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Sexual Sensation Seeking, Co-occurring Sex and Alcohol Use, and Sexual Risk Behavior among Adolescents in Treatment for Substance Use Problems

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Abstract

Objective—This study evaluated relations between sexual sensation seeking, co-occurring sex and alcohol use, and sexual risk behaviors (eg, unprotected intercourse and multiple sex partners) among adolescents receiving treatment for substance abuse problems.

Method—The ethnically diverse sample included 394 adolescents recruited from outpatient treatment (280 males; $M_{age} = 16.33$ years, $SD_{age} = 1.15$). Structural equation modeling (SEM) was used to test direct and indirect paths between sexual sensation seeking and sexual risk behaviors via the frequency of co-occurring sex and alcohol use. Conditional indirect effects by gender were also tested.

Results—Analyses identified significant direct and indirect effects from sexual sensation seeking to sexual risk behaviors via co-occurring sex and alcohol. The path from co-occurring sex and alcohol use to unprotected intercourse was significantly stronger among adolescent girls, suggesting a mediation effect moderated by gender. The path from sexual sensation seeking to past year number of partners via co-occurring sex and alcohol was stronger among adolescent boys. However, this gender path difference was not statistically significant.

Conclusions—Selected prevention efforts are needed to promote HIV risk reduction among adolescents in substance abuse treatment. The documented conditional indirect effect for unprotected intercourse suggests that HIV prevention programs should pay special attention to gender-specific patterns of alcohol use and sexual risk behavior when tailoring program content.

INTRODUCTION

The significant relation between adolescents' alcohol and other drug use and sexual risk behaviors highlights the potential public health impact of co-occurring risk behaviors.^{1,2} Adolescents with substance use problems report significantly earlier onset of sexual activity, greater number of sex partners, and less consistent condom use than adolescents without substance use problems.^{3,4} Co-occurring sexual activity and substance use among adolescents are associated with greater risk for exposure to sexually transmitted infections (STIs).⁴ Although substance use is a significant risk factor for sexual risk behavior, specific mechanisms that promote sexual risk-taking among youth with clinically significant substance use problems are less well understood. Elucidating these processes among adolescents with alcohol or other drug (AOD) use problems is particularly important for intervention research^{3,5} because this is a youth population in which mental health problems and health risk behaviors accelerate during emerging adulthood.

Sensation seeking indexes an individual's inclination to take behavioral and emotional risks to obtain new and exciting sensations and experiences.^{5,6} Sexual sensation seeking, a more narrowly defined personality dimension, captures openness to participate in novel or exciting sexual behaviors.⁷ A considerable body of research links adolescents' and young adults' general sensation seeking to problem behaviors including substance use,^{5,8,9} inconsistent condom use, and higher numbers of lifetime sexual partners.¹⁰ Although sexual sensation seeking predicts specific indicators of sexual risk behavior,^{11,12} little has been done to test this link among adolescents with clinically significant substance use problems.

The relation between sexual sensation seeking and sexual risk behavior is complex. Not every individual who reports high scores for sexual sensation seeking engages in sexual risk behaviors. Studies of HIV risk behaviors have identified alcohol-sexual outcome expectancies¹¹ (ie, individual expectations for self-engagement in sexual risk behavior following alcohol use) as significant mediators of the connection between sexual sensation seeking and sexual risk behavior. However, other factors may independently or interactively influence adolescents' sexual risk behaviors.¹² Evaluating additional mechanisms by which personality traits such as sexual sensation seeking promote behavioral risk for HIV/STI exposure is critical to improving health outcomes in vulnerable adolescent populations. Identifying additional mediators of the relation between sexual sensation seeking and sexual risk behavior among youth with substance use problems will expand knowledge regarding potentially modifiable targets for HIV/STI risk reduction efforts with this population.

A model derived from alcohol myopia theory¹³ posits that acute alcohol intoxication promotes sexual risk behavior through behavioral disinhibition resulting from impeded information processing ability. This in turn allows highly salient cues that influence behavior (eg, sexual arousal) to continue being processed, while suppressing complex, distal cues (ie, long-term adverse consequences of risk behaviors) that would ordinarily inhibit sexual risk behavior. Studies of young adults reveal that alcohol intoxication enhances sexual risk-taking in men and women, and that sexual arousal mediates the relation between alcohol intoxication and sexual risk behavior.¹⁴ Among youth who report clinically significant substance use problems, co-occurring sex and alcohol use may play a significant role in

mediating the relation between sexual sensation seeking and forms of sexual risk behavior, measured as unprotected intercourse and multiple sex partners. Thus, informed by alcohol myopia theory,¹³ this study evaluated the mediating role of co-occurring sex and alcohol use in the link between sexual sensation seeking and sexual risk behaviors.

Evidence for the moderating role of gender in the relation between sexual sensation seeking and sexual risk behaviors has been mixed.¹⁵ Several studies of young adult community samples reported no gender differences.¹¹ Others reported similar relations between sexual sensation seeking and sexual risk behaviors for men and women, but these associations were stronger for women.¹⁶ Although research has revealed significantly higher sexual sensation seeking scores for men than for women across samples,¹⁵ a recent study of college-age youth documented that sensation seeking significantly mediated the relation between substance use and sexual risk behaviors for women but not men.¹⁷ This mixed evidence regarding gender differences in sexual sensation seeking necessitates further research.

In sum, the present study extends the current literature on adolescent risk behaviors in several important ways. First, unlike previous studies, this study tested hypothesized models using data from youth undergoing substance use treatment. Studying mechanisms promoting HIV-risk behavior among adolescents with AOD use problems is important because these youth are at elevated risk for substance use disorders (SUDs) and HIV/STI exposure compared to normative samples of adolescents. Second, among youth in treatment for AOD use problems, risk behaviors are common and identifying variance related to differential risk mechanisms is challenging. Thus, the current study is innovative and significant for its aim to elucidate indirect paths from sensation seeking to sexual risk behavior in this treatment sample of adolescents. Third, the application of a sophisticated modeling technique (SEM) to test a moderated mediation path model allowed the present study to examine how the context of gender affects a mediation model, via the mechanism of co-occurring sex and alcohol use. Last, the present study replicated previous research in an ethnically diverse and largely Latino sample drawn from a large urban center in South Florida.

This study hypothesized significant associations between sexual sensation seeking and (a) co-occurring sex and alcohol use; and (b) unprotected intercourse or number of past year sexual partners; and (c) that co-occurring sex and alcohol use was significantly associated with sexual risk behaviors. Finally, we hypothesized that co-occurring sex and alcohol use significantly mediated the relation between sexual sensation seeking and sexual risk behaviors. Given mixed findings in previous studies, no specific *a priori* hypotheses were formulated about gender as a moderator of indirect paths between sexual sensation seeking and sexual risk behavior.

Understanding these associations in samples of adolescents currently in substance abuse treatment is critical from a public health perspective. These adolescents are at the greatest risk for transmission of STIs, based on earlier sexual onset, greater number of sex partners, and an increased likelihood of engaging in sexual risk behaviors.^{18,19} Furthermore, identification of specific mechanisms may provide modifiable targets for incorporating HIV/STI prevention into adolescent substance abuse treatment.

METHODS

Participants

The sample included 394 adolescents (29.9% female) receiving substance use treatment services at two outpatient facilities in South Florida. Participants' age ranged from 12 to 18 years ($M = 16.33$ years; $SD = 1.15$). The sample was diverse and included participants who were non-Hispanic White (25.4%), Hispanic (44.9%), non-Hispanic Black (20.6%), or from other ethnic groups (9.1%). Eighty-three percent of the participants were born in the United States. About 75% reported their father, mother, or both as primary caregiver(s).

Procedure

Adolescents were invited to participate in a brief motivational HIV risk reduction intervention within 1 week of enrollment in outpatient substance use treatment. Sexual activity during the last 6 months was a core inclusion criterion. Youth were excluded from the study if they: (a) were not sexually active in the previous 6 months; (b) exhibited significant cognitive deficits or developmental delays, according to facility case manager report; (c) reported current suicidality; or (d) did not assent. Participants were further assessed for DSM-IV psychiatric symptoms and given a battery of questionnaires before being enrolled in the intervention. In the broader NIAAA-funded intervention program, participants completed a 60- to 90-minute assessment on substance use, sexual risk behaviors, demographics, and putative mediators and moderators of intervention efficacy. Trained graduate students collected data using a structured interview protocol on laptop computers at participants' treatment facilities. Consistent with the sponsoring university's Institutional Review Board approved procedures, adolescents provided active assent in addition to their primary caregivers' consent. Participants received \$25 for completing the baseline assessment. Cross-sectional data for this study were drawn from this assessment.

Measures

Sexual Sensation Seeking—Drawn from Kalichman and Rompa's²⁵ sexual sensation seeking measure, nine Likert-type items [*strongly disagree* (1) to *strongly agree* (4)] were used to assess adolescents' openness to participate in novel, arousing, or exciting forms of sexual behavior. Sample items included, "I like the sensation of sex without a condom," and "I like new and exciting sexual experiences." The scale had moderate internal consistency ($\alpha = .71$) in the current sample. Therefore, a confirmatory factor analysis (CFA) was pursued in which a subset of four items was retained (ie, with best data fit: $TLI = 1.00$; $CFI = .99$; $RMSEA < .01$; $Std-RMR = .02$) and used to obtain a latent factor for sexual sensation seeking (see Table 2).

Timeline Follow Back-Sexual Risk Behavior (TLFB-SRB)—Using an adapted calendar format to assist in their recall, adolescents were asked to report on substance use and oral, penile–vaginal, and penile–anal intercourse via a modified version of the standard TLFB instrument for the 180 days immediately preceding the baseline assessment.²³ Similarly adapted TLFB calendar methodology has been used in published research to assess sexual risk behavior with adequate reliability and validity.²⁴ Participants reported on a Likert scale [*always* (5), *usually* (4), *sometimes* (3), *rarely* (2), or *never* (1)] how often they

used a condom during sexual intercourse. Adolescents then reported how often during the past 6 months they or their partner drank alcohol before or during sex. The question, “Was it usually you, your partner, or both?” followed. Because 91% of youth indicated that either they or both they and their partner consumed alcohol before or during sexual activity, the question was used as a variable representing self-intoxication. Finally, adolescents reported their total number of sex partners during the past year, that is, “how many different people, including men and women, have you had sex (vaginal, anal, or oral) with even if only one time?”

Sex-Related Alcohol Expectancies—The sex-related alcohol expectancies scale (SRTS)²⁶ is a four-item measure that uses a 6-point Likert response format ranging from *disagree a lot* (1) to *agree a lot* (6). Sample items included “after drinking I am less likely to use a condom,” or “after drinking I am less likely to take precautions before sex.” The measure has evidenced good psychometric properties in numerous studies, including the current one, where $\alpha = .81$. In SEM analyses, the scale was used as a covariate to control for alcohol-sexual outcome expectancies.

DSM-IV Psychiatric Symptoms—Symptoms diagnostic of lifetime and past year DSM-IV psychiatric diagnoses were assessed via the Brief Michigan Version of the Composite International Diagnostic Interview.²⁰ The CIDI is a comprehensive, structured diagnostic interview developed by the World Health Organization (WHO). To assess DSM-IV disorders, trained interviewers administer the CIDI which has excellent interrater reliability, good test–retest reliability,²¹ and sufficient validity based on concordance with clinical judgments.²² In this study, aggregate psychiatric symptom counts for depressive, anxiety, and externalizing disorders were used.

Data Analysis

Data were analyzed using Mplus Version 6.00.²⁷ Minimal missing data (less than 5%) were modeled under the missing-at-random assumption (ie, that missingness was related to variables that were observed but unrelated to the missing values themselves²⁸). The SEM analyses were performed using the robust maximum likelihood (MLR) estimator²⁹ to account for data non-normality identified in the sexual risk behavior indicators. Indirect relations were evaluated with distribution of the product approach, using bias-corrected bootstrap (5,000 replicates) confidence intervals (CIs).³⁰ This method was selected to maximize statistical power for detecting significant mediation effects and to address data non-normality which is common in studies of adolescent health risk behaviors.³¹ We followed the recommendations of Preacher, et al.³² to test a moderated mediation model.

RESULTS

Descriptive Analyses

Table 1 summarizes the matrix of Pearson bivariate correlations among variables or covariates included in the structural model of this study. Participants reported 12.49 unprotected intercourse episodes on average ($SD = 24.10$) during the prior 180 days. Of the sample, 60.7% reported one or more episodes of unprotected intercourse, and 75.0%

reported drinking alcohol during that period. Participants commonly reported co-occurring psychiatric symptoms, with the majority of the sample (89.1%) meeting criteria for one or more DSM-IV psychiatric diagnoses and 48.9% qualifying for a diagnosis of conduct disorder. Finally, participants reported to have had an average of five partners during the past year ($M_{\text{number of partners}} = 4.97$, $SD = 7.63$).

Bivariate Correlations—Co-occurring sex and alcohol use significantly correlated with the two indicators of unprotected intercourse, that is, condom use frequency ($r = .16$) and unprotected intercourse episodes ($r = .17$). Sexual sensation seeking significantly correlated with co-occurring sex and alcohol use ($r = .33$). Sexual sensation seeking, however, did not correlate significantly with either measure of unprotected intercourse. This suggests that this relation might be nonlinear, or exist only among subgroups in the sample.

Evaluation of Measurement Model

Factor compositions of the latent constructs and standardized loading coefficients are displayed in Table 2. The sexual sensation seeking latent construct contained four items (ie, *I like wild (freaky) sex; I enjoy the company of sexual or sexually active people; I'm interested in trying out new sexual experiences; I like new and exciting sexual experiences and sensations*). The Unprotected Intercourse latent construct included total number of unprotected intercourse episodes during the past 180 days and the global rating of the frequency of condom use. Most of the standardized factor loadings were large ($>.4$), with only one moderate loading (.37). Indicator variables adequately measured latent variables ($p < .001$). The overall measurement model's chi-square test of model fit was not statistically significant ($\chi^2(26) = 37.85$, NS). Fit indices suggested good model fit to the data (TLI = .96; CFI = .95; RMSEA $< .048$; Std-RMR = .057).

Evaluation of Structural Model

Direct Paths in the Structural Models—Age, ethnicity, and the four alcohol-sexual outcome expectancy items were entered into each SEM model to control for their potential influence upon hypothesized mediational paths in the two models. The path coefficients between sexual sensation seeking and (a) co-occurring sex and alcohol use; (b) unprotected sex factor; (c) and past year number of partners were significantly positive ($p < .01$). Likewise, path coefficients between age and: (a) co-occurring sex and alcohol use; (b) the unprotected intercourse latent construct; and (c) total alcohol-sexual outcome expectancies scores were statistically significant. These significant path coefficients indicated significant age differences in the frequency of adolescents' self-rated co-occurring sex and alcohol use, in unprotected intercourse episodes, and alcohol-sexual expectancies. On average, older youth reported higher scores for co-occurring sex, alcohol use and for total unprotected intercourse episodes, and showed more positive (riskier) expectancies, compared to their younger peers. No significant ethnic (Hispanic versus not Hispanic) differences were found in any of the outcomes modeled in the two mediation models. In addition, the path between total alcohol-sexual outcome expectancies and the unprotected intercourse latent construct was also significant ($\beta = .30$, $p < .01$), documenting that youth with more positive alcohol-sexual outcome expectancies were significantly more likely to report unprotected intercourse than youth with less positive expectancies.

Mediators—Two path analytic models evaluated co-occurring sex and alcohol use as a mediator of relations between sexual sensation seeking and: (a) unprotected intercourse and (b) total number of past year sexual partners. Findings revealed a significant indirect path ($a*b = 0.071$; $p = 0.028$) between sexual sensation seeking and unprotected intercourse via co-occurring sex and alcohol use. Similarly, a significant indirect effect was revealed for the relation between sexual sensation seeking and the total number of past year sexual partners via co-occurring sex and alcohol use ($a*b = 0.394$; $p = 0.021$). These results underscore the effect of sexual sensation seeking tendencies on specific sexual risk behaviors, as mediated by co-occurring sex and alcohol use, among adolescents receiving substance use treatment services.

Moderated Mediation by Gender—Following “Model 3” described in Preacher et al.³² for assessing moderated mediation, we tested for a significant moderation effect of gender in the b path of the mediation models (see Figs. 1, 2 & Table 3). In the first model, gender significantly moderated the mediational path from sexual sensation seeking to unprotected intercourse via co-occurring sex and alcohol use. Specifically, the effect of co-occurring sex and alcohol use on unprotected intercourse was statistically significant for females only (path $b = .32$, $p < .05$). In model two, results revealed a significant indirect effect between sexual sensation seeking and number of past year partners via co-occurring sex and alcohol use among males only. However, this gender difference was not statistically significant. Thus, the mediational path from sexual sensation seeking to the total number of past year sexual partners via co-occurring sex and alcohol use was not significantly moderated by gender.

DISCUSSION

This study identified significant paths between sexual sensation seeking, co-occurring sex and alcohol use, and specific sexual risk behaviors among adolescents receiving substance use treatment. A moderated mediation analysis³³ revealed that the indirect path from sexual sensation seeking to unprotected intercourse through co-occurring sex and alcohol use, was significant for adolescent girls, but not for adolescent boys. In contrast, co-occurring sex and alcohol use significantly mediated the relation between sexual sensation seeking and total number of past year sexual partners³⁴ among boys and girls. After probing interaction by gender this path difference between boys and girls did not yield statistically significant difference. The present analyses partially replicated the findings of studies that examined adults at high behavioral risk for HIV exposure.^{11,35} Consistent with alcohol myopia theory, compromised information processing abilities among intoxicated youth may affect significantly relations between (a) co-occurring sex and alcohol use and (b) unprotected intercourse or processes of partner selection.^{18,19}

The current study builds upon existing research in several ways. The findings replicated similar research on young adults’ sexual sensation seeking and sexual risk behavior, and extended those findings to an ethnically diverse sample of adolescents in substance use treatment settings.¹¹ In addition, the current study’s inclusion of multiple indicators of sexual risk behavior (ie, global self-report ratings, TLFB-SRB calendar) provided a robust evaluation of behavioral risk for HIV/STI exposure. Finally, the initial support of Spitalnick

et al.¹² for relations between sexual sensation seeking and sexual risk behavior among female youth was extended by testing gender as a potential moderator of the mediating role of co-occurring sex and alcohol use in relations between sexual sensation seeking and specific sexual risk behaviors.

Many adolescents in substance abuse treatment also manifest significant psychiatric symptoms that influence specific socio-emotional competencies salient to sexual behavior.^{1,36} Previous pattern-based analyses of this study's data identified small homogenous subgroups of adolescent girls who, compared to boys, reported significantly higher scores for alcohol use, internalizing problems,¹⁸ experiences of childhood sexual abuse, and neglectful home environments. These gendered experiences reflected the patterns of internalizing problems and maltreatment experiences reported in national samples of women receiving substance abuse treatment services.³⁷ Our findings of moderated mediation by gender using a treatment sample of adolescents is supported by previous findings in samples of university students which documented similar gender differences.¹⁷ These findings potentially underscore unique risks posed by maladaptive alcohol use in sexual contexts by female adolescents reporting clinically significant substance use problems.³⁷ The present findings elucidate a unique interaction between personality factors and alcohol use among females, and thus, further enhance current understanding of underlying processes linking sexual sensation seeking and sexual risk behaviors among adolescent girls. Thus, this investigation extends existing literature on complex, stage-like processes linking aspects of women's alcohol use and sexual risk behavior.^{35,36}

The specificity to females of the mediated relation between sexual sensation seeking and unprotected intercourse by co-occurring sex and alcohol use may be influenced by women's different motives for alcohol use close to sexual activity, or other gender-linked factors that influence alcohol use and women's, but not men's, sexual behavior.³⁸ For example, females presenting to substance use treatment may be more likely than men to endorse coping-depression motives or avoidance motives due to anxieties related to sexual encounters.³⁹ A history of childhood maltreatment, including sexual abuse, is more common among females than males receiving substance abuse treatment and is associated with a wide range of maladaptive outcomes, including alcohol use disorders, the functional significance of alcohol use, and intentions to engage in sexual risk behavior.⁴⁰ In addition, significant relations may be due to the fact that females are more likely to report this information, compared to males.

Although the mediation path from sexual sensation seeking to multiple partners via sex and alcohol use was significant among males but not females, this difference was not statistically significant. The lack of a gender moderation in the mediating effect of co-occurring sex and alcohol use in the relation between sexual sensation seeking and past year sex partners is supported in part by previous research on individuals attending STI clinics in South Africa.⁴¹ This study found that the relation between sensation seeking and HIV risk behavior (ie, a composite of HIV risk behaviors that included number of sex partners and unprotected sex episodes) was partially mediated by alcohol use in proximity to sex, controlling for gender and marital status. The findings of the present study are also supported by a study of young adults in the United States that found a significant direct relation between sexual sensation

seeking and the number of sexual partners, as well as significant mediation of the relation through the frequency of drinking before sex.¹¹ In addition, these associations did not differ significantly by gender, which is congruent with the findings in the present study related to past year sexual partners.

Our findings have significant implications for HIV risk reduction program development for adolescents with substance use problems. HIV prevention specialists working with these youth may target factors such as patterns of heavy episodic substance use or co-occurring sex and alcohol use and associated deficits in socio-emotional or cognitive competencies³⁵ to mitigate risk mechanisms through which sexual sensation seeking promotes sexual risk behavior. Alternatively, prevention materials may be modified so as to maximize their acceptance by program participants, or to alter behavior change messages that target males and females differently. Modification of the surface or deep structures of HIV risk reduction interventions to address salient individual-level variables such as sexual sensation seeking or maladaptive patterns of substance use may improve client engagement in interventions, program completion rates, and maintenance of behavior change.⁵ These findings also highlight the importance of integrating risk reduction programming at specific points where youth reporting substance use problems may be accessed including: (a) drug treatment in juvenile justice settings; or (b) HIV prevention in substance use treatment settings.⁴

This study has limitations in that it utilized single-source, self-report data with all related problems (eg, inaccuracies in recall, social desirability bias, common method bias). However, self-report data are routinely used in studies of sexual or other risk behaviors, in which alternative assessment strategies may be impractical. Moreover, the cross-sectional study design precludes explicit causal conclusions regarding relations among sexual sensation seeking, co-occurring sex and alcohol use, and sexual risk behaviors in the current sample. Finally, the sample for this study is comprised of adolescents receiving outpatient treatment for substance abuse problems, so the findings may not generalize to general population samples of adolescents or to youth undergoing more intensive forms of treatment. Nonetheless, this study represents a significant contribution to current knowledge on multivariate relations between sexual sensation seeking, co-occurring sex and alcohol use, and behavioral risk factors for HIV/STI exposure among adolescents receiving treatment services for substance use problems.

References

1. Oshri A, Tubman JG, Burnette ML. Childhood maltreatment histories, alcohol and other drug use symptoms, and sexual risk behavior in a treatment sample of adolescents. *Am J Public Health.* 2012; 102:S250–S257. [PubMed: 22401530]
2. Connell CM, Gilreath TD, Hansen NB. A multiprocess latent class analysis of the co-occurrence of substance use and sexual risk behavior among adolescents. *J Stud Alcohol Drugs.* 2009; 70:943–951. [PubMed: 19895772]
3. Guo J, Chung I-J, Hill KG, et al. Developmental relationships between adolescent substance use and risky sexual behavior in young adulthood. *J Adolesc Health.* 2002; 31:354–362. [PubMed: 12359381]
4. Tapert SF, Arons GA, Sedlar GR, et al. Adolescent substance use and sexual risk-taking behavior. *J Adolesc Health.* 2001; 28:181–189. [PubMed: 11226840]

5. Sargent JD, Tanski S, Stoolmiller M, et al. Using sensation seeking to target adolescents for substance use interventions. *Addiction*. 2010; 105:506–514. [PubMed: 20402995]
6. Dunlop S, Romer D. Adolescent and young adult crash risk: Sensation seeking, substance use propensity and substance use behaviors. *J Adolesc Health*. 2010; 46:90–92. [PubMed: 20123263]
7. Kalichman SC, Johnson JR, Adair V, et al. Sexual sensation seeking: Scale development and predicting AIDS-risk behavior among homosexually active men. *J Pers Assess*. 1994; 62:385. [PubMed: 8027907]
8. Carlson SR, Johnson SC, Jacobs PC. Disinhibited characteristics and binge drinking among university student drinkers. *Addict Behav*. 2010; 35:242–251. [PubMed: 19926401]
9. Lindgren KP, Mullins PM, Neighbors C, et al. Curiosity killed the cocktail? Curiosity, sensation seeking, and alcohol-related problems in college women. *Addict Behav*. 2010; 35:513–516. [PubMed: 20080358]
10. Donohew L, Zimmerman R, Cupp PS, et al. Sensation seeking, impulsive decision-making, and risky sex: Implications for risk-taking and design of interventions. *Pers Individ Differ*. 2000; 28:1079–1091.
11. Hendershot CS, Stoner SA, George WH, et al. Alcohol use, expectancies, and sexual sensation seeking as correlates of HIV risk behavior in heterosexual young adults. *Psychol Addict Behav*. 2007; 21:365–372. [PubMed: 17874887]
12. Spitalnick JS, DiClemente RJ, Wingood GM, et al. Brief report: Sexual sensation seeking and its relationship to risky sexual behaviour among African-American adolescent females. *J Adolesc*. 2007; 30:165–173. [PubMed: 17140653]
13. Steele CM, Josephs RA. Alcohol myopia: Its prized and dangerous effects. *Am Psychol*. 1990; 45:921–933. [PubMed: 2221564]
14. George WH, Davis KC, Norris J, et al. Indirect effects of acute alcohol intoxication on sexual risk-taking: The roles of subjective and physiological sexual arousal. *Arch Sex Behav*. 2009; 38:498–513. [PubMed: 18431618]
15. Gaither GA, Sellbom M. The sexual sensation seeking scale: Reliability and validity within a heterosexual college student sample. *J Pers Assess*. 2003; 81:157. [PubMed: 12946922]
16. Gaither GA, Sellbom M, Meier BP. The effect of stimulus content on volunteering for sexual interest research among college students. *J Sex Res*. 2003; 40:240–248. [PubMed: 14533018]
17. Turchik JA, Garske JP, Probst DR, et al. Personality, sexuality, and substance use as predictors of sexual risk taking in college students. *J Sex Res*. 2010; 47:411–419. [PubMed: 19711220]
18. Oshri A, Tubman JG, Jaccard J. Psychiatric symptom typology in a sample of youth receiving substance abuse treatment services: Associations with self-reported child maltreatment and sexual risk behaviors. *AIDS Behav*. 2011; 15:1844–1856. DOI: 10.1007/s10461-011-9890-5. [PubMed: 21301951]
19. Oshri A, Tubman JG, Wagner EF, et al. Psychiatric symptom patterns, proximal risk factors and sexual risk behaviors among youth in outpatient substance abuse treatment. *Am J Orthopsychiatry*. 2008; 7:430–441.
20. Kessler RC, McGonagle KA, Zhao S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the National Comorbidity Survey. *Arch Gen Psychiatry*. 1994; 51:8–19. [PubMed: 8279933]
21. Wittchen HU. Reliability and validity studies of the WHO-Composite International Diagnostic Interview (CIDI): A critical review. *J Psych Res*. 1994; 28:57–84.
22. Spitzer, RL, Williams, JB, Gibbon, M. , et al. User's guide for the Structured Clinical Interview for DSM-III-R: SCID 1990. Washington, DC:
23. Sobell, LC, Sobell, MB. Alcohol Timeline Follow-back (TLFB) Users' Manual. Toronto, Canada: Addiction Research Foundation; 1996.
24. Midanik LT, Hines AM, Barrett DC, et al. Self-reports of alcohol use, drug use, and sexual behavior: Expanding the timeline follow-back technique. *J Stud Alcohol Drugs*. 1998; 59:681–689.
25. Kalichman SC, Rompa D. Sexual sensation seeking and sexual compulsivity scales: Validity, and predicting HIV risk behavior. *J Pers Assess*. 1995; 65:586. [PubMed: 8609589]

26. Dermen KH, Cooper ML. Sex-related alcohol expectancies among adolescents: I. Scale development. *Psychol Addict Behav.* 1994; 8:152–160.
27. Muthén, LK, Muthén, B. *Mplus: Statistical Analysis with Latent Variables: User's Guide.* Los Angeles, CA: Muthen & Muthen; 2008.
28. Schafer JL, Graham JW. Missing data: Our view of the state of the art. *Psychol Methods.* 2002; 7:147–177. [PubMed: 12090408]
29. Yuan H, Bentler PM. Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. *Soc Methodol.* 2000; 30:165–200.
30. MacKinnon DP, Lockwood CM, Hoffman JM, et al. A comparison of methods to test mediation and other intervening variable effects. *Psychol Methods.* 2002; 7:83–104. [PubMed: 11928892]
31. MacKinnon DP, Lockwood CM, Williams J. Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behav Res.* 2004; 39:99–128. [PubMed: 20157642]
32. Preacher KJ, Rucker DD, Hayes AF. Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behav Res.* 2007; 42:185–227. [PubMed: 26821081]
33. Edwards JR, Lambert LS. Methods for integrating moderation and mediation: A general analytic framework using moderated path analysis. *Psychol Methods.* 2007; 12:1–22. [PubMed: 17402809]
34. Kalichman SC, Simbayi LC. Multiple-recent sexual partnerships and alcohol use among sexually transmitted infection clinic patients. *Cape Town South Africa Sex Transm Dis.* 2011; 38:18–23. [PubMed: 20625349]
35. Norris J, Stoner SA, Hessler DM, et al. Cognitive mediation of alcohol's effects on women's in-the-moment sexual decision making. *Health Psychol.* 2009; 28:20–28. [PubMed: 19210014]
36. Norris J, Stoner SA, Hessler DM, et al. Influences of sexual sensation seeking, alcohol consumption, and sexual arousal on women's behavioral intentions related to having unprotected sex. *Psychol Addict Behav.* 2009; 23:14–22. [PubMed: 19290686]
37. Brady, TM, Ashley, OS. *Women in Substance Abuse Treatment: Results from the Alcohol and Drug Services Study.* Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies; 2005.
38. Hutton HE, McCaul ME, Santora PB, et al. The relationship between recent alcohol use and sexual behaviors: Gender differences among sexually transmitted disease clinic patients. *Alcohol Clin Exp Res.* 2008; 32:2008–2015. [PubMed: 18782336]
39. Goldstein AL, Flett GL, Wekerle C. Child maltreatment, alcohol use and drinking consequences among male and female college students: An examination of drinking motives as mediators. *Addict Behav.* 2010; 35:636–639. [PubMed: 20199849]
40. Schacht RL, George WH, Davis KC, et al. Sexual abuse history, alcohol intoxication, and women's sexual risk behavior. *Arch Sex Behav.* 2009; 39:898–906. [PubMed: 19728070]
41. Kalichman SC, Simbayi LC, Jooste S, et al. Sensation seeking, alcohol use, and sexual behaviors among sexually transmitted infection clinic patients in Cape Town, South Africa. *Psychol Addict Behav.* 2006; 20:298–304. [PubMed: 16938067]

FIGURE 1.

Structural model of relations among sexual sensation seeking, co-occurring sex and alcohol use, and unprotected intercourse moderated by gender. Standardized and unstandardized path coefficients (in parentheses); d = residual variance; $p < .05$; { * $p < .01$; C = direct total path; C' = direct path controlling for sex and alcohol use. Items 1–4 on the sexual sensation seeking latent variable are listed in Table 2.

FIGURE 2.

Structural Model of Relations among Sexual Sensation Seeking, Co-occurring Sex and Alcohol Use, and Number of Past Year Sex Partners. Standardized and unstandardized path coefficients (in parentheses); d = residual variance; $**p < .01$. Items 1–4 on the sexual sensation seeking latent variable are listed in Table 2.

TABLE 1

Correlation coefficients, means, and standard deviations for the observed variables

	1	2	3	4	5	6	7	8	9
1. Gender	1.00								
2. S&A	-.05	1.00							
3. Partners	-.05	.16**	1.00						
4. TUI	.09	.17*	-.03	1.00					
5. CUF	.27**	.16**	-.05	.50**	1.00				
6. SSS	-.36**	.33**	.15**	.06	.01	1.00			
7. TEXP	-.01	.09	.06	.23**	.27**	.22**	1.00		
8. Age	-.17**	.13**	.11*	.19**	.19**	.14**	.13**	1.00	
9. Hispanic	-.025	.04	-.04	.01	.07	.09	.06	.04	1.00
Mean	n/a	2.08	4.97	12.50	2.24	18.50	10.84	16.33	n/a
SD	n/a	1.11	7.63	24.09	1.27	4.96	6.12	1.15	n/a

S&A = Co-occurring Sex and Alcohol Use; Partners = past year number of partners; TUI = Total Unprotected Intercourse Episodes; CUF = Lack of Condom Use Frequency (higher score reflects higher frequency of unprotected sex); SSS = Sexual Sensation Seeking Items; TEXP = Total AOD-Sexual Outcome Expectancy Items. Hispanic (Yes = 1, No = 0);

* $p < .05$,

** $p < .01$.

TABLE 2

Unstandardized and standardized path estimates for measurement model

	β	SE	CR
Measurement model			
Sensation seeking factor			
1. I like wild (freaky) sex	.552**	.056	9.88
2. I enjoy the company of sexual or sexually active people	.586**	.049	11.91
3. I'm interested in trying out new sexual experiences	.433**	.055	7.90
4. I like new and exciting sexual experiences and sensations	.370**	.047	7.85
Unprotected sex factor			
When you have sex how often do you use a condom	1.00	—	—
Total TLFB calendar count of unprotected sex	.444**	.046	9.69

CR, critical ratio > 1.96 =

*
 $p < .05$;**
 $p < .01$.

TABLE 3

Path estimates for the mediation models

	B (β)	SE (Std SE)	95% CI [Low, High]
Model I-Unprotected Intercourse Outcome			
SSS $\rightarrow$ Unprotected Sex [C]	0.027 (0.225) *	0.160 (0.057)	[0.038, 0.421]
SSS $\rightarrow$ Alcohol and Sex [a]	0.545 (0.290) **	0.130 (0.056)	[0.291, 0.800]
SSS $\rightarrow$ Unprotected Sex [C']	0.122 (0.060)	0.151 (0.073)	[-0.174, 0.418]
Alc & Sex $\rightarrow$ Unprotected Sex [b1; Females]	0.320 (0.296) **	0.109 (0.098)	[0.106, 0.533]
Alc & Sex $\rightarrow$ Unprotected Sex [b1; Males]	0.067 (0.062)	0.072 (0.067)	[-0.075, 0.208]
Alc & Sex X Gender $\rightarrow$ Unprotected Sex [b2]	-0.253 (0.283) *	0.125 (0.138)	[-0.498, -0.008]
Model II-Number of Partners Outcome			
SSS $\rightarrow$ Number of Partners [C]	1.376 (0.130) **	0.604 (0.055)	[0.191, 2.560]
SSS $\rightarrow$ Alcohol and Sex [a]	0.501 (0.283) **	0.116 (0.050)	[0.273, 0.729]
SSS $\rightarrow$ Number of Partners [C']	1.505 (0.123)	0.789 (0.063)	[-0.041, 3.051]
Alc & Sex $\rightarrow$ Number of Partners [b1; Females]	0.480 (0.070)	0.390 (0.062)	[-0.283, 1.244]
Alc & Sex $\rightarrow$ Number of Partners [b; Males]	0.905 (0.131) **	0.374 (0.048)	[0.171, 1.638]
Alc & Sex X Gender $\rightarrow$ Unprotected Sex [b2]	0.424 (0.074)	0.562 (0.093)	[-0.677, 1.525]
Females			
SSS to Unprotected Sex via Alc & Sex	0.145 **	0.063	[0.040, 0.787]
SSS to Number of Partners via Alc & Sex	0.241	0.207	[-0.165, 0.647]
Males			
SSS to Unprotected Sex via Alc & Sex	0.034	0.034	[-0.039, 0.868]
SSS to Number of Partners via Alc & Sex	0.453 **	0.211	[0.039, 0.868]
Indirect effect difference			
$\dagger$ Males vs. Females (Unprotected Sex)	-0.111 *	0.063	[-0.259, -0.006]
$\dagger$ Males vs. Females (Number of Partners)	-0.213	0.282	[-0.817, 0.392]

C = Total effect without covariance of the mediator; C.I. = Confidence Intervals at .05;

* $p < .05$;** $p < .01$.Fit indices for Model I: $\chi^2 = 51.150$ ($df=33$) $p < .022$; CFI = 0.980; TLI = 0.966; RMSEA = 0.037; S-RMR = 0.036; Model II: $\chi^2 = 40.595$ ($df=24$) $p < .024$; CFI = 0.964; TLI = 0.928; RMSEA = 0.040; S-RMR = 0.032; $\dagger$ 10,000 Bias Corrected Bootstrapping C.I.s.