors at the individual, relational and broader social level impact condom use behavior (DiClemente, Salazar, & Crosby, 2007). Among these, individual-level factors have been the focus of many interventions directed at achieving behavioral change (DiClemente et al., 2007). First brought to the forefront by the Health Belief Model (Janz & Becker, 1984), the construct of perceived susceptibility has been a central construct in many of these interventions. Perceived susceptibility refers to one's subjective perception of the risk of contracting a disease or illness (Janz & Becker, 1984).

Despite strong research demonstrating the utility of the concept of perceived susceptibility prior to the mid-1970s, recent research has yielded inconclusive findings (Baume, 2000). With respect to perceptions of STI acquisition and transmission, published findings suggest limited utility of this predictor variable for models of condom use behavior (Eng & Butler, 1997; Sheeran, Abraham, & Orbell, 1999). This may be attributable to inadequate research methodology (Eng & Butler, 1997) rather than an inherent lack of association between perceived risk of STIs and condom use behavior (Kowalewski, Henson, & Longshore, 1997). For example, most studies of HIV risk perception are based on cross-sectional survey data, in which perceived susceptibility is measured using retrospective recall periods that are vulnerable to memory bias (Kowalewski et al., 1997). In contrast, event-level data transcends cause-and-effect limitations by using each specific sexual event as the unit of analysis, i.e., behaviors are measured in real time, linking the predictor variable with the outcome variable in temporal sequence (Crosby, DiClemente, Yarber, Snow, & Troutman, 2008; Hensel, Stupiansky,

Herbenick, & Dodge, & Reece, 2011; Shrier, Walls, Lops, & Feldman, 2011; Warner et al., 2005).

Further, STD risk perception can be conceptualized at two levels. In the parlance of the Health Belief Model, only an individual's risk of acquisition of infection is included (Rosenstock, Strecher, & Becker, 1994). Because of the dyadic nature of sexual encounters, a second level of risk is critical: transmission of disease to a partner. When risk of transmission is considered only as a unidirectional process, only one half of the disease prevention equation is addressed. Nonetheless, perceived risk of STD transmission from self to partner has not been studied empirically. Finally, much of the research on perceived susceptibility has relied on predominantly white (Winfield & Waley, 2002) and/or college student samples (Noar & Zimmerman, 2005; Sheeran et al., 1999). Few investigations have examined the utility of the construct among ethnically diverse or among higher-risk clinic-based samples in which individuals are more likely to report a history of STD infection (Manhart et al., 2004).

Accordingly, the purpose of this study was to determine the event-level association between perceived risk of both STI acquisition and transmission and actual condom use during penile-vaginal intercourse (PVI) among female and male STD clinic attendees. As gender has been documented to influence perceived risk (e.g., Robertson, Stein, & Baird-Thomas, 2006), this study also examined the moderating effect of gender in the association between perceived risk of STDs and condom use. Because the STD disease epidemic has heavily impacted the Black African-American population (CDC, 2012), we also examined the possible moderating role of Black versus non-Black race.

Methods

Study Sample

Data were collected from December 2007 through April 2011 as part of an NIH-funded study of condom effectiveness. A convenience sample was enrolled. All participants were tested for Chlamydia, gonorrhea, and trichomoniasis by urine-based nucleic acid amplification tests; those testing positive were treated with single-dose therapy. Patients were recruited from five clinics caring for individuals at high-risk for STI in three U.S. cities: a publicly-funded STI clinic in the Southern US; a publicly-funded STI clinic in the Midwestern US; and an STI clinic of a large teaching hospital and two adolescent medicine clinics affiliated with a children's hospital, all in the Northeastern US. The STI clinics enrolled individuals aged 18 years and older; the adolescent clinics enrolled individuals as young as 15. Eligibility criteria included reporting penile-vaginal intercourse in the preceding 3 months; speaking English; willing to provide contact information; and providing written informed consent. Institutional review boards at the participating universities approved the study protocol with a waiver of parental consent for adolescents less than 18 years of age.

Recruitment procedures varied slightly across the five clinics. At the adolescent clinics, the study was listed on a research recruitment flag attached to the appointment paperwork of age-eligible patients. The research assistant used the flag to identify eligible patients. This chart-flagging system at adolescent clinics precluded us from calculating a participation rate for those sites. Across the three remaining clinics, 1,424 patients agreed to be screened for eligibility. Of these, 1,297 were eligible and invited to participate; 794 enrolled, yielding a participation rate of 61.2%. With the remaining patients recruited from the Boston clinics (n=135), the participant sample size of the larger study on condom effectiveness was 929.

Participants were trained in the use of an electronic diary report using a password-protected personal digital assistant (PDA) programmed with the Configurable Electronic Real-Time Assessment System (CERTAS; Personal Improvement Computer Systems, Inc. Reston, VA, USA). Each day, participants were prompted to answer the question of whether they had sex in the past 24 hours. Because the research question pertained to urethral/vaginal acquisition of STIs, our assessments concerned penile-vaginal sex. Based on formative research,¹⁶ we defined sex as “putting the penis in the vagina” and the end of sex as the male orgasm. If participants responded affirmatively, they were asked questions about each instance of sexual intercourse. They were also asked to enter a report about their sexual behavior directly into the PDA after each time that they had sex to maximize capture of data on every sex event. These PDA diaries were kept by participants for up to 180 days post-enrollment; however, due to attrition completed diaries for the current study were only available for 622 participants.

Measures

Two key questions from the daily diary assessments were used as a proxy for perceived risk: 1) “Before you had sex did you have any reason at all to suspect that you might currently have an STD that might be transmitted to your partner during sex?” (suspicion-self) and 2) “Before you had sex did you have any reason at all to suspect that your partner might currently have an STD that might be transmitted to you during sex?” (suspicion-partner). Daily assessments also captured condom use at last sex: “Did you or your partner use a condom for the penis-in-vagina part of the sex event?”

Data Analysis

After conducting basic cross-tabulations, multivariate logistic regression models were used to test associations between suspicions of current infections and condom use for PVI. The models included gender and race (black versus non-black) as well as interaction terms (entered

concurrently) between these covariates and the perceived risk variables. Because of the correlations inherent to multiple observations on the same participant (i.e., the use of sex events as the observation units), generalized estimating equations (GEE) models, utilizing an exchangeable correlation matrix, were employed for all analyses. Analyses were performed with SPSS (version 19.0).

Results

Descriptive Findings

The mean age of the sample was 29.9 years ($SD = 10.45$). Of the 622 participants 59.3% identified as African American/Black and 63.1% were female. About one of every four (25.7%) participants was 20 years of age or younger at enrollment. Just over one-half (54.9%) of the participants reported being unemployed. About four of every ten (43.8%) had a high school education or less.

Table 1 provides the descriptive bivariate information pertaining to frequency of condom use stratified by suspicion of partner being infected and by suspicion of self-infection. For convenience, rows are provided for the total sample, males only, and females only. As shown, condoms were used for at least 80% of the 1,202 events when the sex partner was suspected of infection whereas this value was far lower (58.9% – 66.7%) during the 15,478 events when partner infection was not suspected. Also, condoms were used for at least 80% of the 1,177 events occurring when participants suspected self-infection whereas this value was, again, far lower (59.0% – 66.5%) during the 15,508 events occurring when self-infection was not suspected.

Multivariate Findings

Table 2 presents the results of the two GEE models used to estimate the adjusted odds ratios for the effect of suspicion-self and suspicion-partner on condom use. Suspicion-self and suspicion-partner were significantly associated with event-level condom use in the two models.

The model pertaining to suspicion-partner is shown in the top half of Table 2. This model included 16,674 events of PVI, with condoms being used during 10,552 (63.3%) of these events. During 1,202 of the events (7.2%), participants suspected his/her sex partner had an STD. As shown, suspicion-partner was significantly associated with condom use, with condom use being more than twice as likely during penile-vaginal sex events when this suspicion was present. Gender was not significantly related to condom use; however, race did achieve significance in this model. The model suggests that African American/black men and women were about 80% more likely to use condoms. Tests for interactions between suspicion-partner and gender ($P = .68$) and suspicion-partner and race ($P = .46$) were not significant.

The model pertaining to suspicion-self is shown in the bottom half of Table 2. This model included 16,679 events of PVI, with condoms being used during 10,557 (63.3%) of these events. During 1,177 of the events (7.0%), participants suspected their sex partner had an STD. As shown, suspicion-self and race was associated with condom use. The model suggested that when participants suspected self-infection they were more than twice as likely to use condoms. The model also suggests that, beyond the effect of suspicion-self, condom use was about 80% more likely for participants identifying as African American/Black. Tests for interactions between suspicion-self and gender ($P = .28$) and suspicion-self and race ($P = .83$) were not significant.

Discussion

The findings from novel investigation of women and men attending STD clinics suggest that perceptions of STD infection that individuals held just prior to having sex were associated with condom use for that specific sexual encounter. Specifically, the event-level analysis of clinic attendees demonstrated that condom use was nearly twice as likely to occur when the event of PVI involved suspicion that either the individual or his/her partner might currently have an STD that could be transmitted during sex. This association was evident for men and women, meaning that both genders should be the focus of intervention efforts regarding perceived risk of STD acquisition and transmission. Further, this relationship was present regardless of whether participants identified as African American/Black. Also, African American/Black men and women were more likely than non-African American/Black men and women to use condoms irrespective of their perception of STD risks.

Though published findings suggest limited value of the construct of perceived risk relative to condom use behaviors, this study showed robust utility. Event-level assessments represent a methodological improvement over retrospective, more global assessments. This study used ecological momentary assessments of both predictor and outcome variables and assessed perceived risk at two-levels (self-to-partner and partner-to-self). This measurement approach may account for inconsistencies between some of the previous research that failed to find an association (Baume & Middlestadt, 1996 as cited in Baume, 2000) between perceived risk of infection and condom use and the current investigation.

Though it is reassuring that participants who perceived there was a risk for transmission of STD were more likely to use condoms, it is concerning that approximately 93% of the events involved no suspicion of risk for self-to-partner or partner-to-self transmission. This is particularly troubling given the sample was comprised of newly tested clinic patients. An abundance of research supports the idea that individuals are notoriously poor at accurately

assessing their risk for STD infection (East, Jackson, O'Brien & Peters, 2007; Kershaw, Ethier, Nicolai, Lewis, & Ickovics, 2003; Kowalewski et al., 1997). Moreover, individuals may be unlikely to suspect that they might acquire an STD from a partner with whom they choose to have sex. Perceptions of a relationship as characterized by trust, intimacy and connection may invoke a false sense of security against infection (Bolton, McKay, & Schneider, 2010). Further, despite higher rates of STD infection among blacks (CDC, 2012), the rate of suspicion of was not elevated among this subgroup of participants. Nonetheless, they were more likely to use condoms.

Study findings have implications for clinicians and other clinical staff working with STD clinic attendees. STD clinical staff should seek to educate all attendees about the behaviors that put them at risk for STD acquisition or transmission. Further, clinical staff should also help individuals to raise their perceptions of personal susceptibility to STD infection to levels commensurate with their actual risk practices (Elifson, Klein, & Sterk, 2010). The clinical encounter provides an important teachable moment to educate about risk and promote condom use, regardless of diagnosis. For those testing positive, further counseling regarding heightened risk of STD transmission during the posttreatment is vital.

For clinicians and clinical staff should note that although perceived risk is not a sufficient basis for behavior change, it is nonetheless a necessary precondition of behavior change (Napper, Fisher, & Reynolds, 2011). Therefore clinicians should engage in the provision of behavioral skills related to condom negotiation, correct use of condoms, and the consistent use of condoms as well as the provision of condoms that are preferred by their clients.

Limitations and Future Research

This study of STD clinic attendees from five clinics across three cities is constrained by the validity of self-report, as is true for most sexuality research, and its generalizability to other populations may be limited. The event-level analysis, while valuable, may not equally represent all study participants in that individuals vary in the number of events they have contributed to the dataset; however, the GEE models accommodate this by using estimated odds ratios. We did not collect any information about why individuals suspected that they or their partner might currently have any STD; future qualitative studies should be carried out to elucidate the possible origins of suspicion. Also, future research might also investigate whether recent treatment of an STD affects subsequent perceptions of STD acquisition/transmission risk.

Conclusions

Using an event-level research design, this study found that condom use was associated with participants' suspicion that they or their partner might currently have an STD that could be transmitted during the sexual event. This association occurred regardless of gender and race. Health care providers, as a part of teaching information, motivation and behavioral skills, should help individuals develop more realistic assessments of risk for transmission of STD.

Acknowledgements

Support for this project was provided by a grant to the first author from the National Institutes of Allergies and Infectious Diseases, grant # 5 R01 AI068119.

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Table 1. Descriptive Statistics for Event-Level Condom Use according to Suspicion of STD in Partner and in Self, Total and by Gender

	N (%) using condoms when suspicion of STD	N (%) using condoms when no suspicion of STD
Suspect sex partner is infected	994/1,202 (82.7)	9,558/15,478 (61.8)
Suspect sex partner is infected (males only)	397/493 (80.5)	3,776/5,664 (66.7)
Suspect sex partner is infected (females only)	597/709 (84.2)	5,782/9,814 (58.9)
Suspect "I am" infected	977/1,177 (83.0)	9,580/15,508 (61.8)
Suspect "I am" infected (males only)	394/472 (83.5)	3,781/5,687 (66.5)
Suspect "I am" infected (females only)	583/705 (82.7)	5,799/9,821 (59.0)

Table 2. Adjusted Event-Level Associations Between Suspicions of STDs and Condom Use

	<u>Model 1: 621 participants (16,674 events)</u>		
	EOR¹	95% CI²	P
Suspect sex partner is infected	2.17	1.57-3.00	.0001
Gender	.83	.65-1.08	.16
Race	1.84	1.43-2.40	.0001
	<u>Model 2: 622 participants (16,679 events)</u>		
Suspect "I am" infected	2.05	1.43-2.92	.0001
Gender	.83	.64-1.07	.15
Race	1.80	1.40-2.30	.0001
