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## Barriers to Condom Use: Results for Men and Women Enrolled in HIV Risk Reduction Trials in Outpatient Drug Treatment

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### Abstract

HIV transmission often occurs through heterosexual high-risk sex. Even in the era of HIV combination prevention, promoting condom use, and understanding condom barriers, remain priorities, especially among substance-dependent individuals. Men and women (N=729) in outpatient drug treatment participated in a five-session gender-specific risk reduction group or one-session HIV Education group. Condom barriers (Motivation, Partner-related, Access/Availability, Sexual experience) were assessed at baseline and 6-month follow-up. Completing either intervention was associated with fewer motivation and partner-related barriers. Among women, reductions in motivation and sexual experience barriers were associated with less sexual risk with primary partners. Condom barriers are important to gender-specific HIV prevention; given limited resources, brief interventions maximizing active components are needed.

### Keywords

Condoms; Attitudes; Gender differences; Substance Use Disorders; HIV/AIDS

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#### Declaration of Interest

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## Background and Objectives

### HIV Transmission Risk, Condom Use, and Substance Use

In the U.S., male to male and heterosexual high risk sex are the primary mechanisms of HIV transmission, accounting for an estimated 92% of all HIV infections in 2011; 86% of HIV infection among women was linked to heterosexual sex (CDC, 2011). Although PrEP (preexposure prophylaxis) is an emerging strategy within a combined HIV prevention framework (Grant et al, 2010), currently female and male condom use is the most widely available and cost effective method for reducing the risk of HIV transmission. Even when PrEP is prescribed, condoms are an essential component of the guidelines for use, along with other risk reduction methods, based on less than ideal PrEP adherence in clinical trials (CDC, 2014). Thus, understanding the barriers to consistent condom use remains a priority in HIV prevention research, especially among those with substance use disorders. Extensive research has identified specific risk factors associated with substance use that increase HIV risk, including increased unprotected sexual occasions, greater numbers of sexual partners, more sexual activity (protected or unprotected) while under the influence of drugs or alcohol (especially when using stimulants and alcohol), exchanging sex for money or drugs, and challenges with medication adherence (e.g., antiretrovirals and PrEP for HIV transmission prevention) (Booth, Kwiatkowski, & Chitwood, 2000; Hendershot, Stoner, Pantalone, & Tyndall, 2009; Logan, Cole & Leukefeld, 2002; Raj, Saitz, Cheng, Winter, & Samet, 2007; Volkow et al, 2007; Wood, Kerr, Tyndall, & Montaner, 2008; Zule et al., 2007).

### Condom Belief/Attitude Domains

Prior research supports the necessity of exploring multidimensional measures of condom attitudes (Bogart et al, 2005; Helweg-Larson & Collins, 1994; Scott-Sheldon, Marsch, Johnson, & Glasford, 2006; Sturges, Sims, Kareem, 2009). The Condom Barrier Scale (St. Lawrence, Eldridge, Reitman, Little, Shelby, & Brasfield, 1998) was developed to measure women's perceived barriers to condom use and assesses four psychometrically meaningful subscales: motivational barriers, partner barriers, negative effect on sexual experience, and access or availability barriers. This measure was later tested and found to have a similar factor structure among a sample of men (Doyle, Calsyn, & Ball, 2009).

Prior research demonstrates gender differences in specific attitudes towards condom use. In a sample of 348 HIV-positive injection drug users, men had more negative condom beliefs related to sexual pleasure compared to women; negative beliefs were associated with lower self-efficacy (i.e., one's belief that s/he can control his/her own condom use) to use condoms among both men and women (Mizuno, Purcell, Latka, Metsch, Gomez, & Latkin, 2007). Among women and men participating in randomized clinical trials of comparable risk reduction interventions (using the dataset from the current study), men endorsed more barriers to condom use than women, especially those related to the effect on sexual experience (Calsyn et al, 2013). For both men and women, stronger endorsement of barriers to condom use was associated with less frequent use of condoms at the baseline assessment. However, the difference between condom users and non-users in endorsement of condom barriers in general is greater for men than women, especially for those who report having casual partners. Gender differences were also found in a study examining predictors of

condom-use intention (Munoz-Silva, Sanchez-Garcia, Nunes, & Martins, 2007). While condom attitudes predicted intention for females, subjective norms and persuasive skills predicted intention for males. Thus, attitudes towards condoms can be reliably measured, are related to actual condom use, and differ for men and women.

### **Relationship Status and Condom Use**

Relationship status also influences condom use. Studies demonstrate that being in a long-term relationship and believing one's partner to be no-risk, or wanting to establish intimacy and seriousness of the relationship are primary reasons for lack of condom use (Bogart et al., 2005; Bogart et al, 2005; Corbett, Dickson-Gomez, Hilario, & Weeks, 2009; Tortu, Goldstein, Deren, Beardsley, Hamid, & Ziek, 1998). Some studies have found that condom use in long-term relationships is often discouraged or refused by the male partner (Tortu et al., 1998; Libbus, 1995; Weiss, Weston, & Quirinale, 1993) and that married women are more likely to report unprotected sex than single women (Sterk, Klein & Elifson, 2004). Similarly, a greater likelihood of condom use by women in relationships was associated with partner acceptance of condom use and better communication about HIV/AIDS (St. Lawrence et al, 1998). Some evidence suggests that condom use with primary partners can be modified through relationship-focused interventions (El-Bassel et al, 2003).

### **Changing Attitudes Toward Condom Use**

Albarracin and colleagues (Albarracin, Gillette, Earl, Glasman, Durantini, & Ho, 2005) conducted a meta-analysis of drivers of behavior change in HIV prevention interventions (1985-2003), including the Theory of Planned Behavior, Social Cognitive Theory, and the Information, Motivation, Behavioral Skills Model. The common theme in these rational choice models is that behavior results from a combination of accurate information or knowledge; motivation, including perceived social norms, attitudes, perceived risk, and control; skills; intention; and self-efficacy to carry out healthier behaviors. Attitudes towards condoms are theorized to be critical cognitive mediators of behavior change. In turn, negative attitudes or perceived barriers may decrease self-efficacy or intention to use condoms and result in increased sexual risk behaviors. The meta-analysis results showed that attitudinal arguments, or discussion of the positive implications of using condoms, were a component of more effective interventions; however, this was true for females only. Interventions employing behavioral skills arguments and condom use skills were more effective with males.

Change in condom attitudes have also been assessed in several female-only interventions. Wingood (Wingood et al., 2004) demonstrated that a 4-session risk reduction intervention (WiLLOW) produced reductions in partner-related barriers and beliefs about condoms interfering with sex, in addition to the positive outcome of less unprotected sex. In a study examining the mediators of the "Sister-to-Sister" intervention with African-American women, researchers found significant improvement at 12-month follow-up on perceived partner reactions to condom request, partner acceptance of condom use, and self-efficacy to carry condoms and achieve consistent condom use; however beliefs regarding sexual pleasure (sexual experience) did not improve. Despite these positive findings, only self-efficacy for condom use was a significant predictor of actual condom use (O'Leary, Jemmott,

& Jemmott, 2008). In a study comparing a 5-session safer sex skills building intervention (SSSB) to a single session HIV education intervention in outpatient drug treatment (using the current dataset), Campbell et al. (Campbell, Tross, Hu, Pavlicova, Kenney, & Nunes, 2011) showed that positive attitude towards female condoms was higher in the SSSB group at the 6-month follow-up, as well as a partial mediator of the intervention in reducing unprotected sex.

## Purpose

This secondary analysis uses data drawn from two HIV risk reduction intervention effectiveness trials (Calsyn, Hatch-Maillette, Tross, 2009; Tross, Campbell, & Cohen, 2008) conducted within the National Institute on Drug Abuse (NIDA) National Drug Abuse Treatment Clinical Trials Network (CTN) among individuals receiving outpatient drug treatment. These two studies tested the effectiveness of gender specific 5-session HIV risk reduction intervention groups against a single session HIV education intervention modeled on standard HIV prevention in drug treatment programs (Shoptaw, Tross, Stephens, & Tai, 2002).

The purpose of the current study is to explore the effectiveness of gender-specific HIV prevention interventions on: 1) four attitudinal barriers toward condom use; and 2) the association between reductions in condom use barriers and sexual risk behavior over time, and as a function of relationship status (i.e., primary partners and other partners). This study advances prior research by examining attitudes toward condoms longitudinally, and as a result of attending an evidence-based gender-specific HIV risk reduction intervention, among a large sample of high risk men and women in community-based outpatient substance abuse treatment. Findings may inform future tailoring of gender-specific HIV prevention interventions for drug-involved populations and provide further information on a range of attitudinal barriers toward condom use among men and women.

## Methods

### Participants

The sample was comprised of men and women participating in Real Men are Safe (REMAS) (Calsyn et al., 2009) or Safer Sex Skills Building for Women (SSSB) (Tross et al., 2008), respectively, who completed a baseline assessment and the 6-month post-treatment follow-up assessment (N=729, 331 women and 398 men). The two studies were companion protocols and shared major components of study design and methods. The studies took place at 16 outpatient substance abuse treatment programs (n=8 psychosocial outpatient (“drug-free”) treatment programs and n=8 methadone maintenance treatment programs) located across the U.S.; nine of the sites conducted both the men's and the women's protocols. Participants attended outpatient or intensive outpatient standard of care treatment programming, which typically consisted of a mix of individual or group counseling.

Eligibility criteria included: 1) 18+ years of age, 2) able to understand and converse in English, 3) enrolled in a participating drug treatment program (and for at least 30 days if a methadone maintenance client), and 4) reported at least one occasion of unprotected vaginal

or anal intercourse in the 6 months prior to enrollment. Men and women were excluded if they were pregnant or actively trying to conceive with a partner. Participants completed informed consent prior to the screening assessment and before the baseline assessment (i.e. for participation in the intervention trials). Participants were assessed at baseline and 6-months post intervention. All assessments were interviewer-administered, except questions related to sexual behavior which were completed via an automated audio computer-assisted interview.

## Interventions

REMAS and SSSB were both manualized interventions, delivered by treatment program counselors who had attended a centralized training. Participants were randomized in cohorts of three to eight people to receive the REMAS/SSSB experimental intervention or the HIV education intervention. The 5-session REMAS/SSSB intervention was delivered over two and a half weeks. The REMAS intervention consisted of lecture material, liberal use of role-plays, peer group discussions and self-assessment motivational exercises. REMAS focused equally on information delivery and skills building, with a smaller focus on motivation. SSSB focused on building cognitive, affective and behavioral skills for safer sexual decision making and negotiation and emphasized active problem-solving, behavioral modeling, role play rehearsal, interval practice, troubleshooting, and peer feedback and support. Prior to the study, intervention completion was defined as attending at least three of five REMAS or SSSB sessions – i.e., significant exposure to the materials presented.

The HIV education intervention lasted 60 minutes and used a didactic lecture format. Content included information on HIV (and other STI) transmission, testing, counseling, treatment, and prevention and was similar in content to the HIV prevention information provided in Session 1 of REMAS/SSSB. HIV education intervention completion was defined as attendance at the single session.

## Measures

Condom barriers were assessed using the revised Condom Barrier Scale (CBS), (St. Lawrence et al., 1998; Doyle et al., 2009) a 23-item, 5-point Likert-type scale (strongly agree to strongly disagree). The CBS has four psychometrically meaningful subscales: 1) motivational barriers (4 items); 2) partner-related barriers (8 items); 3) access/availability barriers (4 items); and 4) sexual experience barriers (7 items). Mean scores for each subscale are used in this analysis. Higher scores represent fewer barriers. For example, one statement on the CBS is “My partner doesn’t want us to use a condom.” A response of “strongly agree” (1) would indicate a significant barrier to condom use, whereas “strongly disagree” (5) would indicate no barrier for this item.

Table 1 displays the subscales and their items. The CBS was originally developed for African American women. Later, under psychometric evaluation, the scale was reduced from 42 to 29 items with demonstrated internal consistency, stable factor structure, and satisfactory construct criterion, convergent and discriminant validity (St. Lawrence et al., 1998). A more recent analysis (Doyle et al., 2009) using the male respondents from the current study demonstrated the same four factor structure. However, several items loaded on

different factors for men compared to women and these were omitted in the current analysis (i.e., two items were removed from the motivation subscale and four items from the access/availability subscale). Respondents needed to answer all items within a factor to be included in the analysis.

Sexual risk behaviors were assessed using similarly worded questions from the Sexual Behavior Inventory (SBI) for men and the Sexual Experiences and Risk Behavior Assessment Schedule (SERBAS) for women (Meyer-Bahlburg, Ehrhardt, Exner, & Gruen, 1991; Sohler, Colson, Meyer-Bahlberg, & Susser, 2000). Items for the SBI were selected or adapted from the Sex and Drug Abuse Relationship Interview (Calsyn, Wells, Saxon, Jackson, & Heiman, 2000) and the SERBAS. The SERBAS is a widely used sexual risk behavior assessment with good reliability and validity among high risk populations. The number of vaginal and anal sex occasions with and without condom protection was captured for the previous 90 days at baseline and at 6-month follow-up for primary partner and for other partners separately.

### Data Analysis

The current analysis used data from baseline and 6-month follow-up assessments; participants were excluded from the analysis if they missed the CBS at one or both of these visits. Of 515 female cases, two were missing the baseline CBS (one SSSB, one HIV education) and 183 were missing the 6-month follow-up CBS (95 SSSB, 88 HIV education). Of 590 male cases, none were missing baseline CBS and 192 were missing the 6-month follow-up CBS (102 REMAS, 90 HIV education). Descriptive analyses were used to characterize the sample by age, sex, race/ethnicity, education, baseline condom barrier subscale means, and unprotected sex acts with primary and other partners at baseline. Chi-square (categorical variables) and non-parametric Wilcoxon (continuous variables) tests were used to assess differences in descriptive characteristics. T-tests were used to examine differences in condom barrier subscale scores at baseline and 6-month follow-up.

To explore question 1 – associations between the HIV risk reduction intervention and condom barrier subscale scores – linear regression models were used to examine the main and interaction effects among gender, intervention condition (SSSB/REMAS versus HIV Education), and intervention completion (i.e., significant exposure to the intervention defined as attending 3 or more SSSB/REMAS sessions or attending the single HIV Education session). To explore question 2 – associations between condom barrier subscale scores and unprotected sex occasions, respectively, with primary and other partners – negative binomial regression models were used to examine main and interaction effects among gender and mean condom barrier subscale score reduction (baseline to 6-month follow-up), controlling for baseline unprotected sex occasions. The negative binomial distribution was used because the outcome variable (unprotected sex occasions) had non-normal distributions (skewed) and to account for variance greater than the mean. In cases where there were primary or other partners at baseline but not at 6-month follow-up, unprotected sex was coded as zero. (Analyses were also conducted to explore results when participants without partners at 6-month follow-up were removed, but results were similar

and thus, the larger sample is presented here). Interactions were retained in the models if significant ( $p < .05$ ). SAS 9.3 was used to conduct all analyses.

## Results

### Sample Characteristics

The sample was comprised of 331 women (45.4%) and 398 men (54.6%). Approximately half of the women (50.8%) and men (55.3%) were 40 years of age or older ( $X^2(1)=1.48$ ,  $p = .22$ ). Race/ethnicity differed by gender ( $X^2(2)=19.16$ ,  $p < .001$ ). A greater proportion of men (21%) than women (10%) identified as Hispanic/Latino. About half the sample identified as White (55% of women, 44% of men) and a quarter as African American (26% of women and 23% of men). The education distribution also differed by gender ( $X^2(2)=9.47$ ,  $p < .05$ ). Men were more likely to have a high school education (49.8%) compared to women (38.4%); 33.8% of women and 27.6% of men reported more than a high school education and 27.8% of women and 22.6% of men reported less than a high school education. In this outpatient treatment sample, in the 30 days prior to study entry, there were no differences between men and women on use of cocaine or stimulants (36.9% of men and 31.1% of females;  $X^2(1)=2.72$ ,  $p = .10$ ) or use of heroin or other opioids (35.2% of men and 33.8% of women;  $X^2(1)=0.14$ ,  $p = .71$ ). Men were more likely to have used alcohol (42.5% of males and 27.4% of women;  $X^2(1)=17.68$ ,  $p < .001$ ) and cannabis (27.1% of men and 18.9% of women;  $X^2(1)=6.80$ ,  $p = .009$ ). The mean lifetime treatment episodes for drug and alcohol use was  $M=6.9$  ( $SD=10.6$ ), with a median of 4 episodes.

Seventy-nine percent of both men and women reported having a primary partner. Men were slightly more likely to have other partners (39.7%) compared to women (33.3%). Men reported higher mean unprotected vaginal/anal sex acts with primary partners compared to women (24.67 [ $SD=29.92$ ] vs. 20.30 [ $SD=31.66$ ];  $z=2.57$ ,  $p = .01$ ), and with other partners (16.23 [ $SD=27.10$ ] vs. 5.13 [ $SD=12.23$ ];  $z=5.01$ ,  $p < .001$ ). Overall, 62.7% of the sample completed the interventions; 66.1% of those in the HIV Education condition attended the single session and 58.9% of those in the SSSB/REMAS condition attended at least three of five sessions.

### Mean Condom Barrier Subscale Scores

At baseline, men reported more condom barriers compared to women for motivation (3.01 [ $SD=0.87$ ] vs. 3.16 [ $SD=0.89$ ];  $z=2.13$ ,  $p < .05$ ); access/availability (4.13 [ $SD=0.64$ ] vs. 4.22 [ $SD=0.61$ ];  $z=1.91$ ,  $p = .06$ ); and sexual experience (2.88 [ $SD=0.91$ ] vs. 3.20 [ $SD=0.88$ ];  $z=4.65$ ,  $p < .001$ ). Men reported the same level of partner-related barriers as women (3.49 [ $SD=0.91$ ] vs. 3.48 [ $SD=0.93$ ];  $z=0.35$ ,  $p = .70$ ). Overall, there were significantly fewer barriers reported at 6-month post intervention follow-up across all four subscales: motivation (3.08 [ $SD=0.88$ ] vs. 3.42 [ $SD=0.90$ ];  $t=7.30$ ,  $p < .001$ ); partner-related (3.48 [ $SD=0.92$ ] vs. 3.63 [ $SD=0.93$ ];  $t=3.13$ ,  $p < .01$ ); access/availability (4.17 [ $SD=0.63$ ] vs. 4.24 [ $SD=0.61$ ];  $t=2.17$ ,  $p < .05$ ); and sexual experience (3.02 [ $SD=0.91$ ] vs. 3.21 [ $SD=0.87$ ];  $t=4.09$ ,  $p < .001$ ).

### **Associations between Gender, Intervention, Intervention Completion, and Mean Condom Barrier Subscale Scores**

Linear regression models were used to analyze 6-month follow-up mean Condom Barrier Subscale scores for motivation, partner-related, sexual experience, and access/availability. Interactions were explored between gender, intervention condition (SSSB/REMAS or HIV Education), and intervention completion. There were no significant associations detected between gender or intervention and condom barrier subscale scores at 6 months. Intervention completion was associated with motivation and partner-related barrier subscales (see Table 2). Women and men who attended at least three of five SSSB/REMAS sessions or the single session HIV Education session were more likely to report fewer motivation ( $t=3.11$ ,  $p = .002$ ) and partner-related barriers ( $t=2.35$ ,  $p = .019$ ) at 6 months. None of the interactions were significant ( $p < .05$ ). There were no significant findings for sexual experience or access/availability condom barrier subscales.

### **Associations between Condom Barrier Reduction and Unprotected Sex Occasions at 6-month Follow-up with Primary Partners**

Negative binomial regression models were used to explore associations between reductions in the four condom barrier subscales and the count of unprotected vaginal/anal sex occasions with primary partners ( $n=513$ ) and other partners at 6-month follow-up ( $n=254$ ). Two gender by barrier interactions were detected (see Table 3). For women, motivation ( $t=-2.52$ ,  $p = .01$ ) and sexual experience ( $t=-2.19$ ,  $p = .03$ ) condom barrier reductions were associated with fewer unprotected sex occasions with primary male partners. For both men and women, reductions in partner-related barriers were associated with fewer unprotected sex occasions ( $t=-2.26$ ,  $p = .02$ ).

### **Associations between Condom Barrier Reduction and Unprotected Sex Occasions at 6-month Follow-up with Other Partners**

Female gender was associated with fewer unprotected sex occasions with other partners (see Table 4). Reductions in motivation, partner-related, and access/acceptability barriers were not associated with unprotected sex occasions with other partners. Surprisingly, reduction in barriers related to sexual experience was associated with more unprotected sex occasions ( $t=2.38$ ,  $p = .02$ ). To explore this counterintuitive finding further, number of other partners was included in the model to assess whether having just one “other” partner compared to having multiple other partners was associated with the outcome. Having more than one other partner was associated with more unprotected sex occasions ( $t=4.59$ ,  $p < .001$ ); when added to the model, the association between sexual experience barriers and unprotected sex was no longer significant ( $t=1.13$ ,  $p=0.26$ ).

## **Discussion**

This study assessed attitudes related to condom use among a sample of men and women in outpatient substance abuse treatment who participated in parallel effectiveness trials of gender-specific HIV risk reduction interventions. At baseline, women reported fewer condom barrier attitudes related to motivation, access/availability, and sexual experience (see also Calsyn et al., 2013 for more details), but not partner-related barriers. There were no



gender differences in barrier reduction on any of the barrier subscales, although there were significant reductions overall in barriers for each of the subscales from baseline to 6-month follow-up. Overall reductions in condom barriers over time, across all domains for both men and women, lent support to behavioral change theories that focus on attitudes, and suggested that both sexes are open to changing attitudes about condom use.

Indeed, the lack of gender differences suggests that although the use of gender-specific treatment for substance abusing men and women is supported in the literature (Claus et al., 2007; Greenfield et al., 2007), outcomes may not vary by gender. The lack of gender differences may in fact support accessible gender-specific HIV prevention interventions in that both the SSSB/REMAS and HIV Education treatment groups were developed to address gender-specific skills and barriers.

Intervention condition was not associated with condom barriers across any of the four domains; however individuals who attended at least three of the five SSSB/REMAS sessions or the single session of HIV Education were more likely to report fewer motivation and partner-related barriers. This could likely be the result of greater motivation or stability among those who had better attendance. However, it could also indicate that exposure to HIV risk reduction education, incorporating practical prevention information but not necessarily skill practice, is sufficient to produce positive change in motivational or partner-related attitudinal barriers. A worthwhile topic for future study is to explore whether a dose response effect exists where exposure to more sessions results in greater reduction of condom barriers (e.g., those who completed 4 or 5 sessions of REMAS/SSSB compared to those who completed 3) or exposure to specific sessions results in greater reduction of barriers (e.g., attending the session introducing problem-solving). Such analyses are especially important for bringing interventions to real-world programs, like those in these effectiveness trials, since attendance is often variable.

Reductions in condom barriers were associated with fewer unprotected sex occasions, mainly with primary partners. Specifically, for both men and women, reductions in partner-related barriers were associated with fewer unprotected vaginal/anal sex acts with primary partners. Using condoms with primary partners is consistently practiced less often than using condoms with casual partners (Exnet, Hoffman, Dworkin, & Ehrhardt, 2003; Hirsch, Higgins, Bentley, & Nathanson, 2002; Misovich, Fisher, & Fisher, 1997). These findings suggest that both men and women struggle with condom use due to perceived partner-related barriers, which may include issues of trust, fear that your partner might think you are cheating, or turning a partner “off” sexually, especially within primary partnerships. Given the role of gender-based power differentials in being able to practice safer sex in heterosexual relationships, addressing partner-related barriers with both men and women could be equally important. These findings are consistent with those of HIV prevention interventions that include relationship components (El-Bassel et al, 2003; Witte, El-Bassel, Gilbert, Wu, Change, & Hill, 2006) and provide further support for differentiating relationship types in studies of sexual risk behavior.

Reducing motivational and sexual experience barriers was associated with fewer unprotected sexual occasions with primary partners, but only for female participants. For men, in

contrast, with the exception of partner-related barriers, reducing attitudinal barriers was not associated with increased condom use with primary partners. Similar results have been found in studies of female-only HIV interventions (Anderson et al, 2006; Wingood et al., 2004); further research is needed to identify effective intervention strategies for men.

Reductions in condom barrier attitudes were not associated with unprotected sex with other-than-primary partners. These findings may be explained by the increased use of condoms with other partners in general with fewer barriers overall to condom use. Women were more likely to use condoms with other partners, which again is consistent with prior research (Exnet et al., 2003; Misovich et al, 1997). One exception was that reductions in sexual experience barriers were associated with greater counts of unprotected sex. Although the presence of Type I error cannot be ruled out, this finding is challenging to reconcile. In analysis including the number of other partners (one versus two or more), the association between sexual experience barriers and unprotected sex became non-significant. This suggests that the “other” partner designation may be more complex and that there is a need to investigate the nature and number of the casual sexual encounters outside of the primary relationship in order to adequately interpret this particular condom barrier finding. For example, multiple casual partners may indicate situations of trading sex for drugs or money. In these situations, the ability to negotiate condom use may be challenging. The role of active substance use in these types of casual sexual encounters also bears further investigation.

### Limitations

Strengths of this study include the large, relatively diverse sample recruited from outpatient methadone and psychosocial addiction treatment programs across the U.S. and the validated condom barrier measure which included four distinct subscales. However, several limitations warrant mention. First, men and women received comparable, gender-specific 5-session interventions; however the content was unique for each. Thus, we cannot point to specific activities within the interventions that might or might not be associated with attitudinal change, but instead only to broader concepts that each intervention contained. The lack of any significant differences between intervention conditions is disappointing, but points to the need for additional research to understand specific intervention components that lead to attitudinal changes (e.g., eroticizing safer sex; hands-on practice with condoms using table top models). The relatively low rates of attendance for SSSB/REMAS (59% attended 3 or more sessions), however, reflect the challenges of delivering multi-session HIV prevention in outpatient substance abuse treatment, as well as obfuscating participant versus intervention characteristics associated with behavior change. Further, these effectiveness trials relied on frontline substance abuse treatment program providers – who were relatively new to delivering sexuality-focused interventions. Second, length of primary relationship and perception of the relationship, among other factors, were not assessed and likely influence attitudes regarding condom barriers. Outcomes may also reflect changes in relationship not accounted for in the current study or other important contextual factors (relapse or ongoing use of drugs and alcohol). Third, it is possible that there are additional barriers or other reasons for individuals to not use condoms that were not included in the measure selected for this study.

## Scientific Significance and Future Directions

Even in the era of HIV combination (i.e. biobehavioral) prevention, condom use is, and will continue to be, an essential means of HIV risk reduction. To maximize cost-effectiveness with limited resources in drug treatment settings, identifying the specific components of HIV risk reduction interventions that impact behavior is critical. HIV prevention interventions should continue to focus on salient domains of condom use barriers, especially those related to individual motivation, perceptions of partner-related barriers, and attitudes about the effect of condoms on sexual experience. Access and availability do not appear to be significant barriers to condom use among this population – an important finding given the potential cost and accessibility barriers to other types of HIV prevention methods (e.g., PrEP). These findings support the need for greater examination of which intervention components lead to attitudinal change in order to improve the impact of risk reduction interventions among high risk populations, especially given the overall lack of associations between the SSSB/REMAS interventions and condom attitudes. Future research should be aimed at unpacking the effects of motivational enhancement and other distinct intervention components on reducing HIV risk behavior.

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**Table 1**

## Condom Barrier subscales and items

Barrier Subscale	Item
Motivation	1. Most of the time neither of us has a condom available.
	2. (♀) My partner doesn't want me to put a condom on him. (♂) I don't want my partner to put a condom on me.
	3. I usually forget about using a condom
	4. I don't need to use a condom, I never catch anything.
Partner	1. If I suggest to my partner we use a condom he/she might end the relationship.
	2. My partner doesn't want us to use condoms.
	3. If I suggested we use a condom my partner would think I don't trust him/her.
	4. If I suggested we use a condom my partner would think I'm accusing him/her of cheating.
	5. If my partner used a condom I might think he/she is cheating on me.
	6. If I suggested to my partner we use a condom he/she might be turned off and lose interest in having sex.
	7. If I used a condom my partner might get angry.
	8. If I suggested my partner use a condom he/she might think I am putting him/her down or insulting him/her.
Access / Availability	1. Condoms are against my religious values.
	2. Condoms cost too much.
	3. I don't have transportation to buy or get condoms.
	4. I would be embarrassed to buy condoms or ask for them.
Sexual Experience	1. Condoms rub and cause irritation.
	2. Condoms don't feel good.
	3. Condoms interrupt the mood.
	4. Condoms feel unnatural.
	5. Condoms don't fit right.
	6. I feel closer to my partner without a condom.
	7. Condoms change the climax or orgasm.

**Table 2**  
 Mean Condom Barrier subscale score at 6-month follow-up as a function of gender, treatment (HIV-Ed vs. SSSB), Completion ( 3 sessions of SSSB or attending one HIV-Ed session), and baseline Condom Barrier Subscale score (n=721-723)

	Motivation			Partner-related			Access/Availability			Sexual Experience		
	$\beta$	s.e.	t-test	$\beta$	s.e.	t-test	$\beta$	s.e.	t-test	$\beta$	s.e.	t-test
Baseline Subscale Score	0.48	0.03	14.24 <sup>***</sup>	0.61	0.03	20.20 <sup>***</sup>	0.41	0.03	12.42 <sup>***</sup>	0.60	0.03	21.48 <sup>***</sup>
Gender (female)	0.03	0.06	0.58	0.02	0.06	0.37	-0.04	0.04	-0.95	0.06	0.05	1.14
Treatment (HIV Ed)	-0.04	0.06	-0.62	-0.01	0.06	-0.14	0.07	0.04	1.67 <sup>+</sup>	-0.03	0.05	-0.59
Completion (No)	-0.19	0.06	-3.11 <sup>**</sup>	-0.14	0.06	-2.35 <sup>*</sup>	0.01	0.04	0.34	-0.02	0.05	-0.30

<sup>+</sup> P<.10.

<sup>\*</sup> P<.05.

<sup>\*\*</sup> P<.01.

<sup>\*\*\*</sup> P<.001

**Table 3**

Negative binomial model of unprotected sex occasions (USO) with main partner as a function of gender, mean barrier reduction (baseline to 6-month), gender by barrier reduction interaction (if  $p < .05$ ), and baseline USO (n=513)

	Motivation			Partner-related			Access/Availability			Sexual Experience		
	$\beta$	s.e.	t-test	$\beta$	s.e.	t-test	$\beta$	s.e.	t-test	$\beta$	s.e.	t-test
Baseline USO (logged)	0.47	0.05	10.09***	0.46	0.05	9.82***	0.46	0.05	9.93***	0.46	0.05	9.86***
Gender (female)	0.16	0.14	1.10	0.08	0.13	0.59	0.12	0.14	0.88	0.13	0.14	0.89
Barrier Reduction (mean) <sup>a</sup>	0.08	0.10	0.77	-0.18	0.08	-2.26*	0.15	0.08	1.74	0.07	0.11	0.59
Gender × Barrier Reduction	-0.34	0.15	-2.33*			NS			NS	-0.37	0.18	-2.07*

+P<.10.

\*\* P<.01.

\* P<.05.

\*\*\* P<.001

<sup>a</sup> positive scores indicate reduced barriers



Negative binomial model of unprotected sex occasions (USO) with other partner(s) as a function of gender, mean barrier reduction (baseline to 6-month), gender by barrier reduction interaction (if  $p < .05$ ), and baseline USO ( $n = 254$ ).

**Table 4**

	Motivation			Partner-related			Access/Availability			Sexual Experience		
	$\beta$	s.e.	t-test	$\beta$	s.e.	t-test	$\beta$	s.e.	t-test	$\beta$	s.e.	t-test
Baseline USO (logged)	0.37	0.17	2.15*	0.33	0.16	2.05*	0.42	0.17	2.44*	0.30	0.15	1.94
Gender (female)	-1.59	0.49	-3.23**	-1.72	0.50	-3.45***	-1.42	0.50	-2.87**	-1.93	0.50	-3.87***
Barrier Reduction (mean) <sup>a</sup>	0.08	0.24	0.34	-0.55	0.30	-1.82	0.36	0.30	1.17	0.60	0.25	2.38*

+ $P < .10$ .  
 \*  $P < .05$ .  
 \*\*  $P < .01$ .  
 \*\*\*  $P < .001$

<sup>a</sup> positive scores indicate reduced barriers